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### Registration of 'Goldmine' Big Bluestem

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### Registration of 'Goldmine' Big Bluestem

'Goldmine' big bluestem [*Andropogon gerardii* Vitman.] (Reg. no. CV-14, PI 641702) was released in May 2004 by the USDA, Agricultural Research Service and the Agricultural Research Division, Institute of Agriculture and Natural Resources, University of Nebraska. Goldmine is a perennial warm-season grass cultivar that produces forage with moderately improved in vitro dry matter digestibility (IVDMD), protein concentration, and improved forage yields in some hay management systems. Animal gains from Goldmine were greater than its parent cultivar when utilized by beef cattle in well-managed grazing systems. Goldmine was tested as Kaw C3.

Goldmine is an open-pollinated population that was developed by three generations of breeding for improved forage yield and forage digestibility as measured by IVDMD. The base population was the cultivar Kaw which was released in 1950 (Alderson and Sharp, 1994). Kaw, which has a broad genetic base, has proven to be well adapted over a broad geographic area in the Central and Southern Plains and adjacent regions of the Midwest. Kaw was not selected or evaluated for forage quality; hence, a need existed to improve its forage quality for use in livestock production systems. The breeding phase of the research was initiated in 1977. A modified restricted, recurrent selection breeding system (Vogel and Pedersen, 1993) was used in which forage yield and forage IVDMD were the main selection criteria. Approximately 55 to 60 selected plants were intermated in isolation in each selection cycle to produce seed to start the next generation of selection. Each selection cycle took approximately 5 yr. The breeding research was conducted at the University of Nebraska's Agricultural Research and Development Center near Mead, NE. After the third cycle of selection was completed, seed was increased for use in small plot evaluation trials and a replicated grazing trial.

Two sets of multi-year forage evaluation trials were conducted at Mead, Clay Center, and Concord, NE during the period 1999 to 2002 to evaluate the hay production potential of the cultivar. Concord and Mead are in the tallgrass prairie ecosystem in Plant Hardiness Zones 4 and 5, respectively, while Clay Center is in the transition zone between the tallgrass and midgrass prairie ecoregions in Plant Hardiness Zone 5. One set of trials was managed for hay harvest at the mid- to late-boot stage of physiological development while the other set was managed for hay harvest after inflorescences emerged, which was about a month later. Forage of Goldmine had moderately greater IVDMD ( $P \leq 0.20$ ) than Kaw when harvested before heading or as regrowth ( $P \leq 0.10$ ), and its forage had greater crude protein concentration ( $P \leq 0.10$ ) when harvested before heading. Forage yields of Goldmine were significantly greater ( $P \leq 0.10$ ) than those of Kaw when hay was harvested after heading. Goldmine had greater forage yields and forage IVDMD ( $P \leq 0.10$ ) averaged over all trials and harvests than the cultivars Pawnee, Rountree, and Niagara. Goldmine was compared to Kaw in a replicated grazing trial located near Mead, NE using yearling steers during the period 2000 to 2002 (Mitchell et al., 2005a). Based on weekly samples during the grazing season, forage availability and IVDMD were similar for Goldmine and Kaw, but forage of Goldmine had greater crude protein concentration ( $P \leq 0.05$ ). Averaged over 3 yr at Mead, yearling steers grazing the Goldmine pastures had 7% greater average daily gain ( $P \leq 0.20$ ) than cattle grazing Kaw pastures. Based on an economic analysis, the increased gain by cattle grazing Goldmine pastures in comparison to Kaw pastures resulted in an increase of \$11 per ha net return (Mitchell et al., 2005a, 2005b).

Goldmine is botanically typical of big bluestems that are native to the tallgrass prairie ecoregion of North America.

In space-transplanted nurseries, plants of Goldmine are at the R2 stage of development (spikelets fully emerged/peduncle not emerged; Moore et al., 1991) an average of 1 d later than those of Kaw when evaluated at Mead, NE (41° N Lat.). In solid stands or sward trials, there were no differences in maturity between Goldmine and Kaw. Goldmine can be distinguished from Kaw by its wider (5.6 vs. 4.5 mm) and longer (14.9 vs. 11.1 mm) flag leaf and a greater percentage of plants with reddish-brown glumes (18 vs. 8%) and peduncles (23 vs. 16%), and by correspondingly fewer plants with brown or light brown glume and peduncle color. In spaced-plant nurseries at Mead, Goldmine is at the R2 stage of development 10 and 8 d later than 'Pawnee' and 'Bonanza', respectively, 12 d later than 'Rountree', and 18 day later than 'Champ' and 'Sunnyview'. In swards, Goldmine is later in maturity than other released cultivars except for Kaw and 'Earl'. It is a minimum of 4 d earlier in maturity than Earl. Goldmine can be differentiated from Kaw by the percentage of plants with light brown and reddish brown glume and peduncle color. At 41° N Lat., Goldmine is at the R2 stage of development about 10 August. It is a hexaploid cultivar.

Goldmine is a stable, improved, random mating population and will be maintained and increased accordingly. It is adapted to lower USDA Plant Hardiness Zone 5 and Plant Hardiness Zone 6 of the U.S. Central Plains and Midwest, and pending additional tests, it may be adapted to other regions. Breeder seed will be jointly maintained and produced by USDA-ARS and the University of Nebraska-Lincoln with random-mated, isolated increase fields originating from the Syn-2 breeder seed produced from the cycle-3 polycross nursery. Foundation seed production of Goldmine will be managed by the Nebraska Foundation Seed Division, University of Nebraska-Lincoln, Lincoln, NE 68583. Foundation seed will be made available for Certified seed production on a non-exclusive basis to seed producers who contractually agree to produce and market the seed only as Certified seed using the cultivar name Goldmine. Foundation and Certified seed fields will be limited to a single generation. Certified seed production will be restricted to the southern half of USDA Plant Hardiness Zone 5 and Plant Hardiness Zone 6 where the cultivar is adapted. A technology development and transfer fee will be assessed by the University of Nebraska. Application has been made for U.S. Plant Variety Protection. Contact the corresponding author for all seed requests. Recipients are asked to recognize the source if it contributes to the development of a cultivar or germplasm or is used for other research purposes. Seed of Goldmine will be deposited in the National Plant Germplasm System (NPGS) (USDA-ARS, 2006), but no seed will be distributed by the NPGS without written permission for 20 yr from the date of publication in Crop Science, at which time seed will also be available from NPGS.

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