UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

AND

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

AND

NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

AND

MINNESOTA AGRICULTURAL EXPERIMENT STATION

AND

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

ANNOUNCE THE
RELEASE OF 'BONILLA' BIG BLUESTEM

'Bonilla' big bluestem (Andropogon gerardii Vitman) was collected by the USDA, SCS, Plant Materials Center, Bismarck, North Dakota, and was developed and evaluated in cooperation with the USDA, ARS, Mandan, North Dakota. Bonilla was tested as SD-27 **(PI-315658)** and jointly released with the North Dakota Agricultural Experiment Station, North Dakota State University, Fargo, North Dakota; the Agricultural Experiment Station, University of Minnesota, St. Paul, Minnesota and the South Dakota Agricultural Experiment Station, South Dakota State University, Brookings, South Dakota.

Bonilla originated from seed collected at two sites (native stands located 1.3 and 7.3 miles north of Bonilla, South Dakota, along state highway 281) in Beadle County in 1961 by John W. McDermand, SCS Plant Materials Specialist. The original seed collection (4.3 pounds) was used to establish a 0.9 acre initial increase field at Bismarck, in 1962.

Initial evaluation studies were conducted from 1963-67 to compare Bonill with other accessions of big bluestem at the Bismarck Plant Materials Center. Bonilla was selected over other accessions for having high seed and forag yields and high winter survival. The phenology, forage yield and qualit animal performance and wildlife habitat potential have been extensively evaluated in advanced evaluation studies and large scale field plantings located throughout North Dakota, South Dakota, and Minnesota.

Bonilla has demonstrated superior winter hardiness and persistence, and higher seed production ability over other accessions. Forage production exceeds that of the northern seed source, NDG-4, and is equal to 'Champ' and 'Kaw'. When grown at northern sites, cultivars from southern sources ('Champ', 'Pawnee', 'Kaw') initially produce more forage. However, pressures resulting from

Table 1. Initial evaluations of big bluestem accessions grown in 0.9 acr plots at Bismarck, North Dakota.

	Forage Yield (dry weight)					Seed Yield				
Accession	1964	1965	1966	1967	$\bar{X}$	1963	1964	1965	1966	$\bar{X}$
	lbs/ac									
Bonilla (SD–27)	9438	9075	7260	7986	8440	242	323	58	224	212
SD–29	4359	6534	7260	7260	6353	97	133	48	35	91
SD–31	----	6534	6171	7260	6655	145	207	115	207	169
SD–33	7260	7260	5808	7260	6897	193	143	71	121	132
SD–47	7623	8349	6171	7986	7532	242	241	97	199	195
SD–57	6897	5808	6897	6171	6443	193	162	60	.9	134
SD–60	5808	6171	6534	5445	5990	145	114	35	38	108
SD–63	7986	6897	6171	7260	7079	97	70	4	102	68
ND–102	5082	4719	4719	5082	4901	97	126	64	39	84
ND–106	5455	6897	4719	6534	5901	145	230	99	111	146
ND–116	5082	6534	5082	7260	5990	48	141	65	00	86
ND–337	4356	4719	5445	6534	5264	145	150	89	31	129
ND–344	6534	7260	4356	7623	6443	145	114	73	51	121
ND–345	6534	7986	5082	7623	6806	97	214	85	146	136
ND–348	5082	5082	4356	5808	5082	193	---	155	28	125
ND–357	4356	4719	4356	5445	4719	97	97	34	51	72

Table 2. Maturity ratings of big bluestem cultivars grown at four (4) locations.

Accession	Origin	Upham, ND 1983	Upham, ND 1984*	Bismarck, ND 1982	Lake Andes, SD 1984**	Fergus Falls, MN 1983*	$\bar{X}$
"DG-4	Morton Co., ND	6.0	5.0	-	4.3	4.8	5.0
Bonilla (SD-27)	Beadle Co., SD	4.5	3.0	6.5	3.6	3.3	4.2
SD-43	Southeast SD	3.5	2.5	6.0	3.1	2.7	3.6
Rountree	N. Iowa	-	-	-	3.1	-	3.1
Champ	Nebraska	2.0	3.0	5.5	3.1	2.6	3.2
Pawnee	Pawnee Co., NE	1.5	1.5	5.0	2.7	2.3	2.6
Kaw	SE Kansas	1.0	1.0	2.0	2.7	1.6	2.1

Maturity ratings:
1=vegetative
2=boot
3=first emergence of inflorescence
4=first anthesis
5=50% anthesis
6=first seed ripe
7-50% seed ripe
8=seed mature
9=complete dormancy

*Mean of ratings from four (4) dates.

