

1 **Notice of Release of Coastal Plains little bluestem: A Selected Class of Natural**
2 **Germplasm**

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23 **Notice of Release of Coastal Plains little bluestem: A Selected Class of Natural**
24 **Germplasm**

25 **ABSTRACT**

26 This selected class germplasm of little bluestem [*Schizachyrium scoparium* (Michx.)
27 Nash var. *scoparium*] [Poaceae]) was released in 2016 to provide an adapted source of
28 little bluestem for restoration of coastal prairies, longleaf pine understory, soil
29 conservation, and wildlife habitat in the Western Coastal Plains region of Texas and
30 Louisiana. Eighty seven seed collections from eastern Texas and Louisiana were
31 evaluated for germination and seedling vigor under greenhouse conditions. Seventy
32 seven accessions (38 from Texas and 39 from Louisiana) with favorable germination and
33 seedling vigor were further evaluated for foliage abundance, disease resistance, lodging,
34 seed production, plant height and width, boot date and bloom dates in a common garden
35 at the USDA-NRCS East Texas Plant Materials Center (ETPMC). Seed harvested from
36 the common garden was used to establish Coastal Plains Germplasm little bluestem.

37 **KEY WORDS**

38 *Schizachyrium scoparium*, little bluestem, East Texas Plant Materials Center, Coastal
39 Plains Germplasm, Plant Materials Program, Poaceae

40 **NOMENCLATURE**

41 USDA (2016)

42 **COLLABORATORS**

43 USDA NRCS East Texas Plant Materials Center, Nacogdoches, Texas

44 USDA NRCS Golden Meadow Plant Materials Center, Galliano, Louisiana

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46 **INTRODUCTION**

47 The United States Department of Agriculture (USDA), Natural Resources Conservation
48 Service (NRCS), East Texas Plant Materials Center (ETPMC) and USDA NRCS Golden
49 Meadow Plant Materials Center (LAPMC) released a selected plant material of little
50 bluestem [*Schizachyrium scoparium* (Michx.) Nash var. *scoparium*] [Poaceae]) in 2016.
51 The primary use of this release is for coastal prairie and long leaf pine restoration
52 plantings, soil conservation, and wildlife habitat improvement in the Western Coastal
53 Plains, MLRA 133B, and adjacent major land resources areas. This release was given the
54 name Coastal Plains Germplasm little bluestem.

55 USDA NRCS in Louisiana and Texas, in partnership with the Louisiana Native
56 Plant Initiative, identified a need for an adapted little bluestem for conservation.
57 Commercially available little bluestem cultivars and other seed sources are
58 predominantly developed from germplasms collected greater than 200 miles north of the
59 western coastal plains of the southern United States. Most originate from germplasm
60 found in USDA NRCS Land Resource Regions (LRR) H, N, and M (USDA 2006) in
61 USDA Hardiness Zones 5b - 8a (USDA NRCS, 2012). High failure rates have been
62 reported in conservation plantings in eastern Texas and Louisiana in LRR P, O, and T
63 (USDA NRCS, 2006).

64 Land Resource Regions P, O, and T is within USDA Hardiness Zones 8a, 8b, and
65 9a (USDA 2006). Environmental conditions in LRR P, O, and T are distinctly different
66 from those in LRR H, N, M, respectively. The growing season is approximately 60 days
67 longer, with an average of 20 more inches of annual rainfall. Mean temperature is also
68 approximately 10 degrees warmer (USDA 2006). To ensure long-term conservation

69 benefits from little bluestem, an adapted source is needed to tolerate the soils and climatic
70 conditions of LRR P, O, and T in eastern Texas and Louisiana.

71 **COLLECTION SITE INFORMATION**

72 Coastal Plains Germplasm little bluestem consist of 77 seed collections from native
73 stands of little bluestem in eastern Texas and Louisiana. The parishes and counties of
74 collections are provided in Figure 1 and Table 1. The collection area, primarily MLRA
75 133B, but also includes MLRAs 85, 86A, B, 87A, 131A, B, C, D, 134, 150A, B, and
76 152B (USDA 2006) within USDA Hardiness Zones 8a – 9a (USDA 2012).

