UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Washington, D.C.

and

UNITED STATES DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service
Plant Materials Centers
at
Manhattan, Kansas
and
Knox City, Texas

NOTICE OF RELEASE OF 'CENTENNIAL' SAND BLUESTEM

The Agricultural Research Service (ARS), United States Department of Agriculture and the Natural Resources Conservation Service (NRCS), United States Department of Agriculture announce the naming and release of Centennial sand bluestem (Andropogon hallii Hack.). Centennial is recommended for pasture or hay, complementary rangeland-forage production systems, soil stabilization, or reclamation of marginal croplands in the central and southern Great Plains of the United States. The superior characteristics of Centennial sand bluestem are improved seed germination and seedling establishment under field conditions.

Breeding and Selection: Two cycles of recurrent selection were used to create Centennial. The plant materials and selection procedures are outlined below.

Seeds from sand bluestem population 'AB-medium Syn-0' were harvested and cleaned to produce a chaffy-seed product of 98 percent pure seed. AB-medium Syn-0 was originally selected for growth and regrowth, disease incidence, leafiness, seedling vigor, and plant height at the USDA-ARS, Southern Plains Range Research Station at Woodward, OK. AB-medium Syn-0 was released as 'Chet' sand bluestem in 2004, and a detailed description of the selection of Chet was outlined by Springer et al. (2005).

Selection Cycle 1: Selection pressure consisted of germinating 3,500 pure-seeds of AB-medium Syn-0 in deionized water having a water potential of –0.8 MPa (-8 bars) for seven days. At the end of seven days, all germinated seed (approximately 250 seeds) were removed, washed with deionized water, planted into cavity trays containing a greenhouse soil mix, and maintained in the greenhouse until field planting. Seeds were considered germinated if the seedling root and shoot were at least 1 mm long. The selected population was transplanted to the field into a polycross isolation plot where plants were allowed to grow and produce the next generation seeds designated as AB-medium Syn-1.

Selection Cycle 2: Approximately 3,500 pure-seed of population AB-medium Syn-1were germinated in deionized water having a water potential of –0.8 MPa for seven days. At the end

of seven days, all germinated seed (approximately 250 seeds) were removed, washed with deionized water, planted into cavity trays containing a greenhouse soil mix, and maintained in the greenhouse until field planting. Seeds were considered germinated if the seedling root and shoot were at least 1 mm long. The selected populations were transplanted to the field into a polycross isolation plot where plants were allowed to grow and produce the next generation seeds designated as AB-medium Syn-2.

Seed Germination: Germination of seeds from AB-medium Syn-1 was 7.4 percent greater than that of AB-medium Syn-0, and AB-medium Syn-2 was 9.0 percent higher than that of AB-medium Syn-1 in a water potential of –0.8 MPa. Germination of seeds in deionized water or a water potential of 0 MPa showed that there were no differences between populations AB-medium Syn-0 and AB-medium Syn-1 for 7-d seed germination. Germination of seed from the AB-medium Syn-2 was 12.8 percent higher than that of AB-medium Syn-0 in deionized water.

Field Establishment: Small plot trials for field establishment were conducted at the USDA-ARS, Southern Plains Range Research Station at Woodward, OK, and the USDA-NRCS, Plant Material Centers at Knox City, TX, and Manhattan, KS. Field plots were seeded to a plant population equivalent to 108 pure live seed per square meter. Plantings were made on or near 1 May in 2008-2010. Seeds from population AB-medium Syn-2 had significantly greater field emergence (62.7 percent emergence) than either the AB-medium Syn-1 (59.6 percent emergence) or AB-medium Syn-0 (54.6 percent emergence) generations, and the AB-medium Syn-1 generation had significantly greater emergence compared with generation AB-medium Syn-0.

Forage Yield and Quality: At all locations listed above, generation of selection (AB-medium Syn-0, Syn-1, or Syn-2) had no affect on forage dry-matter yield, forage crude protein, or forage dry matter digestibility. Average forage yields were greatest at Woodward, OK (10.7 Mg/ha = 4.8 tons/acre) followed by Manhattan, KS (8.6 Mg/ha = 3.8 tons/acre) and Knox City, TX (3.0 Mg/ha = 1.3 ton/acre).

Seed Production: The average annual seed production from non-replicated field plots of AB-Medium Syn-2 over 5-years was 47 kg/ha (42 pounds/acre).

Conclusions: The germination and seedling emergence of AB-medium Syn-2 were consistently superior to that of AB-medium Syn-0, and forage dry-matter yield, forage crude protein, and forage digestibility did not differ among bluestem populations (Syn-0, Syn-1, or Syn-2). On the basis of superior germination and seedling emergence, AB-medium Syn-2 warrants release as a new cultivar to be named 'Centennial'.

Availability: Centennial is a stable, random mating population improved for increased seed germination and seedling emergence. Centennial was tested under the experimental designation AB-medium Syn-2. It is adapted to USDA Plant Hardiness Zones 5b, 6, and 7a of the Central and Southern Great Plains of the USA where it was tested. Upon additional testing, it may be adapted to other regions as well. Four classes of seed (Breeder, Foundation, Registered, and Certified) are recognized for Centennial sand bluestem. Breeder seed will be produced and maintained by USDA-ARS, Southern Plains Range Research Station at Woodward, OK, for a

period of 10 years. Foundation seed will be produced and maintained by the USDA-ARS, Southern Plains Range Research Station at Woodward, OK, the USDA-NRCS, Manhattan Plant Material Center at Manhattan, KS, and the USDA-NRCS James E. "Bud" Smith Plant Materials Center at Knox City, TX, for a period of 10 years. Certified seed production of Centennial will be limited to a single generation and can only be marketed as Centennial. Certified seed production will also be limited to USDA Hardiness Zones 5b, 6, or 7a in its known adaptation range in the Central and Southern Great Plains region. Seed of Centennial will be deposited in the USDA-ARS National Plant Germplasm System (NPGS). Appropriate recognition is requested if this release contributes to the development of new breeding lines or cultivars.

Centennial was named to signify the first 100 years (1913-2013) of USDA agricultural research at Woodward, OK. Selection and testing of Centennial was accomplished through a cooperative effort of USDA-ARS and USDA-NRCS and included the following individuals: Tim Springer (lead scientist), Richard Wynia, Gary Rea, William Cooper, Emalee Friend, and Rudy Esquivel.

More information can be found in these publications:

Springer, T.L., C.L. Dewald, P.L. Sims, R.L. Gillen, V.H. Louthan, W.J. Cooper, C.M. Taliaferro, R.L. Wynia, M.J. Houck Jr., R.G. Esquivel, J.A. Stevens, and M.R. Brakie. 2005. Registration of 'Chet' sand bluestem. Crop Sci. 45:2125-2126.

Springer, T.L. 2011. Recurrent selection for increased seed germination in sand bluestem (Andropogon hallii). Plant Breeding 131:198-202.

Springer, T.L., R.L Wynia, and G.L. Rea. 2012. Field emergence and plant density of sand bluestem lines selected for increased seed germination. Crop Sci. 52:2826-2829.

Signatures:

State Conservationist – Oklahoma
USDA, NRCS

7/9/13
Date

for Director of Ecological Science Division
USDA, NRCS, Ecological Sciences Division

9/19/2013
Date

K Simmons
Deputy Administrator, Crop Production and Protection
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10/21/13
Date