TEXAS A&M UNIVERSITY KINGSVILLE

# South Texas Native Plant Restoration Project
# Final Report

## Technical Report 0-4570-1

**Cooperative Research Program**


CAESAR KLEBERG WILDLIFE RESEARCH INSTITUTE
TEXAS A&M UNIVERSITY–KINGSVILLE
KINGSVILLE, TEXAS 78363



in cooperation with the
Federal Highway Administration and the
Texas Department of Transportation
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# APPENDIX B

## PUBLISHED NOTICE OF RELEASE ARTICLES FOR SPECIES FORMALLY RELEASED

*Figure 1.* Breeder seed field at maturity at Rio Farms near Monte Alto, Texas, which is one of the 12 accessions that make up La Salle Germplasm Arizona cottontop. Photo by Forrest S Smith

NOTICE OF RELEASE OF LA SALLE GERMPLASM

# ARIZONA COTTONTOP

SELECTED CLASS OF NATURAL GERMPLASM

**Forrest S Smith, William R Ocumpaugh, Paula D Maywald, John Lloyd-Reilley, Shelly D Maher, Keith A Pawelek, Andrew W Scott Jr, and Juan Garza**

ABSTRACT

A selected germplasm of Arizona cottontop (*Digitaria californica* (Benth.) Henr. [Poaceae]) has been released for rangeland reseeding and wildlife habitat enhancement plantings in the Rio Grande Plain of Texas. La Salle Germplasm Arizona cottontop is a blend of 12 selected accessions from an extensive evaluation at multiple sites in southern Texas. The release comprises accessions that are increased from the original seed collections of native populations to maintain the genetic integrity of each accession. This germplasm represents the first commercially available release of Arizona cottontop that originates from the intended area of use.

Smith FS, Ocumpaugh WR, Maywald PD, Lloyd-Reilley J, Maher SD, Pawelek KA, Scott AW Jr, Garza J. 2009. Notice of release of La Salle Germplasm Arizona cottontop: selected class of natural germplasm. Native Plants Journal 10(1):43–47.

**KEY WORDS**

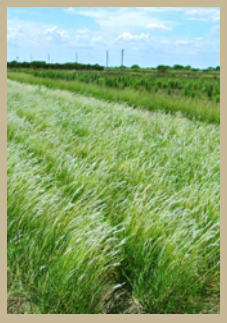
*Digitaria californica,* Rio Grande Plain

**NOMENCLATURE**

USDA NRCS (2008)

**COLLABORATORS**

South Texas Natives CKWRI-TAMUK, Kingsville, Texas; USDA NRCS E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; Texas Agrilife Research-Beeville, Beeville, Texas; and Rio Farms Inc, Monte Alto, Texas.



**Species** | *Digitaria californica* (Benth.) Henr.
**Common Name** | Arizona cottontop
**Accession number** | 9093398

La Salle Germplasm Arizona cottontop (*Digitaria californica* (Benth.) Henr. [Poaceae]), a Texas Selected Native Plant Germplasm eligible for seed certification under the Texas Department of Agriculture (TDA) and Texas Administrative Code guidelines (TAC 2007), is available for use in the Rio Grande Plain of Texas. As a selected class release, this selection will be referred to as La Salle Germplasm Arizona cottontop, USDA Natural Resources Conservation Services (NRCS) accession number 9093398, and Agricultural Resources Service (ARS)–Germplasm Resources Information Network (GRIN)–National Plant Germplasm System (NPGS) PI number 652936.

## JUSTIFICATION

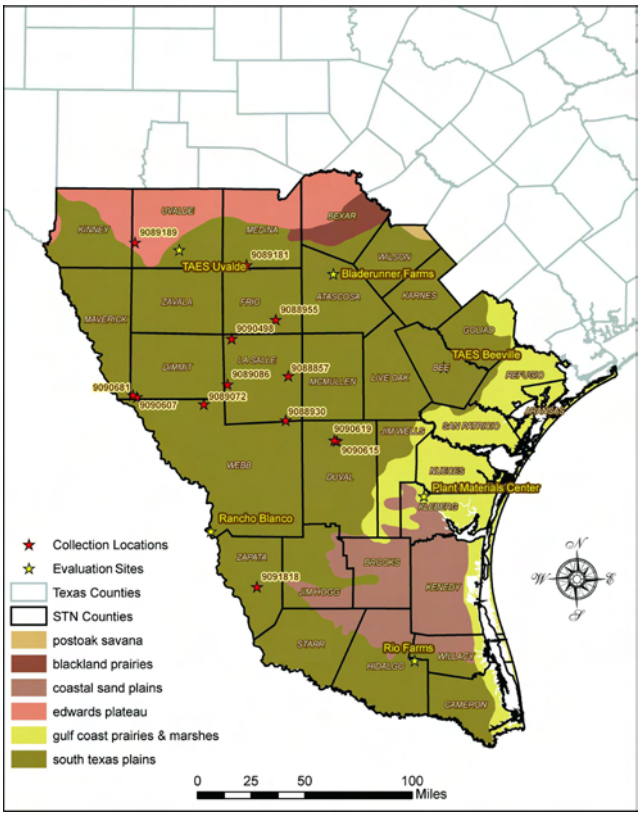
This germplasm is the first release of an Arizona cottontop germplasm that originates from the Rio Grande Plain of southern Texas. Other releases of Arizona cottontop are PMT-389 (Culberson County, Texas, informal) and 'Loetta' (Arizona, cultivar) (USDA NRCS 2007). Neither of these releases meets current standards for use of native seeds in the Rio Grande Plain as outlined by the USDA NRCS Range Planting Code 550 (USDA NRCS 2007). La Salle Germplasm does meet these standards, and is further justified for release because no other commercial sources of Arizona cottontop are currently available in the intended area of use. The name La Salle Germplasm was chosen because 3 of the 13 accessions constituting the germplasm originated from native populations in La Salle County, Texas.