77 **DESCRIPTION**

78 Coastal Plains Germplasm little bluestem is a native, long lived, perennial bunch grass. It
79 reproduces from seed and may or may not have rhizomes. Culms reach 150 cm in height
80 and may be green or glaucous. They are freely branched producing numerous floriferous
81 branches. Sheaths may be up to 10 mm wide, are laterally flattened with strong keels,
82 and may be glabrous to villous-pubescent. Ligules are firm and 1 to 3 mm in length.
83 Blades are linear-acuminate with basal blades ranging from 1.5 to 6 mm in width and 25
84 cm or more in length. They may be glabrous or sparsely hispid to villous. Racemes
85 range from 2.5 to 5 cm in length. Rachis joints and pedicels are ciliate with long, silver
86 hairs on at least the upper two-thirds. Sessile spikelets range from 6 to 8 mm in length
87 with the first glume glabrous or scabrous and the lemma 8 to 15 mm long. Pediceled
88 spikelets, staminate or neutered, may be no longer than the sessile spikelets, and are
89 awnless or with a short, straight awn.

90 **METHOD OF SELECTION**

91 87 seed collections of little bluestem were made throughout the Western Coastal Plains of
92 eastern Texas and Louisiana, Figure 1. Seed collections were initially evaluated for
93 active germination and observed for seedling vigor under greenhouse conditions. Seventy
94 seven accessions (38 from Texas and 39 from Louisiana) were further evaluated for
95 foliage abundance, disease resistance, lodging, seed production, plant height, plant width,
96 boot date and bloom dates in a common garden at the USDA-NRCS East Texas Plant
97 Materials Center (ETPMC) in 2006-2007.

98 The 77 accession were harvested with Woodward Flail Vac FV-212 (AG-
99 Renewal, INC Woodward, OK). The harvested seed was cleaned, debearded, and planted
100 in a half acre breeder block at the ETPMC. The breeder block has been in production
101 since 2007 and shown excellent plant vigor, seed set, and diversity with minimal foliar
102 disease (Figure 2).

103 ***Seed Increase***

104 Seed production fields at the ETPMC have a 5 year average of 65 PLS pounds of seed
105 per acre. Harvests have exceeded 80 PLS pounds per acre in good years. Seed stored at
106 45° F and below 60% relative humidity maintained greater than 70% germination up to
107 six years. Viability dropped to 40% at 7 years and showed trends for rapidly declining
108 viability beyond 7 years of storage.

109 ***Seed Production, Harvest, and Cleaning***

110 Seed production fields of Coastal Plains Germplasm are best started using greenhouse
111 grown transplants. Germination tests have shown approximately 40% dormancy in
112 freshly harvested seed of Coastal Plains Germplasm. Fields started via direct seeding
113 will require two growing season to establish, whereas well-managed transplant stands

114 will produce a marketable seed crop in the planting year. Transplants also allow the use
115 of pre-emergent herbicides to reduce competition from annual weeds.

116 Direct seeding should be done February 15 – May 15 on a clean, firm seedbed
117 with adequate moisture. A grain drill equipped with a native grass seed box and picker
118 wheels is the best method for direct seeding. Seed boxes will require some form of
119 agitation to eliminate seed bridging in the planter and the picker wheels will aid in
120 pulling seed into the drop tubes of the planter. Seed should be debarbed to remove the
121 fuzzy awns and appendages from the seed to facilitate its flow through the planter. The
122 use of a dry lubricant such as powdered graphite may further reduce bridging of the seed
123 in the planter mechanism. Seed should be planted 1/8th inch deep; planting depth maybe
124 increased to 1/4 inch in sandy soils. Coastal Plains Germplasm little bluestem averages
125 330, 000 seeds per pound, and a seeding rate of 5 pounds of pure live seed per acre is
126 recommended. For seed mixes, adjust the rate according to the desired percentage of
127 little bluestem in the mix.