**Mean of ratings from seven (7) dates.

Table 3. Mean annual forage production of big bluestem cultivars at eight locations. 1977-1985

Cultivar/ Accession	*(7) Bismarck, ND	*(3) Upham, ND	*(2) Lake Andes, SD	*(1) Pierre, SD	*(3) Fergus Falls, MN	(3) Morris, MN	(1) Lamberton, MN	(2) Rosemount, MN	Average
				lbs/ac					
NDG-4	--	5916	3589	405	3346	--	--	--	3314
Bonilla (SD-27)	3569	4800	3263	666	4470	3660	4200	5220	3731
SD-43	4016	6870	4575	889	5048	--	--	--	4280
Rountree	--	--	**3545**	**1167**	--	--	--	--	**2356**
Champ	3551	5254	4139	1148	4451	3060	4620	4260	3810
Pawnee	3462	5198	3871	1545	4982	3840	5080	5660	4205
Kaw	3551	5328	4738	1988	3891	--	--	--	3899

( ) indicates number of years data averaged.

* trials with three replications each.

Table 4. Stand ratings of big bluestem accessions at four (4) locations.

Accession	Fergus Falls, MN					Pierre, SD			Lake Andes, SD			Upham, ND					Overall Average
	1982	1983	1984	1985	$\bar{X}$	1984	1985	$\bar{X}$	1983	1984	$\bar{X}$	1982	1983	1984	1985	$\bar{X}$	
NDG-4	5	3	1	1	3	2	2	2	3	2	3	1	1	1	1	1	2.3
Bonilla (SD-27)	5	2	1	2	3	3	2	3	2	1	2	1	1	1	2	1	2.3
SD-43	7	3	1	1	3	2	2	2	2	2	2	1	1	1	3	2	2.3
Rountree	-	-	-	-	-	3	2	3	4	3	4	-	-	-	-	-	3.5
Champ	6	5	2	3	4	3	1	2	2	2	2	1	3	2	1	2	2.5
Pawnee	4	4	1	3	3	2	1	2	1	1	1	1	3	1	1	2	2.0
Kaw	4	3	1	3	3	3	1	2	1	1	1	1	5	2	1	2	2.0

Note: Stand ratings were visual scores with 1=excellent, 3=good, 5=fair, 7=poor, 9=very poor.

Table 5. Plant density of big bluestem accessions grown in four (4) locations.

Accession	Fergus Falls, MN			Pierre, SD			Lake Andes, SD	Upham, ND				Overall Average
	1983	1984	X	1984	1985	X	1984	1982	1983	1984	X	
	plts/ft^2											
NDG-4	18	28	23	21	34	28	27	22	33	34	30	27
Bonilla (SD-27)	19	31	25	22	30	26	39	27	33	36	32	31
SD-43	18	22	20	21	30	26	24	22	26	27	25	24
Rountree	-	-	-	15	26	21	14	-	-	-	-	18
Champ	9	19	14	19	31	25	15	21	19	23	21	19
Pawnee	13	28	21	26	35	31	29	22	25	30	26	27
Kaw	17	25	21	18	31	25	29	21	13	19	18	23

Cultivars from southern sources ('Champ', 'Pawnee', and 'Kaw') initially produce more forage. However, pressures resulting from grazing, drought and winter injury eventually reduce stands and decrease forage production in northern latitudes. Bonilla has resulted in increased animal performance (average daily gains) over 'Pawnee' when grown at Morris, Minnesota (Table 6).

Phenology: Phenology data recorded at Fergus Falls, Minnesota, indicate Bonilla to be 25 days later in maturity than the northern source NDG-4 and is 23 days earlier than SD-43. 'Champ', 'Pawnee' and 'Kaw' do not consistently produce mature seed in northern latitudes (Table 2).

Soils: Bonilla is best suited to deep well drained fertile soils.

Adaptation: The primary area of adaptation for Bonilla is on sites where big bluestem is recommended in the Major Land Resource Areas:

North Dakota: 53B - Central Dark Brown Glaciated Plains (south half); 54 - Rolling Soft Shale Plain; 55B - Central Black Glaciated Plain and 56 - Red River Valley of the North (south half).

South Dakota: 53B and 53C - Central and Southern Dark Brown Glaciated Plains; 55B and 55C - Central and Southern Black Glaciated Plains; 60A - Pierre Shale Plains; 61 - Black Hills Footslopes; 63A and 63B - Rolling Pierre Shale Plains; 102A - Rolling Till Prairie and 102B - Loess Uplands and Till Plains.

Minnesota: 56 - Red River Valley of the North (south half); 57 - Northern Minnesota Gray Drift; 90 - Minnesota Thin Loess and Till; 91 - Minnesota Sandy Outwash; 102A - Rolling Till Prairie; 102B - Loess Uplands and Till Plains; 103 - Central Minnesota Till Prairie; 104 - Eastern Iowa and Minnesota Till Prairies and 105 - Northern Mississippi Valley Loess Hills.

Physical features of these resource areas are described in Land Resource Regions and Major Land Resource Areas of the United States (USDA, SCS, 1981).

Seed Production: Stand establishment of Bonilla can usually be accomplished in one growing season. The second growing season may be needed to develop increased vigor and forage. Seed production can be expected the second year and continue indefinitely, provided good management techniques are applied.

References:

Hitchcock, A. s. 1951. Manual of the grasses of the United States. 2nd ed. Rev. by Agnes Chase. US Dept. Agr. Misc. Pub. No. 200. Washington, D.C.

USDA Soil Conservation Service. 1981. Land Resource Regions and Major and Resource Areas of the United States, Agric. Handbook *296*, 156 p.

