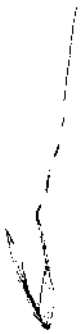
UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
TUCSON PLANT MATERIALS CENTER
TUCSON, ARIZONA



NOTICE OF RELEASE OF A SELECTION OF CANE BLUESTEM

Saltillo Origin Germplasm Cane Bluestem

[*Bothriochloa barbinodis* (Lag.) Herter] from Coahuila, Mexico

The U.S. Department of Agriculture, Natural Resources Conservation Service announces the release of a selected ecotype of CANE BLUESTEM [*Bothriochloa barbinodis* (Lag.) Herter].

As a "selected" release will be referred to as Saltillo Origin Germplasm cane bluestem to document its original collection location.

Species:	*Bothriochloa barbinodis*
Common Name:	cane bluestem
Plant Symbol:	BOBA3
Accession Numbers:	P.I. 216101, G-866, 18087-B

Origin: Collected in 1953 by staff members of the Agricultural Experiment Station, College Station, Texas between Saltillo and Torreon, Mexico (see Map 1).

Description: *Bothriochloa barbinodis* (Lag.) Herter is described by Gould (1975) as a cespitose perennial, the culms often in large clumps. *Culms* erect or geniculate at the base, tending to become decumbent and much-branched below in age, mostly 60-120 cm tall; *Culm Nodes* bearded with hairs mostly 1-3 mm long (occasionally longer), these typically erect and not widely spreading; *Leaves* essentially glabrous except for few to numerous long hairs on upper sheath margins and in vicinity of ligule; *Ligule* 1-2 mm long, becoming erose and lacerate; *Blades* firm, linear, 2-7 mm broad, often 25-30 cm or more long but the upper culm blades greatly reduced; *Panicles* mostly 7-13 cm long, often partially included in upper sheath, with a straight main axis and numerous primary branches mostly 4-9 cm long, these erect or loosely spreading at tips, the basal ones moderately rebranched; *Internodes of Panicle Branches and Pedicels* more or less densely villous on the thickened margins, with a broad, membranous central region; *Sessile Spikelet* 4.5-7.3 mm long excluding awn; *First Glume* usually sparsely hairy below the middle; *Lemma Awn* 20-30 mm or more long, geniculate and twisted. Chromosome number 2*n*=180.

Gould (1956) states that *Bothriochloa barbinodis*, with the high chromosome number of 2*n*=180, frequently has irregular meiosis but appears to produce sufficient good pollen for normal fertilization. This grass is highly cleistogamous, especially under conditions of aridity and heat when the inflorescence usually remains partially enclosed in the subtending sheath or "boot".

This species is important in the Southwest since it grows in relatively dry habitats. If supplemented by occasional flooding from heavy summer showers, this species can grow where annual precipitation ranges from 130-180 mm (Judd 1962). Although the role of *Bothriochloa barbinodis* in the original grassland associations of the Southwest may have been minor in the past, it has flourished on disturbed soils of road and railroad rights of way. From eastern Texas to southern Arizona and in northern Mexico it is consistently represented in roadside floras (Gould 1953).

Method of Development: Saltillo Origin Germplasm cane bluestem was included in two initial evaluation plantings at the Tucson PMC: (1) the 1973 Initial Evaluation Planting (IEP) of Warm Season Grasses for Cover (63 accessions) and (2) the 1976 Arid Land Grass IEP (65 accessions). Eight of the best performing accessions from both of the IEP trials were selected and used to establish the 1981 *Andropogon barbinodis* Strain Trial at the Tucson PMC. Saltillo Origin Germplasm cane bluestem (P.I. 216101) was selected as the top performer in this trial based on its superior vigor, forage production, and tolerance to drought and cold.

Area of Adaptation: This species is important in the Southwest since it grows in relatively dry habitats. If supplemented by occasional flooding from heavy summer showers, this species can grow where annual precipitation ranges from 5-7 inches (127 mm) (Judd 1962). Cane bluestem can be found growing on open, sandy or gravelly ground and rocky slopes. Potential adapted soil textural classes include: sandy loam, loam, fine sandy loam, loamy fine sand, and gravelly and rocky soils. Within Arizona this species is adapted to Major Land Resource Areas 30-2, 39-3, 38-1, 40-1, 40-3, 41-1, 41-2, and 41-3 at elevations ranging from 1,000 to 6,000 feet. This species produces best in areas receiving 12-16 inches of rainfall annually.