128 Broadcast seeding is a less preferred method of direct seeding. Seeding rates
129 should be increased at least 25% when using this method. Due to its light weight and
130 tendency to bridge on itself, seed may require mixing with a carrier agent such as sand or
131 cat litter to facilitate dispersal. After broadcasting the seed, the planted area should be
132 lightly dragged or cultipacked to ensure good seed-to-soil contact. Hydromulching may
133 also be a viable broadcast method for seeding where applicable.

134 Flail-Vacs and seed strippers are the preferred method of harvest. Coastal Plains
135 Germplasm little bluestem is indeterminate and genetically diverse (Figure 3). Plants
136 mature throughout the fall starting approximately in September and ending in late

137 November. Non-destructive harvest methods offer the greatest seed yield potential and
138 maintain the genetic diversity of the release. Combine harvests are possible, but not
139 recommended. Combine harvests will rapidly diminish the genetic diversity in this
140 release by selecting seed based on maturity date.

141 Once harvested, seed should be scalped to remove any large debris and dried.
142 Drying can be accomplished by spreading the seed on a barn floor with fans forcing air
143 over the seed, or using a drying bin with forced air and no heat. Once dry, seed may be
144 stored, or further refined by removal of the awns and other seed appendages with a
145 debearding apparatus or additional cleaning through an air-screen cleaner or air
146 fractioning seed cleaner.

147 **ECOLOGICAL CONSIDERATIONS**

148 An Environmental Evaluation of Plant Materials Releases was completed using
149 guidelines established by the NRCS (USDA-NRCS, 2010), and the best available
150 information for this species. Results from this evaluation determined that Coastal Plains
151 Germplasm was suitable for release based on the criterion contained in this document.
152 Little bluestem is a naturally occurring species throughout North America and the release
153 of Coastal Plains Germplasm would not constitute the introduction of a foreign species to
154 local ecosystems. Coastal Plains Germplasm was selected from native stands of little
155 bluestem and has had no genetic modification. It is believed that any negative impact to
156 other native species would be minimal to non-existent.

157 **ANTICIPATED CONSERVATION USE**

158 Coastal Plains Germplasm little bluestem is recommended for soil conservation, coastal
159 prairie and long leaf pine restoration, wildlife habitat and forage for livestock. Grelen

160 and Hughes (1984) reported little bluestem as one of the dominate grasses in the longleaf
161 pine ecosystem making up more than 50% of the available forage in some areas. Little
162 bluestem collection used to make up Coastal Plains Germplasm area of adaptation
163 overlaps the historic range of the longleaf pine in eastern Texas and Louisiana (USDA
164 2016) making it a viable option for use in longleaf pine understory restoration plantings
165 (Figure 4). Its presence in the longleaf understory make it a viable option for use in
166 silvopasture, and it is an important component for wildlife habitat improvement. Little
167 bluestem provides cover for game animals including white-tailed deer (Leithead et al.
168 1971 and Tyrl et al. 2008) and turkey (Taylor and Guthery 1980).

169 **AREA OF ADAPTATION**

170 **Based on origin**

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172 Coastal Plains Germplasm little bluestem is adapted to eastern Texas and Louisiana
173 within its area of collection (Figure 1). The area of collection is within MLRAs 85, 86A,
174 B, 87A, 131A, B, C, D, 133B, 134, 150A, B, and 152B (USDA NRCS 2006), and is
175 within USDA Hardiness Zones 8a – 9a (USDA 2012). Annual rainfall within these
176 MLRAs averages 43 inches with a mean annual temperature of 58° F and a minimum
177 average of 255 frost free days (USDA 2006).