## COLLECTION SITE INFORMATION

Accessions contributing to La Salle Germplasm Arizona cottontop were collected from native plants at 12 locations throughout the Rio Grande Plain ecoregion. Original collections were hand harvested from stands observed in seed collection efforts across the region. Seeds were hand stripped from as many plants as possible at each collection site. Collections were cleaned, assigned individual accession numbers, and stored for evaluation. Accessions selected for release as La Salle Germplasm originate from 9 counties and from a variety of range sites and soil types.

## DESCRIPTION

La Salle Germplasm Arizona cottontop is a warm-season perennial bunchgrass that grows 61 to 122 cm (2 to 4 ft) in height. Plants of Arizona cottontop are long-lived and will produce seeds during all months of the year under favorable conditions. Accessions that make up La Salle show some genetic variation in plant size, leaf blade width, seedhead length, pubescence, and coloration. The release comprises accessions that are increased from the original collection of a native population, and in spatially discrete increase fields to maintain the genetic integrity of each accession. Seeds harvested from each increased accession are blended by equal percentages of pure live seed (PLS) following harvest. Accessions included in the release have shown superior performance in several ecological and agronomic performance categories as well as in the higher mean percentage of active




Collection sites for germplasm used in developing Arizona Cottontop.

seed germination of accessions sampled from the target ecoregion of the release.

## METHOD OF SELECTION

Criteria for selection of accessions for initial evaluation included viability of original seeds, geographic origin, and soil type of collection location. Geographic origin, soil type, and amount of original seeds were evaluated by analysis of the collection information provided for each of 52 accessions of Arizona cottontop collected by the South Texas Natives program from 2001 to 2003. (South Texas Natives is a native plant development project whose primary goal is the development of native plant materials for revegetation and restoration practices in south Texas.) Information included specific locale of the collection (ranch, county road, and so forth), county of the collection site, and major soil type where plants were found. A minimum of one accession from each county and soil type where Arizona cottontop was collected was included in the initial evaluation.

Viability of original seeds was determined by sowing 10 bulk seeds per cell in 72-cell seedling flats filled with commercially available potting medium. Trays were placed in greenhouses with growing conditions of 12 h with daytime temperature maintained near 30 °C (86 °F) and 12 h with night temperature near 18 °C (64 °F) and were watered daily to maintain adequate soil moisture for optimum germination. This greenhouse evaluation of original seeds resulted in the selection of 34 accessions for field evaluation. Those selected had a minimum of one live plant per cell after 60 d in greenhouse conditions.

Initial field evaluation plots of these 34 accessions were established at 4 locations in the Rio Grande Plain of south Texas. Commercially available releases PMT-389 and Loetta were also planted for evaluation at each location for comparison. Evaluation locations were Rancho Blanco near Laredo, Rio Farms near Monte Alto, the E "Kika" de la Garza Plant Materials Center near Kingsville, and Texas AgriLife Research Station-Uvalde near Uvalde. The sites represent broad geographic distribution (125 to 355 km [77 to 220 mi] between sites), differing climatic conditions, and 4 common soil types in which native populations of Arizona cottontop commonly occur (silt loam, sandy loam, clay, and clay loam). At each location 2 replications of 10 transplants of each accession were established in randomized, spaced plantings (30 cm [12 in] between plants), complete block design, on 90-cm (36-in) rows. Plants were irrigated to ensure establishment during the initial growing season. Plantings were not irrigated after September 2004. In 2004, visual rankings (1 to 9; 1 = best, 9 = worst) were given monthly (from May through November) to each replication of each accession for plant vigor, foliage den-

*Figure 2.* Certified seed field of La Salle Germplasm Arizona cottontop at Bladerunner Farms near Poteet, Texas; field was planted from 12-accession breeder seed blend. Photo by Forrest S Smith

sity, uniformity, development stage, seed production, biomass production, and plant height. In 2005, visual rankings were recorded bi-monthly (from March through November) for each replication. Seeds were collected when ripe from each accession throughout the growing season in 2004 and 2005, and were tested for active seed germination in germination chambers (3 replications x 50 seeds per accession, 12 hr light at 30 °C [86 °F], and 12 hr dark at 18 °C [64 °F]). Active seed germination was recorded for each accession at 3-d intervals for 30 d.

