

The
UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
and
NORTH DAKOTA
AGRICULTURAL EXPERIMENT STATION
and
SOUTH DAKOTA
AGRICULTURAL EXPERIMENT STATION
and
NORTH DAKOTA ASSOCIATION OF SOIL CONSERVATION DISTRICTS

ANNOUNCE THE RELEASE OF SELECTED "NATURAL" GERmplasm OF

BAD RIVER ECOTYPE BLUE GRAMA

The United States Department of Agriculture, Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service); the **North** Dakota Agricultural Experiment Station; the South Dakota Agricultural Experiment Station; and the North Dakota Association of Soil Conservation Districts (NDASCD) announce the naming and release of selected natural germplasm of Bad River ecotype blue grama, *Bouteloua gracilis* (H.B.K.)Lag. ex Steud.

Bad River ecotype blue grama has been assigned the NRCS accession number 9063064 and the Plant Introduction (PI) number 591814. It has been developed to provide an adapted source for use in the Northern Great Plains, primarily as a component in range seeding mixtures. Other uses include reduced maintenance plantings, prairie restoration, and xeric landscaping.

ORIGIN: Bad River ecotype blue grama originated from seed harvested in 1988 by Scott Kennedy and Cliff Ramsey on a floodplain of the South Fork of the Bad River in Haakon County, South Dakota. The collection site is located on the Cliff Ramsey Ranch, approximately 3 miles west on highway 14 and 1 mile south of Philip, South Dakota, on NE1/4NW1/4 sec. 28, T. 1 N, R. 20 E. Normal annual precipitation (30-year average at Philip weather station) at the site is approximately 16 inches and normal mean temperature is 47.8 degrees F. Elevation of the site area is approximately 2,200 feet. Seed was machine harvested from this native stand in 1988 and given a lot number (#8-19-RK), which stayed with the seed until it was cleaned by NDASCD Lincoln-Oakes Nurseries, Bismarck, North Dakota, later that year. In 1990, the Plant Materials Center at Bismarck obtained seed produced by Lincoln-Oakes Nurseries from a field planted with original seed harvested from the Haakon county site. This seed was used for initial plant evaluation. A seed increase field was also established from this seed in 1992 at the Bismarck Plant Materials Center.

ECOTYPE DESCRIPTION: Blue grama is a densely tufted, perennial, warm-season, native short grass distributed throughout the Great Plains and Southwest. It is found on open plains and rocky slopes. It is best adapted to medium and fine textured, relatively deep soils of rolling uplands. It may be confused with buffalograss, with which it grows, but blue grama lacks the creeping stolons of buffalograss. In short grass sod, it frequently is the primary dominant. Reproduction of blue grama is primarily by seed and short rhizomes. It spreads outward slowly from parent plants by tillering, frequently creating a sod appearance, especially when heavily grazed (Johnson and Nichols 1982).

Bad River ecotype does not differ significantly from the general taxonomic description of blue grama. Its leaf blades are 1 to 6 inches long, light to medium green, curled, with prominent veins (above and below) and rolled at emergence. Most of the curly leaves are at the base of the plant. The inflorescence is a panicle with 1 to 3 spicate primary branches. The curved shape of the inflorescence resembles a human eyebrow.

SITE DESCRIPTION: Slope at the collection site is 0 to 2 percent. Soils at the collection site are a Craft very fine sandy loam. The Craft series consists of deep, well-drained soils formed in calcareous alluvium on flood plains. Free carbonates at or near the surface make the pH reaction mildly alkaline or moderately alkaline throughout the profile.

The original collection site is in Major Land Resource Area (MLRA) 63A; Northern Rolling Pierre Shale Plains. This MLRA supports a transition between mixed and true prairie vegetation. The annual freeze-free period ranges from 130 to 160 days, and precipitation is not adequate for maximum plant growth in most years. Green needlegrass, western wheatgrass, needleandthread, porcupinegrass, little bluestem, and big bluestem are the major species found on native grasslands (USDA Soil Conservation Service 1981).