178 **Anticipated area of adaptation**

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180 Based on the known environmental parameters of the area of collection, Coastal Plains
181 Germplasm little bluestem’s adaptation is expected to extend across the southeastern
182 United States through Land Resource Regions P, O, T, and J (USDA 2006) that lie within
183 USDA Hardiness Zones 8a – 9a (USDA 2012). Adaptation trials are needed to confirm
184 this anticipated range of adaptation.

185 **AVAILABILITY OF PLANT MATERIALS**

186 Breeder Seed will be produced and maintained by the ETPMC. Commercial growers
187 may submit requests for seed to the ETPMC. Seed will be evenly distributed based on the
188 number of requests and seed production on an annual basis. Limited quantities of seed
189 for research or evaluation purposes will also be available upon request. Recipients of
190 seeds are asked to make appropriate recognition of the source of this germplasm if it is
191 used in the development of a new cultivar, germplasm, parental line, or genetic stock.

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195 collections, and also recognize the Louisiana Native Plant Initiative and its partners for
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- 201 • University of Louisiana at Lafayette – Center for Ecology and Environment
202 Technology
- 203 • Acadiana RC&D Council

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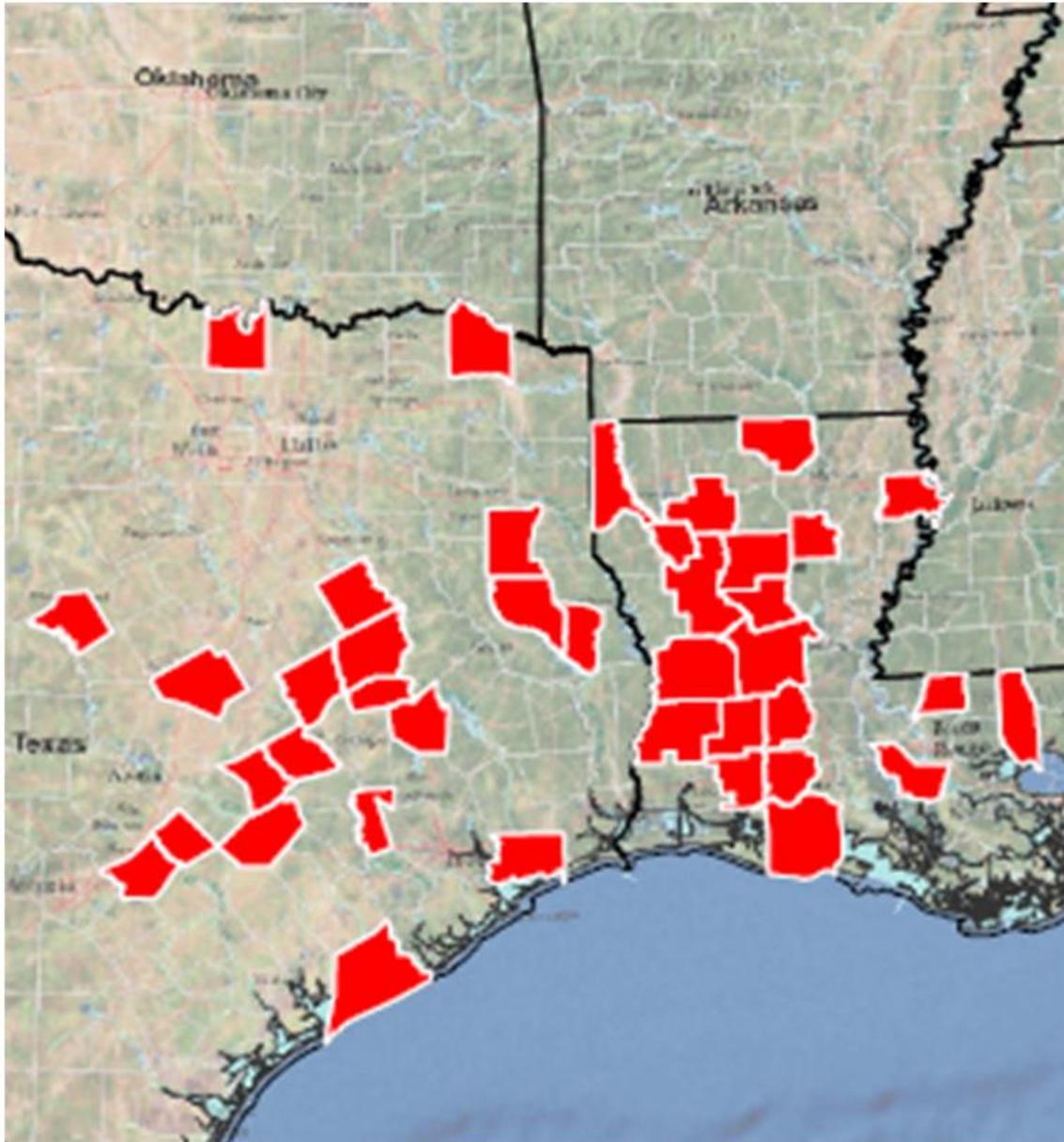
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253 **FIGURES and Tables**