Accessions were selected for release and seed increase by analysis of visual rankings and germination tests in 2004 through 2005. Accessions were ranked by performance in field evaluation (categories given equal consideration and combined by location) and percentage of active germination (2-y mean), for a total of 8 evaluation categories (evaluations at 4 sites, germination at 4 sites). Accessions selected were those with greater than mean performance in the greatest number of evaluation categories. The releases PMT-389 and Loetta had acceptable performance in terms of survival and seed production; however, distinct differences in initiation of growth, seed set, and plant dormancy were noted. A severe degree of lodging was noted in plantings of Loetta at 3 evaluation locations. Mean plant vigor ratings of PMT-389 were lower than most south Texas–collected accessions at 2 of the evaluation locations, and limited seeding trial data from studies performed at the E "Kika" de la Garza Plant Materials Center showed greater emergence and higher seedling density of a composite of south Texas–collected accessions in comparison with PMT-389, 6 mo after planting.

Following selection, accessions were increased using the original seeds. Transplants (5000) of each accession were grown and outplanted in 0.05 ha (0.12 ac) isolated breeder blocks. Seeds from these breeder blocks of each accession were harvested and bulked by an equal percentage of PLS of each accession, so that the genetic integrity of each accession is maintained, and the potential for genetic shift or adaptation to the breeder field site is minimized. The bulked breeder blend is released to commercial growers as foundation seeds through the Texas Foundation Seed Service for establishment of certified seed fields of La Salle Germplasm Arizona cottontop.

## ECOLOGICAL CONSIDERATIONS

Arizona cottontop is a naturally occurring species in Texas and planting it would therefore not constitute an introduction of an exotic species into local ecosystems. Any negative impacts on other native plant species would likely be minimal to nonexistent. Also, release of this species will make available an additional native species for rangeland planting.

## ANTICIPATED CONSERVATION USE

La Salle Germplasm Arizona cottontop will provide a native grass species for rangeland revegetation and wildlife habitat plantings in the Rio Grande Plain of south Texas.

## ANTICIPATED AREA OF ADAPTATION

La Salle Germplasm is known to be adapted to the region south of lat 29°27'N and west of long 97°47'W. The southern and western boundary of known adaptation is the Rio Grande River; the area of adaptation encompasses the Rio Grande Plain Ecoregion, or Major Land Resource Area 83.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by South Texas Natives and distributed through the Texas Foundation Seed Service. Certified seeds may be grown within the State of Texas. Limited quantities of seeds for research or evaluation purposes will be available on request from Forrest Smith (forrest.smith@tamuk.edu).

## REFERENCES

[TAC] Texas Administrative Code. 2007. Chapter 9, Seed quality standards; Chapter 10, Seed certification standards. Title 4 Agriculture, Part 1. Texas Department of Agriculture.

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[USDA NRCS] USDA Natural Resources Conservation Service. 2008. Conservation plant releases by scientific name. URL: http://plantmaterials.nrcs.usda.gov/releases/releasesallbysci.html (accessed 1 Feb 2008).

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*Figure 1.* Breeder seed field of one component of Dilley Germplasm slender grama. Photo by Forrest S Smith

NOTICE OF RELEASE OF

# DILLEY GERMPLASM SLENDER GRAMA

**Forrest S Smith, William R Ocumpaugh, Paula D Maywald, John Lloyd-Reilley, Shelly D Maher and Keith A Pawelek,**

ABSTRACT

A selected germplasm of slender grama (*Bouteloua repens* (Kunth) Scribn. & Merr. [Poaceae]) was released for rangeland reseeding, highway rights-of-way plantings, and wildlife habitat enhancement plantings in southern Texas. Dilley Germplasm slender grama is a blend of 5 accessions selected from evaluation at multiple sites in southern Texas. Accessions comprising the release are increased from the original collection of a native population to maintain the genetic integrity of each accession. Dilley Germplasm slender grama has shown consistent early emergence and establishment in rangeland plantings and is highly competitive with several problematic exotic grass species.

Smith FS, Ocumpaugh WR, Maywald PD, Lloyd-Reilley J, Maher SD, Pawelek KA. 2009. Notice of release of Dilley Germplasm slender grama. Native Plants Journal 10(3): 295–298.

## KEY WORDS

*Bouteloua repens*, Poaceae, southern Texas

## NOMENCLATURE

Plants: USDA NRCS (2008)
Insects: ITIS (2009)

## COLLABORATORS

*South Texas Natives* CKWRI-TAMUK, Kingsville, Texas; USDA NRCS E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; Texas AgriLife Research-Beeville, Beeville, Texas; Bladerunner Farms Inc, Poteet, Texas; Rancho Blanco, Laredo, Texas; and Rio Farms Inc, Monte Alto, Texas.

**Species** | *Bouteloua repens* (Kunth) Scribn. & Merr.
**Common Name** | Dilley Germplasm slender grama
**Accession number** | 9093399

Dilley Germplasm slender grama (*Bouteloua repens* (Kunth) Scribn. & Merr. [Poaceae]) was released by *South Texas Natives*-Caesar Kleberg Wildlife Research Institute-Texas A&M University-Kingsville, the USDA-NRCS E "Kika" de la Garza Plant Materials Center, and Texas AgriLife Research-Beeville in 2007. This plant is eligible for seed certification under the Texas Department of Agriculture (TDA) and Texas Administrative Code guidelines (TAC 2007). As a selected class release, this selection will be referred to as Dilley Germplasm slender grama, USDA NRCS accession number 9093399, and Agricultural Resources Service (ARS)-Germplasm Resources Information Network (GRIN)-National Plant Germplasm System (NPGS) PI number GRIF 16602.

