UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
BISMARCK, NORTH DAKOTA

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NOTICE OF RELEASE OF BOUNTY GERMPLASM BIG BLUESTEM

The US Department of Agriculture; Natural Resources Conservation Service; Minnesota Agricultural Experiment Station; North Dakota Agricultural Experiment Station; and the South Dakota Agricultural Experiment Station announce the naming and release of a seed propagated selected class germplasm of big bluestem, *Andropogon gerardii* (Vitman). This selected class pre-varietal release will be known as Bounty Germplasm big bluestem.

Bounty Germplasm big bluestem has been developed from an original composite of 82 vegetatively selected plants from 40 different counties in Minnesota, and 9 counties in eastern South Dakota (Figure 1, Table 1). NRCS accession number 9063122 was assigned to this selection. Bounty Germplasm big bluestem will fill the need for a more genetically diverse improved release that is broadly adapted to Minnesota and the surrounding region. This release is expected to perform well wherever big bluestem is recommended in Minnesota, North Dakota, South Dakota, and surrounding regions in the Northern Great Plains and Upper Midwest.

Bounty Germplasm big bluestem is released for conservation use in native plantings with the primary objective of ecological revegetation, wildlife habitat, and forage production. Variation in maturity, plant size, leafiness, color, and potential seed production were documented in the breeder seed field. Bounty Germplasm has a high level of species diversity and forage quality, and is expected to perform well over a broad area throughout Minnesota, the eastern Dakotas, and bordering states. Seed sources within the composite are local to specific planting sites. Plants originating greater distances from the planting site add genetic diversity within the species, for improved long-term stability and broader area of adaptation (Harris et al 2006). Generation 0 (breeder) seed was harvested from the clonally propagated progeny of selected plants that had promise of genetic superiority. Individual seed maturity differences may range two to three weeks.

Collection Site Information: Vegetative collections of 326 accessions of naturally occurring big bluestem were made by NRCS field personnel in Minnesota, and in eastern South Dakota in the fall of 1985. This area covers parts of three land resource regions including (F) Northern Plains Spring Wheat Region, (K) Northern Lake States Forest and Forage Region, and the (M) Central Feed Grains and Livestock Region. Average annual rainfall ranges from approximately 20-34 inches with a freeze-free period ranging from 95 days in northern Minnesota to150 days near the Iowa border (USDA 2006).

Accession numbers were assigned to each collection and the vegetative crown pieces were divided and potted into small containers in the spring of 1986.

Description: Big bluestem is a tall, stout, perennial, warm-season, native grass with stiff, erect culms. Leaf blades have prominent midribs, flattened and keeled sheaths, and fringed membranous ligules below the collar. Rachis internodes are thinly to rather densely hairy (Sedivec and Barker, no date). It is often called "turkeyfoot" because the seed heads usually have 3 spikelets. Big bluestem varies in height from 4 to 8 feet tall. It is shorter in more northern climates. The forage is one of the most palatable grasses. Its deep, spreading root system makes it an excellent erosion control plant. It can form a sod, and has short, scaly rhizomes. It performs best on fertile, well drained soils, but is also adapted to sites with shallow depth, low pH, and low fertility. Big bluestem is the dominant grass species of the Midwestern tall grass prairie. It provides excellent wildlife habitat and food sources. It is native to most of the United States and Canada except for the far western areas (USDA 2011). Big bluestem is a host plant to many butterflies and other pollinator species (Tallamy 2009). It is becoming more popular as a landscaping plant.

Method of Selection: The evaluation nursery was located at the USDA-Agricultural Research Service, Northern Great Plains Research Laboratory at Mandan, North Dakota. More than 4,000 plants were established in the nursery from May 27 to June 13, 1986 (USDA 1990-1991). The experimental design was a randomized complete block with four replications. Individual subplots of three cloned big bluestem plants were randomly planted within each block. Individual blocks contained 1,071 plants or 357 three-plant subplots. Six different varieties of big bluestem were included in the nursery as standards of comparison, including Champ, Pawnee, Rountree, Bonilla, Bison, and Sunnyview.