254 **Figure 1.** Coastal Plains Germplasm little bluestem seed collection sites in Texas and

255 Louisiana, USDA-NRCS East Texas Plant Materials Center, Nacogdoches, TX, 2016.



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259 **Figure 2.** Seed production field of Coastal Plains Germplasm at the ETPMC showing,
260 healthy vigorous plants after 7 years of production, USDA-NRCS East Texas Plant
261 Materials Center, Nacogdoches, TX, 2016.



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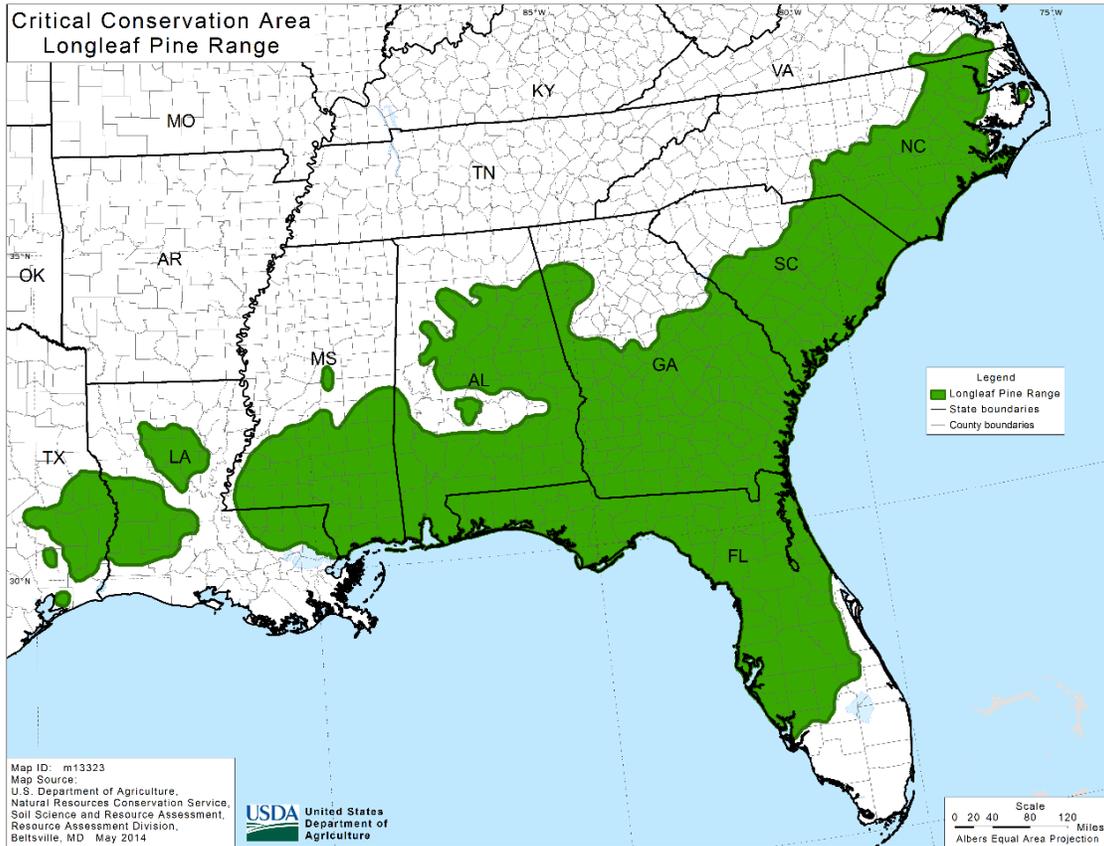
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264 **Figure 3.** Representative plants of Coastal Plains Germplasm little bluestem in seed
265 production field showing plant diversity within the release, USDA-NRCS East Texas
266 Plant Materials Center, Nacogdoches, TX, 2016.