## JUSTIFICATION

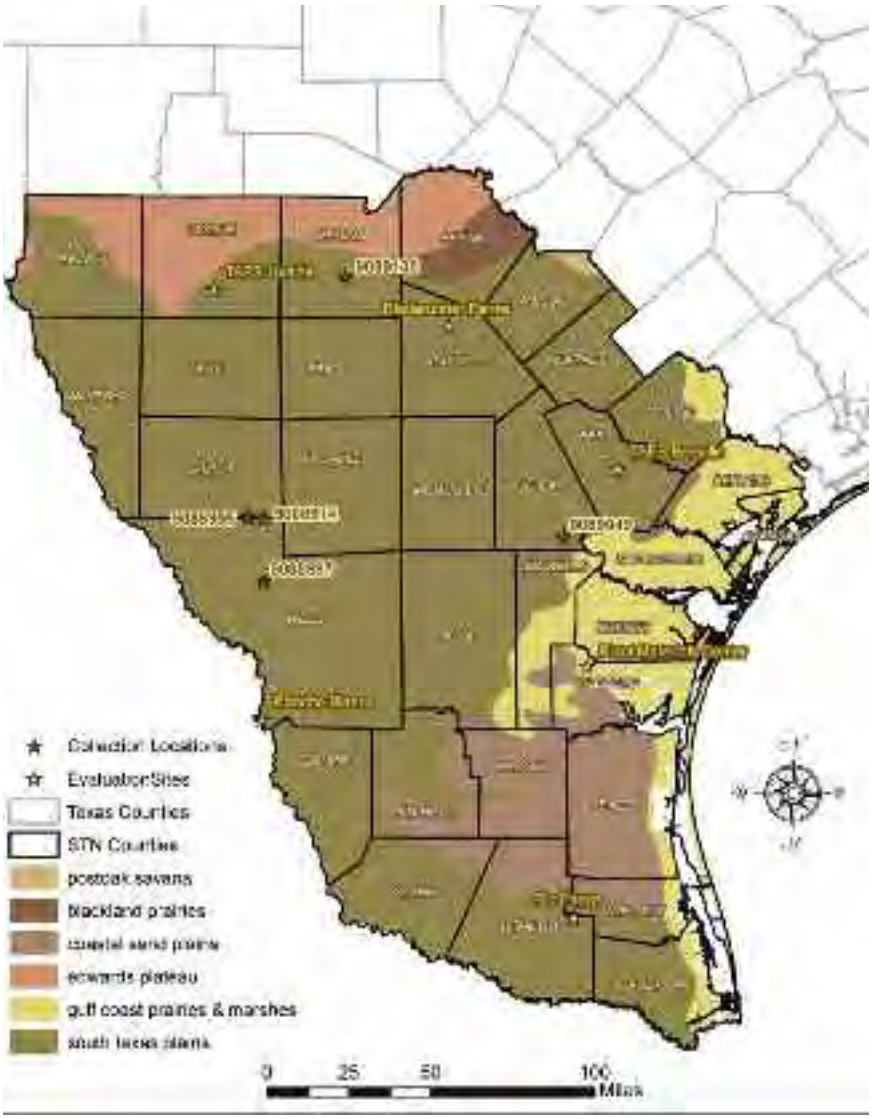
This germplasm represents the first public release of slender grama; previously, there were no commercial sources of this plant available. The name Dilley Germplasm was chosen because 2 accessions comprising the germplasm originated from native populations collected from Dilley fine sandy loam soil types.

## COLLECTION SITE INFORMATION

Accessions comprising Dilley Germplasm slender grama were collected from native populations at 5 locations throughout the Rio Grande Plain ecoregion. Accessions selected for release as Dilley Germplasm originate from 4 Texas counties: Webb, Dimmitt, Live Oak, and Medina, and from loam and sandy loam soil types.

## DESCRIPTION

Dilley Germplasm slender grama is a warm-season perennial tufted (or bunch grass on some soils) that grows 30 to 61 cm (1 to 2 ft) in height. All accessions commonly exhibit a stoloniferous growth habit on coarse-textured soils. Slender grama will produce seeds in all months of the year under favorable conditions. Slender



grama has a low palatability rating, and forage value is also relatively poor. Dilley Germplasm's parent accessions are uniform in growth habit, phenology, and morphology. Accessions that make up the release were increased from the original collection of a native population and were spatially isolated from other populations of slender grama to maintain the genetic integrity of each accession. Seeds harvested from each increased accession are blended following harvest for distribution to interested producers. Selected accessions have shown a strong perennial habit, good seed production potential, and higher mean percentage active seed germination of populations sampled from the target ecoregion of the release.