Arizona Ecological Sites[1]

MLRA/Annual Precipitation	Breaks	Shallow Loamy	Clay Upland	Clayloam Upland	Clayey Hills	Clay Bottom	Loamy Bottom	Loamy Upland	Volcanic Hills
30-2 / 9-12”	X								
39-3 / 16-20”		X							
38-1 / 12-16”		X	X	X				X	X
38-1 / 16-20”		X		X			X	X	X
40-1 / 10-13”					X		X		
40-3 / 8-10”									X
40-3 / 10-12”				X	X	X	X	X	X
41-1 / 16-20”					X			X	X
41-2 / 7-12”			X	X	X	X	X		
41-2 / 12-16”			X	X	X		X	X	X

MLRA/Annual Precipitation	Sandy Bottom	Sandyloam Upland	Limy Slopes	Basalt Hills	Granitic Hills	Deep Sandyloam	Limestone Hills	Shallow Upland
30-2 / 9-12”								
39-3 / 16-20”								
38-1 / 12-16”					X			
38-1 / 16-20”					X			
40-1 / 10-13”	X							
40-3 / 8-10”								
40-3 / 10-12”	X	X						
41-1 / 16-20”			X					
41-2 / 7-12”	X	X						
41-2 / 12-16”	X	X	X	X	X	X	X	X

Uses: The potential use for Saltillo Origin Germplasm cane bluestem is primarily as an erosion control plant on mismanaged rangelands and critical areas such as abandoned cropland and road cuts.

Establishment: Properly prepare the planting site and seedbed then drill, broadcast or hydroseed into firm soil at a depth of 0.25-0.75 inches. Heavier textured soils will require a more shallow planting depth. Dragging or other suitable method to obtain appropriate soil cover should cover broadcasted seed. Plant as a component 5-20% of a seed mix. Seed should be planted at the following rates:

[1] Ecological Sites in Arizona where the species minimally represents 10% of the plant community.

Purpose (Land Use)	Seeding Method and Row Spacing	lbs/acre (PLS)[2]
Soil Erosion Control (Disturbed Lands)	Drill, 6-12" row spacing	0.07-0.29 *
Soil Erosion Control (Disturbed Lands)	Broadcast	0.14-0.58**

*Based on 25 seeds/ft^2 and cane bluestem representing 5-20% of a mix.
**Based on 50 seeds/ft^2 and cane bluestem representing 5-20% of a mix.

For optimum stand establishment, seed should be planted during late July through early August following the onset of summer rains within Arizona . Mulching and/or supplemental irrigation may be required to assure establishment on disturbed sites. Seeding can be conducted earlier if irrigation can be supplied.

At the Tucson Plant Materials Center, Saltillo Origin Germplasm cane bluestem is most efficiently harvested using a Flail-Vac type harvester (200-250 rpm brush speed). Conditioning following harvest consists of using a Westrup Brush Machine with a #12 screen (mantle) at a brush speed of 10. The resulting material is then processed through an Office Clipper (Dual Air Screen Separator) using a #9 top screen and a 45x45-bottom screen. There are approximately 754,000 (estimated) seeds per pound.

Initial Evaluation Performance at the Tucson PMC: Saltillo Origin Germplasm cane bluestem was selected for advanced evaluation because of its superior vigor, herbage production, and tolerance to drought and cold. It was included in two initial evaluation plantings out of which the 1981 *Andropogon barbinodis* Strain Trial was established (Briggs 1981). Saltillo Origin Germplasm cane bluestem, maintained its superior performance throughout all three evaluation trials.

Saltillo Origin Germplasm cane bluestem was comparatively evaluated in 1974 with two other cane bluestem accessions by the USDA Agricultural Research Service and Texas A&M University under three water and three harvest regimes (Koshi, Stubbendieck, and McCully 1977). Saltillo Origin Germplasm cane bluestem ranked highest in terms of productivity under natural rainfall conditions.

Saltillo Origin Germplasm cane bluestem was also comparatively evaluated in1993 along with five other species for its ability to emerge from three different planting depths and become established on an abandoned cropland site in Avra Valley, Arizona.

Regardless of planting depth, Saltillo Origin Germplasm cane bluestem exhibited a significantly higher average number of seedlings per linear foot (26.45) than the other five species (see Fig.1). The average number of seedlings per foot for Saltillo Origin Germplasm cane bluestem did not differ significantly between the three different planting depths of 0.25, 0.5 and 1.0 inches (see Fig. 2).