Data collected from 1987-1990 included survival, vigor, disease, size, leafiness, and forage quality. These plants displayed 97 percent survival the first year. Approximately 41 percent of those surviving plants were rated as having low vigor, and 2 percent as very high vigor. A majority of the plants were rated as having good vigor. The most vigorous plants had a broader crown and were larger than plants having low vigor. Disease problems consisted mostly of leaf and stem rust.

Evaluations in 1989 and 1990 included gridding the nursery into 4 x 6 plant plots. Two superior plants were selected in each 24 plant grid. Each was representative of an early and a late-maturing population. Selection factors included leafiness, disease resistance, seed production potential, and vigor. In 1990, selected plants were rated for phenology and separated into early and late-maturing populations. Based primarily on forage quality parameters, 94 out of 177 (53%) of the early-maturing accessions were selected for further study. Generally, these plants had finer leaf and stem material, and were smaller and less robust than the later-maturing population. The selected plants were vegetatively established into a polycross block in 1991. Additional evaluation and some roguing were completed prior to seed harvest. Leaf, stem, and culm samples were collected from the remaining 82 plants at first flowering. These samples were analyzed for crude protein, acid detergent fiber, neutral detergent fiber, and relative feed value by the Northern Great Plains Research Laboratory at Mandan, North Dakota. Crude protein ranged from 6 to 10 percent and Relative Feed Values varied from 62 to 77 percent (Table 2). The standards of comparison were also sampled for forage quality. The most northern origin big bluestem, Bison averaged 7% crude protein compared to Rountree (IA) which averaged 4% (Figure 2).

The selected big bluestem plants comprising Bounty Germplasm averaged slightly more than 7% crude protein, higher than the population average of 6%. The average relative feed value increased from 67% for the base population to 9% for the selected plants (Figure 4). Seed harvested from the selected early-maturing population was seeded in the increase field at the Bismarck Plant Materials Center in June 2010. This seed (Bounty Germplasm) from 82 superior plants contains a broad representation originating from 40 Minnesota and 9 South Dakota counties (Figure 1).

Field Measurements: On July 26, 2011, data was collected from the foundation field that was planted in 2010. To document the diversity within the population, the field was divided into 5 representative sample areas. Ten plants were systematically flagged for sampling in each of the 5 sample areas. Data from those samples indicated that individual plant height varied from 3.75 to 6 feet. Sample means were more uniform from 4.9 to 5.45 feet. Width was less variable and most of the two-year-old plants were nearly a half foot wide. Most plants rated best for leafiness, and none of the sample means rated more than 1.4 (1=best; 3=poor). Phenology varied up to three weeks from medium boot (12%) to medium flower (2%). Most of the plants were late boot (44%) to early flower (42%), (Table 3).

Ecological Considerations: Big bluestem is relatively easy to establish and competes well with other species. It has been known to establish from seed in smooth bromegrass stands over time, especially if the bromegrass is mowed or grazed during critical periods, allowing the big bluestem to gain a foothold. Big bluestem is a native species with many desirable traits. Encroachment off site would not generally be considered negative. Seed is spread by birds and other animals, as well as natural events such as flooding and wind storms. Vegetative spread is minimal. Big bluestem is considered non-invasive and is easy to control as a landscape plant.

Conservation Use: The conservation uses of Bounty Germplasm big bluestem are many, and include conservation cover, erosion control, pasture and hayland, wildlife habitat, prairie revegetation, rangeland seeding, and landscaping.

Potential Area of Adaptation: Bounty Germplasm big bluestem is expected to perform well throughout Minnesota, the eastern Dakotas, and surrounding regions in the Northern Great Plains and Upper Midwest.

Availability of Plant Materials: Breeder seed (Generation 0) will be maintained by the Bismarck Plant Materials Center. Foundation seed will be grown by the Bismarck PMC, and distributed through North Dakota State University Foundation Seed Stocks as a selected class (green tag) germplasm.

References:

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Approvals for the release of Bounty Germplasm big bluestem, *Andropogon gerardii* (Vitman):

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