## METHOD OF SELECTION

Slender grama was selected for evaluation of potential use as a low-growing native species in highway rights-of-way plantings and as an aggressive, early successional native plant species for restoration plantings and exotic grass diversification efforts. Nine slender grama seed collections were obtained for evaluation in 2002. Transplants of each accession were grown in greenhouses and planted for evaluation in a split plot design with 2 replications of each accession. Each replication consisted of a 3 x 6-m (10 x 20-ft) plot with 25 evenly spaced transplants. Each plot was irrigated at planting to ensure transplant establishment. Four of the 9 accessions experienced 100% transplant mortality by one year after planting. Seeds were collected from the 5 surviving accessions and tested for active seed germination in 2003. All accessions had a high percentage of active seed germination in the evaluation setting (mean active seed germination in growth chamber of > 20%, mean active seed germination in greenhouse tests of > 30%); good set (94% mean seed viability determined by tetrazolium tests); and seed production potential (> 200 bulk lb of seeds produced per ac). In 2004 plots were subjected to a severe drought; however, survival and tolerance to extremely adverse environmental conditions were observed to be excellent. Slender grama showed greater drought tolerance than did several other low-growing native species planted nearby. In 2005, 2- to 10-plant transplant plots of each of the 5 surviving accessions were planted for advanced evaluation at 3 locations in southern Texas (Laredo, Beeville, and Kingsville). Again in this evaluation, all 5 accessions had good performance. Mean active seed germination of the 5 accessions was 30%, 36%, and 25%, respectively, at each evaluation site. In 2005, these slender grama accessions were also planted to assess commercial seed production potential of the species. Seed yield was found to be acceptable for commercial production, with bulk seed production of 100 lb per ac (45 kg/0.4 ha) at Kingsville, and 360 bulk lb per ac (163 kg/0.4 ha) at Beeville. Harvest averaged 50% pure live seed. At this time, harvest, cleaning, and processing criteria were developed. Harvest is best achieved using a Flail-Vac or similar brush-type harvester. Rice stink bugs (*Oebalus pugnax* (Fabricius, 1775) [Pentatomidae]) and thrips (*Thrips* spp. Linnaeus, 1758 [Thripidae]) were identified as harmful seed pests in irrigated fields, and control regimes were devised. Following the advanced evaluation, all 5 accessions were chosen for release. Seeds of each accession were planted in isolated increase fields near Poteet, Texas. Mean seed yield for the 5

accessions was 296 lb bulk seeds per ac (134 kg/0.4 ha). In 2006, harvests from May to August had mean pure live seed of 35%, while September to November harvests had a mean of 53% pure live seed. Harvests of each accession were blended by equal percentage pure live seed for distribution to commercial producers.

A series of seeding trials were conducted using the Dilley Germplasm slender grama blend throughout 2005 to 2009. Plantings were made in a variety of soil types in San Patricio, Kleberg, Webb, Hidalgo, Jim Hogg, Duval, and La Salle counties of southern Texas. Dilley Germplasm slender grama was noted in each planting as one of the first native grasses to emerge, establish, and produce seeds. Plantings in Webb County were conducted to determine the competitive ability of 10 native grass species with the nonnative buffelgrass (*Pennisetum ciliare* (L.) Link) (all Poaceae). Results showed that Dilley Germplasm slender grama was one of 2 native grasses that were able to reliably establish and persist in these areas. Plantings in San Patricio County also identified Dilley Germplasm slender grama as a competitive native species in areas dominated by nonnative Old World bluestems (*Dichanthium* spp.). Demonstration plantings in Kleberg County along a major highway showed Dilley Germplasm's ability to also establish in a highly disturbed area, with competition from a variety of nonnative species, including bermudagrass (*Cynodon dactylon* (L.) Pers.). A wildlife habitat improvement planting in Hidalgo County showed that among 27 native species that were planted, Dilley Germplasm slender grama had the greatest plant density 6 mo after seeding, despite comprising only 4% of the overall seed mixture. When included in rangeland native seed mixes in southern Texas, Dilley Germplasm slender grama is often the first planted native grass species to establish and produce seeds. Our evaluations show that Dilley Germplasm slender grama is a reliable, easy-to-establish native grass species that should aid in restoration attempts by quickly stabilizing soil and increasing native plant competition with exotic grasses. Dilley Germplasm slender grama shows broad adaptability to a variety of soil types in the region, ranging from coarse sands to fine-textured clays. Dilley Germplasm slender grama can be planted in most standard seed drills, but seeds may be coated to ensure flowability. The recommended seeding rate for solid stands is 8 lb pure live seed per ac (3.6 kg/0.4 ha).

## ECOLOGICAL CONSIDERATIONS

Slender grama is a naturally occurring species in Texas, and planting it would not constitute an introduction of an exotic species into local ecosystems. Any negative impacts on other native plant species would likely be minimal to nonexistent. Also, release of this species will make available an additional native species for rangeland and highway rights-of-way plantings.

## ANTICIPATED CONSERVATION USE

Dilley Germplasm slender grama will provide a native grass species for highway rights-of-way, rangeland revegetation, and wildlife habitat plantings in southern Texas.

## ANTICIPATED AREA OF ADAPTATION

Dilley Germplasm slender grama is known to be adapted to the region south of latitude 29°27'N and west of longitude 97°47'W. The southern and western boundary of known adaptation is the Rio Grande River; the area of adaptation encompasses the Rio Grande Plain Ecoregion and Gulf Coast Prairies, or Major Land Resource Areas 83 and 150. Experimen-tal plantings in southern Oklahoma, central Texas, and north central Texas have had poor winter survival.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by *South Texas Natives* and the Texas Foundation Seed Service. Certified seeds may be grown within the State of Texas from seeds obtained from the breeder. Limited quantities of seeds for research or evaluation purposes will be available on request from Forrest Smith (forrest.smith@tamuk.edu) for 5 y after registration through Native Plants Journal. Afterward, seeds will be available from the National Plant Germ-plasm System (NPGS). Recipients of seeds are asked to make appropriate recognition of the source of germplasm if it is used in the development of a new cultivar, germplasm, parental line, or genetic stock.