Prepared by: The data to support release of Bonilla big bluestem was assembled by Russell J. Haas, Plant Materials Specialist, Soil Conservation Service, Bismarck, North Dakota, and Erling T. Jacobson, Plant Materials Specialist, MNTC, Soil Conservation Service, Lincoln, Nebraska.

Table 6. Animal and plant performance of Bonilla (SD-27) and Pawnee big bluestem in pastures at Morris, Minnesota, 1983–1985.

Measurement	Year	Cultivar	
		Bonilla (SD-27)	Pawnee
Average Daily Gain (lb/day)			
	1983	1.20	.64
	1984	4.55	.64
	1985	3.82	1.55
	3-year average	3.19	.94
Animal gain/acre (lb/ac)			
	1983	119	61
	1984	170	64
	1985	215	116
	3-year average	167	80
Plant cover following 1983-1985 grazing (% cover)			
	Plant	32	21
	Litter	43	69
	Bare ground	25	9
	Other	0	1

Data t Support Release f 'Bonill ' Big Bluestem

Cultivar: 'Bonilla'

Accession No.: SD-27, PI-315658

Common Name: big bluestem

Scientific Name: Andropogon gerardii Vitman Symbol: ANGE

capable of producing a sod from short rhizomes. Plants often glaucous; culms robust, often in large tufts, sometimes with short rhizomes, 1 to 2 m tall, usually sparingly branching toward the summit; lower sheaths and blades sometimes villous, occasionally densely so, the blades flat, elongate, mostly 5 to 10 mm wide, the margins very scabrous; racemes on the long exserted terminal peduncle mostly 3 to 6, fewer on the branches, 5 to 10 cm long, usually purplish, sometimes yellowish; rachis straight, the joints and pedicels stiffly ciliate on one or both margins, the joints hispid at base; sessile spikelet 7 to 10 mm long, the first glume slightly sulcate, usually scabrous, the arm geniculate and tightly twisted below, 1 to 2 cm long; pedicellate spikelet not reduced, or but slightly so, awnless, staminate (Hitchcock 1951).

Big bluestem is found on subirrigated lowlands, on nearly level to gently undulating glacial till plains, overflow sites, level swales and depressions and bottomlands along rivers and streams. Distribution ranges from Quebec and Maine to Saskatchewan and Montana, south to Florida, Wyoming, Utah, Arizona and Mexico.

Origin: Bonilla big bluestem originated from a collection in Beadle Cou ty, South Dakota in 1961. Seed was collected from native stands located 1.3 iles and 7.3 miles north of Bonilla, South Dakota along state highway 281 by hn W. McDermand, USDA Soil Conservation Service, Plant Materials Specialist. The 4.3 pounds of seed from that collection was used to establish a 0.9 acre increase field on the USDA Soil Conservation Service Plant Materials Cen er at Bismarck, North Dakota.

Uses: Bonilla is recommended for range and pasture seedings, wildlife habitat and natural area development, critical areas and transportation corridors in North Dakota, South Dakota, and Minnesota.

Performance: Initial evaluation studies were conducted from 1963-67 in comparison with other accessions of big bluestem on the Bismarck Plant Materials Center (Table 1).

The phenology, forage quantity, animal performance and wildlife habitat potential has been extensively evaluated in advanced evaluation studies d field plantings located throughout North Dakota, South Dakota, and Minnes ta. (Refer to Tables 2, 3, 5, 6).

Bonilla has demonstrated superior winter hardiness and seed production and has resulted in high animal performance (Table 6). Forage production exceeds that of the northern seed source NDG-4 and is equal to 'Champ' and 'Kaw' (Table 3).

grazing, drought and winter injury eventually reduce stands and decreas production of the southern cultivars. Bonilla has shown increased animal performance (average daily gains) over 'Pawnee' when grown at Morris, MN.

The mean flowering date (anthesis) for big bluestem has a northwest to southeast gradient in the northern Great Plains. Phenology evaluations t Fergus Falls, Minnesota, indicated Bonilla to be 14-25 days later in maturity than the northern source NDG-4. It is 13-23 days earlier than SD-43 and 14-33 days earlier than the southern sources 'Champ', 'Pawnee', and 'Kaw'.

The primary area of adaptation and use of Bonilla is on sites where big bluestem is recommended for range and pasture seedings, wildlife habitat and natural area development, revegetation of surface mined land, erosion control structures and transportation corridors in North Dakota, South Dakota and Minnesota.

Breeder seed of Bonilla big bluestem will be maintained at the USDA ARS Research Laboratory, Mandan, ND 58554. Foundation and certified generations of seed increase beyond breeders seed are authorized. Foundation seed will be available from the USDA SCS, Plant Materials Center, Bismarck, ND 5850

Release date for publicity purposes shall be effective on the date of final signature of the release notice.

Robert R Shaw 2/6/87
Chief Date
Soil Conservation Service
Washington, D.C.

T. B. Kinney / MAR 10 1987
Administrator Date
Agricultural Research Service
Washington, D.C.

August P. Mandernach 12/10/86
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