Saltillo Origin Germplasm cane bluestem was also seeded in three watershed improvement plantings at: (1) the Cochise Stronghold Administrative Horse Pasture (USDA-USFS, Coronado NF, Douglas Ranger District) in June 1999; and (2) the MaGoffin and (3) Glenn Ranches (east of Douglas, AZ, Whitewater Draw Resource Conservation District) in June 2000. All three plantings were determined to be highly successful in terms of increased forage production and soil stabilization.

[2] Calculation Example: 5% of a mix based on 25 seeds/ft^2 = 1.25 seeds/ft^2; 1.25 seeds/ft^2 x 43,560 = 54,450 seeds/acre; 54,450 seeds/acre ÷ 754,000 estimated seeds per pound = 0.07 lbs/acre

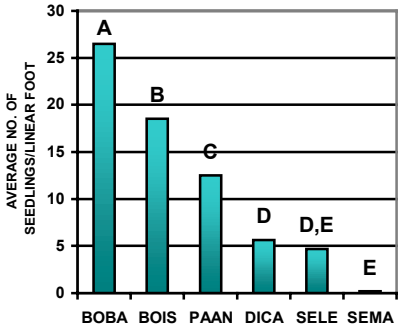
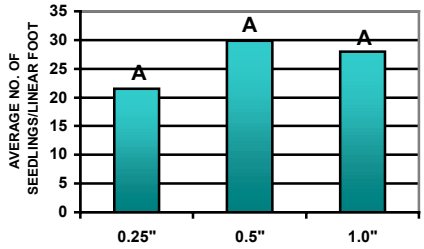


Fig. 1. Average number of seedlings per linear foot for all species regardless of planting depth. Boba: Saltillo Origin Germplasm cane bluestem, Bois: yellow bluestem, Paan: 'A-130' blue panic, Dica: Arizona cottontop, Sele: 9003939



plains bristlegrass, Sema: plains bristlegrass (common variety). Means with different letters are significantly different at the 0.05 level of significance.
Fig. 2. Average number of seedlings per linear foot for Saltillo Origin Germplasm cane bluestem at three planting depths. Means with the same letter are not significantly different at the 0.05 level of significance.

Wildlife Potential: Cane bluestem provides cover for Gambel's quail, dove, and rabbits as well as other small rodents.

Livestock: *Bothriochloa barbinodis* is considered fair to good forage while young (Judd 1962). Humphrey (1960) classified this species as fair forage because it is coarse and nutrients tend to leach from forage when plants are dry. Although Tucson PMC personnel consider this to be a poor forage species in MLRA 41, Gay and Dwyer (1965) considered it fair to good forage for cattle and sheep. Fudge and Fraps (1945) found that *Bothriochloa barbinodis* contained more crude protein and phosphoric acid than did silver bluestem. Judd (1962) states that usually it is found as scattered plants or in small groups; seldom in dense, pure stands. It is a good indicator of proper grazing, since it tends to disappear when a range is excessively utilized.

Reardon and Merrill (1974) evaluated nonstructural carbohydrates in grazed and ungrazed *Bothriochloa barbinodis*. The trend of carbohydrate reserves, major storage carbohydrates, and primary storage locations were determined in grazed and ungrazed cane bluestem plants. Sucrose was usually the major reserve carbohydrate, and the largest concentration of reserve carbohydrates was in the crown portion of the plant. The total nonstructural carbohydrate (TNC) levels were higher in grazed than in ungrazed plants. The ungrazed plants matured earlier, as indicated by an earlier TNC peak and had lower winter TNC levels. Their results indicate that maximum plant vigor can be maintained with a periodic June to November grazing deferment followed by moderate foliage removal. This deferment would allow the plant to synthesize and accumulate plant foods and go into dormancy with a relatively high reserve TNC level. Moderate grazing after the October peak should not be harmful.

Poisonous Properties: No poisonous properties have been noted in literature reviewed.

Weediness: Cane bluestem is not considered to be a weed.

Maintenance of Saltillo Origin Germplasm (P.I. 216101) cane bluestem: The Tucson Plant Materials Center will maintain seed production blocks. Limited amounts of seed will be available to seed producers interested in seed production block establishment and to researchers as requested and as available.

National Environmental Policy Act (NEPA) Consideration: This material is native germplasm. Weediness and poisonous potential has been determined to be non-significant (See Attachment A. – Environmental Evaluation of Plant Materials Releases). Cane bluestem is not considered a weed. It does not appear in lists of plants with poisonous properties.

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