## ACKNOWLEDGMENTS

Special thanks are extended to Jim Muir, PhD, of Texas AgriLife Research-Stephenville, and Twain J Butler, PhD, of the Samuel Roberts Nobel Foundation-Ardmore, Oklahoma, for evaluating plant material.

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[TAC] Texas Administrative Code. 2007. Title 4 Agriculture, Part 1 Texas Department of Agriculture. Chapter 9, Seed Quality Standards and Chapter 10, Seed Certification Standards.

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[USDA NRCS] USDA Natural Resources Conservation Service. 2008. Conservation Plant Releases by Scientific Name. URL: http://plant-materials.nrcs.usda.gov/releases/releasesallbysci.html (accessed 1 Feb 2008). Baton Rouge (LA): National Plant Data Center.

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Breeder seed fields at Rio Farms Inc near Monte Alto, Texas

NOTICE OF RELEASE OF

# CHAPARRAL GERMPLASM HAIRY GRAMA

SELECTED CLASS OF NATURAL GERMPLASM

**Forrest S Smith, Paula D Maywald, William R Ocumpaugh, John Lloyd-Reilley, Shelly D Maher, and Keith A Pawelek**

## ABSTRACT

Chaparral Germplasm hairy grama (*Bouteloua hirsuta* Lag. var. *hirsuta* [Poaceae]) was released as a Texas Selected Native Plant Germplasm in 2007. This germplasm is a blend of 4 selections of hairy grama originating from native populations in the Edwards Plateau, Rio Grande Plain, Sandsheet Prairie, and Gulf Coast Prairies ecoregions of Texas. Chaparral Germplasm comprises plants representative of the considerable ecotypic variation of *B. hirsuta* found across the intended area of use and contains ecotypes originating from a variety of soils where the species occurs. This germplasm has high potential for use in rangeland seed mixtures and in highway rights-of-way plantings. Chaparral Germplasm represents the first release of selected plant material of this widespread native grass.

Smith FS, Maywald PD, Ocumpaugh WR, Lloyd-Reilley J, Maher SD, Pawelek KA. 2010. Notice of release of Chaparral Germplasm hairy grama: selected class of natural germplasm. Native Plants Journal 11(3):295–298.

## KEY WORDS

*Bouteloua hirsuta,* Texas, restoration, Poaceae

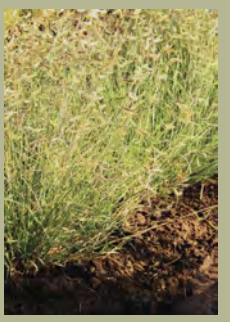
## NOMENCLATURE

Plants: USDA NRCS (2009a)
Major Land Resource Areas: USDA NRCS (2006)

## COLLABORATORS

South Texas Natives, Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, Texas; USDA Natural Resources Conservation Service E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; Texas AgriLife Research, Beeville, Texas; Bladerunner Farms, Poteet, Texas; and Rio Farms Inc, Monte Alto, Texas.

Photos by Forrest S Smith



**Species** | *Bouteloua hirsuta* Lag. var. *hirsuta*
**Common name** | hairy grama
**Accession number** | 9093400

Chaparral Germplasm hairy grama, the first release of selected plant material of this widespread native grass, comprises 4 selections representing ecotypes originating from a variety of soils where this species occurs.

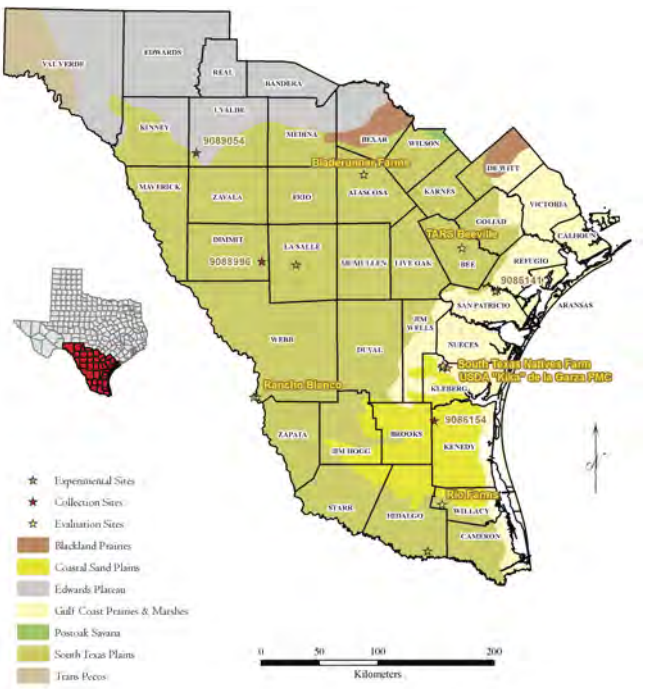
Hairy grama (*Bouteloua hirsuta* Lag. var. *hirsuta* [Poaceae]) is a widespread subdominant plant of grassland communities throughout the US. In south Texas, hairy grama is found on well-drained sand or sandy loam soils in the Gulf Prairies and Marshes and Sand Plains (Hatch and others 1999), and in the Edwards Plateau on shallow, dry, or rocky sites, as well as in well-drained sandy clays, limestone, and caliche-like soils (Loflin and Loflin 2006). Native populations of *B. hirsuta* show considerable morphological variation (Roy and Gould 1971). Evidence of this variation includes stoloniferous and caespitose ecotypes (Morrow and others 1954), vegetative apomixis in the form of vivipary in some populations (Hill 1982), and hybridization with similar *Bouteloua* species (Roy and Gould 1971). Because of this inherent variation, and the assumption of a cross-pollinated mode of reproduction (Roy 1968), Chaparral was developed to be a freely crossing germplasm, comprising a designated blend of seed from populations originating from the diverse areas of intended use.