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268 **Figure 4.** Historic Range of the Longleaf Pine, USDA 2016.



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279 **Table 1.** Collection sites and accession numbers of 77 little bluestem collections. USDA-
 280 NRCS East Texas Plant Materials Center, Nacogdoches, TX 2016.

Accession	County/Parish	State	Accession	County/Parish	State	Accession	County/Parish	State
9067216	Chambers	TX	9067345	Robertson	TX	9067717	Red River	LA
9067226	Madison	TX	9067352	Matagorda	TX	9067719	Grant	LA
9067251	Matagorda	TX	9067354	Burleson	TX	9067721	Acadia	LA
9067257	Robertson	TX	9067200	Robertson	TX	9067723	Evangeline	LA
9067259	Robertson	TX	9067206	Nacogdoches	TX	9067727	Tangipahoa	LA
9067266	Nacogdoches	TX	9067208	Freestone	TX	9067680	Winn	LA
9067271	Bell	TX	9067249	Rusk	TX	9067682	Lasalle	LA
9067283	Lee	TX	9067222	Nacogdoches	TX	9067686	East Feliciana	LA
9067292	Guadalupe	TX	9067228	Walker	TX	9067726	Jefferson Davis	LA
9067318	Nacogdoches	TX	9067267	Nacogdoches	TX	9067694	Bienville	LA
9067324	San Augustine	TX	9067687	East Feliciana	LA	9067696	Winn	LA
9067336	Freestone	TX	9067691	Caldwell	LA	9067700	Rapides	LA
9067346	Robertson	TX	9067693	Bienville	LA	9067702	Vernon	LA
9067353	Burleson	TX	9067695	Winn	LA	9067704	Vernon	LA
9067355	Burleson	TX	9067697	Rapides	LA	9067706	Beauregard	LA
9067237	Leon	TX	9067699	Rapides	LA	9067710	Rapides	LA
9067252	Matagorda	TX	9067701	Vernon	LA	9067714	Natchitoches	LA
9067258	Robertson	TX	9067703	Vernon	LA	9067716	Caddo	LA
9067263	Freestone	TX	9067705	Beauregard	LA	9067718	Rapides	LA
9067268	Fayette	TX	9067707	Iberville	LA	9067720	Vermilion	LA
9067279	Burleson	TX	9067709	Allen	LA	9067722	Acadia	LA
9067288	Mills	TX	9067711	Rapides	LA	9067724	Rapides	LA
9067297	Waller	TX	9067713	Natchitoches	LA	9067728	Vermilion	LA
9067322	Nacogdoches	TX	9067715	Desoto	LA	9067688	Rapides	LA
9067325	San Augustine	TX	9067690	Caldwell	LA	9067692	Union	LA
9067330	Cooke	TX	9067725	Vermilion	LA			

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