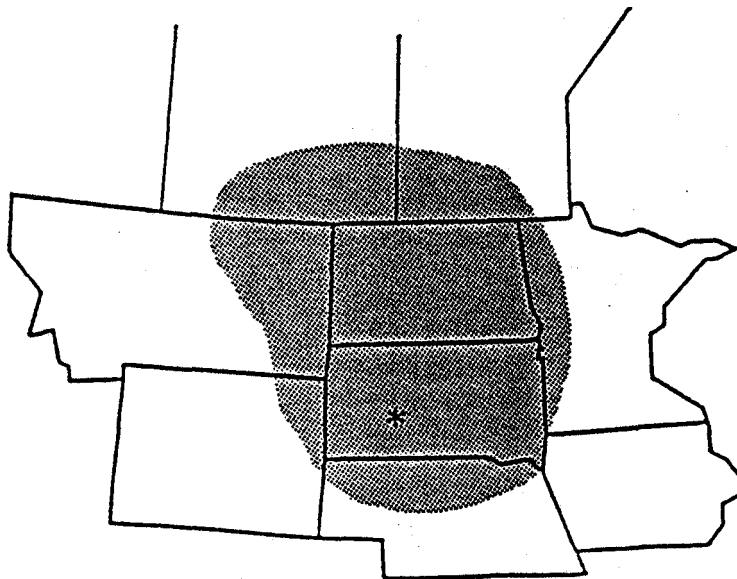
The range site at the original collection area is a loamy terrace. The potential native vegetation on this site is mixed prairie grasses. Western wheatgrass and green needlegrass, the major cool-season grasses, make up 70 percent of the vegetation on these range sites. Needleandthread constitutes approximately 10 percent. Warm-season grasses such as big bluestem, prairie sandreed, blue grama, and buffalograss, comprise about 25 percent. At the time of the original collection, blue grama and western wheatgrass were the primary species at the site.

PLANT PERFORMANCE: Height of Bad River ecotype was superior to South Dakota common (ND-3775) in side-by-side comparisons in cultivated, nonirrigated plots at the Plant Materials Center. At maturity in August 1993 and September 1995, height of plants, including the seed stalk, averaged 30 inches for Bad River ecotype and 23 inches for South Dakota common (ND-3775). Bad River ecotype was also superior in leafiness. Early maturity is a characteristic of Bad River ecotype blue grama. Average first anthesis at Bismarck, North Dakota, is early July, and the first seed is generally ripe in early to mid-August.

Bad River ecotype showed improvement over South Dakota common for emergence, vigor, and adventitious root development in preliminary greenhouse tests at the Plant Materials Center in 1995 (Table 1). These traits were found to be an indication of blue grama survival and establishment (Nason et al. 1987).

Blue grama is considered to be an excellent forage grass. It is highly palatable and retains its feeding value into the winter months. Forage samples were collected from Bad River ecotype and South Dakota common blue grama at early anthesis (7/14/94) for quality analysis. Samples consisted of whole above ground plant parts. Bad River ecotype blue grama exhibited higher mean crude protein and lower mean acid detergent fiber (ADF) and neutral detergent fiber (NDF) than South Dakota common (Table 2) in wet lab analysis comparisons completed by Olson Biochemistry Laboratory, South Dakota State University.

The predicted area of adaptation is shown on the following map with the symbol * indicating the source of original material.



MANAGEMENT CONSIDERATIONS: Probably the most important grazing grass species in North Dakota (NDSU 1979), blue grama provides nutritious forage on millions of acres of native rangeland. In areas of its adaptation, blue grama performs relatively better than most other grasses on drier sites. Management considerations for Bad River ecotype blue grama do not differ from that recommended for the species. Proper stocking rates are essential for continued productivity. Continued overgrazing will reduce the productivity of blue grama, as well as associated mid and tall grass species. Prescribed burning during plant dormancy will improve the herbage and seed production of blue grama.

Seed can be harvested by combining or stripping. Seed of blue grama is light; therefore, air should be reduced or closed off on most combines. Seed strippers should be used after a majority of the seed has matured and when the spikelets can be readily stripped by hand. Shattering is generally not a major problem, and harvesting seed with a stripper is usually done late in the growing season.

RELEASE JUSTIFICATION: There are no adapted northern origin varieties of blue grama currently available for range seeding in the Northern Great Plains (Tober and Chamrad **1992**). Common seed from native harvest is limited in quantity and is unpredictable in performance. Varieties of southern origin blue grama have not been winter hardy when planted at the Bismarck Plant Materials Center.