## JUSTIFICATION

Commercially available seed of hairy grama would provide considerable utility to range seed mixes in south Texas, especially for use on sand and sandy loam soils. It provides good forage for livestock and is an important component of grassland and prairie vegetation in south Texas. It may also be useful as a soil stabilizing species on highway rights-of-way because it is a low-growing native species that could help reduce mowing costs.

## COLLECTION SITE INFORMATION

Chaparral Germplasm comprises 4 selected accessions of hairy grama collected during extensive seed collection efforts across south Texas from 2001–2005. Accession 9086154 was collected in Kenedy County from a private ranch on a Sarita fine sand soil. Accession 9086141 was collected in San Patricio County from the Welder Wildlife Refuge on an Odem fine sandy loam soil. Accession 9089054 was collected in Uvalde County from the Farm to Market Road 1022 right-of-way on Olmos and Ector very gravelly loam soils. Accession 9088996 was collected in Dimmit County from the Texas Parks and Wildlife Department Chaparral Wildlife Management Area on a Duval fine sandy loam soil (USDA NRCS 2009b). Germplasm collections originated from the Sand Plains, Gulf Prairies and Marshes, Edwards Plateau, and Rio Grande Plain ecoregions of Texas, respectively. Collectors hand-stripped seed from as many plants as possible at each collection site.




Courtesy of CKWRI Wildlife Research Technologies Laboratory

## DESCRIPTION

Accessions constituting Chaparral Germplasm represent 2 morphologically distinct types of hairy grama found in south Texas. Accessions 9086141 and 9086154 are sprawling, stoloniferous ecotypes, whose seedheads exhibit a high degree of vivipary (spikelets bear plantlets in lieu of seeds) in mid-late summer. Maximum seed production of these accessions occurs in fall months, and overall is 3 to 4 times greater than the other 2 accessions. These stoloniferous ecotypes have longer leaves, ranging from 18 to 30 cm (7 to 12 in) in length and 2+ mm (0.08 in) in width. Accessions 9089054 and 9088996 are caespitose ecotypes that produce seed-bearing spikelets throughout the year. Leaf length of these caespitose ecotypes is characteristically shorter, ranging from 9 to 14 cm (3.5 to 5.5 in) and < 2 mm in width. Spikes of the stoloniferous ecotypes average 3 cm (1.2 in) in length, whereas the spikes of caespitose ecotypes average 2 cm (0.8 in). Seedhead and maximum height of both types is 30 cm (12 in).

## METHOD OF SELECTION

Seed from 24 native populations of hairy grama was planted in greenhouse plug containers to grow plants for field evaluations in 2003. Thirteen of the 24 accessions had little or no germination and were eliminated from consideration. The remaining 11 accessions were planted in replicated plots at Bladerunner Farms near Poteet, Texas. Only 5 of the 11 accessions survived and produced seed through fall 2004. Germination of seed produced in 2004 was low, averaging < 5%. We selected 4 of the 5 surviving accessions to plant at 3 Texas locations (Beeville, Monte Alto, and Kingsville) for further evaluation. Accessions selected from this evaluation were those with the highest survival and plant vigor, and included plant materials from each of the 4 ecoregions where hairy grama had been obtained. Vegetatively, all accessions performed well in this multi-site evaluation; however, germination of all accessions was low, averaging just 2.8%. Because of the poor seed germination potential (and negative implications for successfully planting seed in restoration plantings) but good plant performance, larger isolated seed increase blocks of each accession were planted with the hope of increasing seed quality with intensive management and agronomic inputs. Consultation with commercial seed producers of Poaceae gramas *Bouteloua gracilis* (Willd. ex Kunth) Lag. ex Griffiths and *B. eriopoda* (Torr.) Torr. revealed that seed production of these species is extremely variable by year and can also be influenced by infestations of thrips and other insects, which greatly reduce seed fill.

In order to assess seed yields under maximum production conditions, 0.10 ha (0.25 ac) seed production fields of each accession were established. Fields were intensively irrigated and treated for insect pests throughout the growing season. One of the 4 fields was lost due to equipment operator error, but the remaining 3 fields were harvested throughout the growing season, seed was cleaned, bulked by accession, and tested by outside laboratories to assess seed production potential. Tetrazolium tests revealed 69% seed dormancy in 2 accessions, with 7% seed germination, while the third accession had 44% germination and 6% dormancy.