South Dakota common blue grama was used as the standard of comparison for evaluation of Bad River ecotype blue grama. Bad River ecotype blue grama has shown increased size, leafiness, and improved stand establishment. Initial forage quality comparisons have indicated higher average crude protein and relative feed values. Bad River ecotype blue grama will provide a northern source of seed of known origin for range seedings and other conservation uses in the Northern Great Plains.

AVAILABILITY OF PLANT MATERIALS: **Generation 2** seed, equivalent to Foundation Seed, of Bad River ecotype blue grama is available from the USDA-NRCS Plant Materials Center, **3308** University Drive, Bismarck, North Dakota **58504-7564**. Limited quantities of **Generation 3** seed, equivalent to Certified Seed, are currently available from commercial vendors.

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APPROVALS:



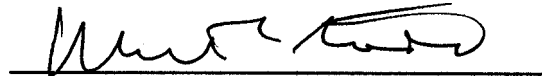
State Conservationist **ACTING**
United States Department of Agriculture
Natural Resources Conservation Service
Bismarck, North Dakota

3-5-96
Date



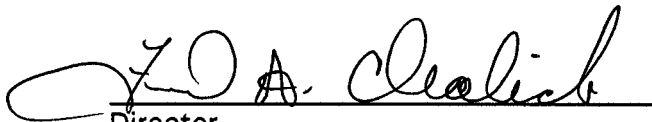
State Conservationist
United States Department of Agriculture
Natural Resources Conservation Service
Huron, South Dakota

3-18-96
Date



Director
North Dakota State University
Agricultural Experiment Station
Fargo, North Dakota

3-16-96
Date



Director
South Dakota State University
Agricultural Experiment Station
Brookings, South Dakota

3-22-96
Date



President
North Dakota Association of
Soil Conservation Districts

4-3-96
Date

Table 1. Greenhouse seedling vigor comparisons of South Dakota common and Bad River origin blue grama using plant height and leaf stage as indicators.

	South Dakota common				Bad River origin			
	rep 1	rep 2	rep 3	mean	rep 1	rep 2	rep 3	mean
2 weeks after seeding								
no. of plants	28	18	27		21	32	31	
mean leaf stage	1.0	1.3	1.2	1.2	1.2	1.3	1.5	1.3
height (inches)	2.8	3.2	2.5	2.8	3.2	3.7	3.8	3.6
3 weeks after seeding								
no. of plants	26	18	27		21	32	31	
mean leaf stage	2.7	2.8	2.6	2.7	2.8	2.9	2.9	2.9
height (inches)	6.7	7.0	5.7	6.5	6.4	7.4	7.5	7.1

Table 2. Blue grama forage quality, 1994 harvest.

<u>Sample</u>	<u>Crude Protein</u>	<u>ADE</u>	<u>NDF</u>	<u>% DDM</u>	<u>DMI</u>	<u>RFV</u>
SD Common	8.65	39.20	76.46	58	1.57	71
SD Common	8.92	40.87	75.28	57	1.59	71
SD Common	7.99	43.31	77.10	55	1.56	67
SD Common	9.43	38.60	75.82	59	1.58	72
SD Common	7.42	41.09	77.41	57	1.55	68
Mean	8.48	40.61	76.41	57	1.57	69.8
Bad River	11.43	39.30	75.52	58	1.59	72
Bad River	11.16	39.61	74.27	58	1.62	73
Bad River	12.31	39.94	73.79	58	1.63	73
Bad River	11.43	41.04	74.53	57	1.61	71
Bad River	11.40	38.71	72.73	59	1.65	75
Mean	11.55	39.72	74.17	58	1.62	72.8

All analysis is reported on a dry matter basis

Crude Protein
 ADF=Acid Detergent Fiber
 NDF=Neutral Detergent Fiber
 DDM=Digestible Dry Matter
 DMI=Dry Matter Intake
 RFV=Relative Feed Value

Analysis
 lab
 lab
 lab
 $88.9 - (.779 * ADF)$
 $120/NDF$
 $(DDM * DMI) / 1.29$