Tests of seed produced from all 4 selected accessions under intensive seed production conditions in 2006, 2007, and 2008 have shown acceptable production for commercialization of Chaparral Germplasm. Seed germination has averaged 25, 24, and 25%, and seed dormancy 69, 64, and 60%, respectively. Bulk seed yields of these accessions have averaged 240 kg/ha (220 lb/ac), and cleaned seed averages 30% pure live seed (PLS).

Because of the relatively low production potential of hairy grama seed, it should be used as a component of a mixture of species in rangeland and highway right-of-way seed mixes. Seeding trials of Chaparral Germplasm have shown best emergence when planted at a rate of 2 kg PLS per ha (2 lb/ac). Emergence of seed is sporadic, often occurring during a 2- to 3-y period after planting, due in large part to the high degree of inherent seed dormancy. Seeded plants show exceptional drought tolerance.

## ECOLOGICAL CONSIDERATION

Hairy grama is a naturally occurring species in Texas and planting would not constitute an introduction of an exotic species into local ecosystems. This release will provide roadside planting materials for south Texas, and its use may help reduce the planting of exotic grasses that may spread into adjacent habitats and negatively affect native plant and animal species.

## ANTICIPATED CONSERVATION USE

Chaparral Germplasm is the first known release of hairy grama. It will be useful as a component of rangeland seed mixes and for highway right-of-way revegetation. Hairy grama has potential use as a vegetative cover for non-mow areas of urban landscapes and in ornamental lawn plantings. It will be an excellent plant for reclamation or stabilization of caliche, stony, or shallow upland soils, and sandy textured soils.

## ANTICIPATED AREA OF ADAPTATION

Best performance of Chaparral Germplasm is anticipated in the major land resource area (MLRA) 83A-E and 150. Because one collection included in the blend originated near the eastern edge of MLRA 42 and another occurred near the southern extent of the Edwards Plateau, good performance may be observed in MLRA 42 and 81A-D, although this use has yet to be tested. Evaluation plantings in north central Texas and southern Oklahoma have had poor winter survival and sporadic seed production.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by South Texas Natives and distributed through the Texas Foundation Seed Service. Limited quantities of seed for research and evaluation purposes are available on request from South Texas Natives (stn@tamuk.edu).

## ACKNOWLEDGMENT

This is Caesar Kleberg Wildlife Research Institute Manuscript 10-107.

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Breeder seed block of one component of Atascosa Germplasm growing near Poteet, Texas

Photos by Forrest S Smith

NOTICE OF RELEASE OF

# ATASCOSA GERMPLASM TEXAS GRAMA

SELECTED CLASS OF NATURAL GERMPLASM

**Forrest S Smith, Paula D Maywald, William R Ocumpaugh, John Lloyd-Reilley, Shelly D Maher, and Keith A Pawelek**

## ABSTRACT

A blend of selected germplasms of Texas grama (*Bouteloua rigidiseta* (Steud.) Hitchc. [Poaceae]) has been released for roadside revegetation and wildlife habitat restoration in south Texas. This release will be referred to as Atascosa Germplasm Texas grama. The 6 accessions constituting the release were selected from an evaluation of plants grown from seed obtained at 21 locations in the Rio Grande Plain of south Texas. Texas grama is a low-growing, early successional native bunchgrass that grows well on shallow, rocky soils, making it an ideal plant for roadside revegetation. Accessions making up the blend have been increased in isolation, and seed is blended following harvest to ensure genetic diversity in seed distributed to commercial producers. Selections were made based on perennial habit, seed germination, and good performance at multiple evaluation locations. A critical need for ecotypic native seed for restoration and revegetation exists in south Texas, especially for roadsides and degraded rangelands. Texas grama should meet these needs because of its natural adaptation to disturbed sites, and prolific seed production and colonization ability.

Smith FS, Maywald PD, Ocumpaugh WR, Lloyd-Reilley J, Maher SD, Pawelek KA. 2010. Notice of release of Atascosa Germplasm Texas grama: selected class of natural germplasm. Native Plants Journal 11(3):299–304.

## KEY WORDS

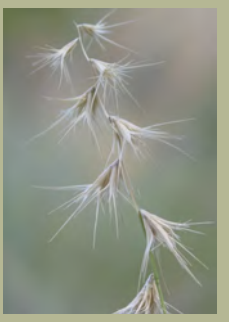
*Bouteloua rigidiseta,* Texas, restoration, Rio Grande Plain, Poaceae

## NOMENCLATURE

Plants: USDA NRCS (2009a)
Major Land Resource Areas: USDA NRCS (2006)

## COLLABORATORS

South Texas Natives, Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, Texas; USDA Natural Resources Conservation Service E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; Texas AgriLife Research, Beeville, Texas; Bladerunner Farms, Poteet, Texas; and Rio Farms Inc, Monte Alto, Texas.



**Species** | *Bouteloua rigidiseta* (Steud.) Hitchc.
**Common name** | Texas grama
**Accession number** | 9093401

Six accessions of this low-growing, early successional native bunchgrass constitute this release of Atascosa Germplasm Texas grama. Adapted to shallow, rocky soils and having prolific seed production and colonization abilities, this release is ideal for roadside revegetation.

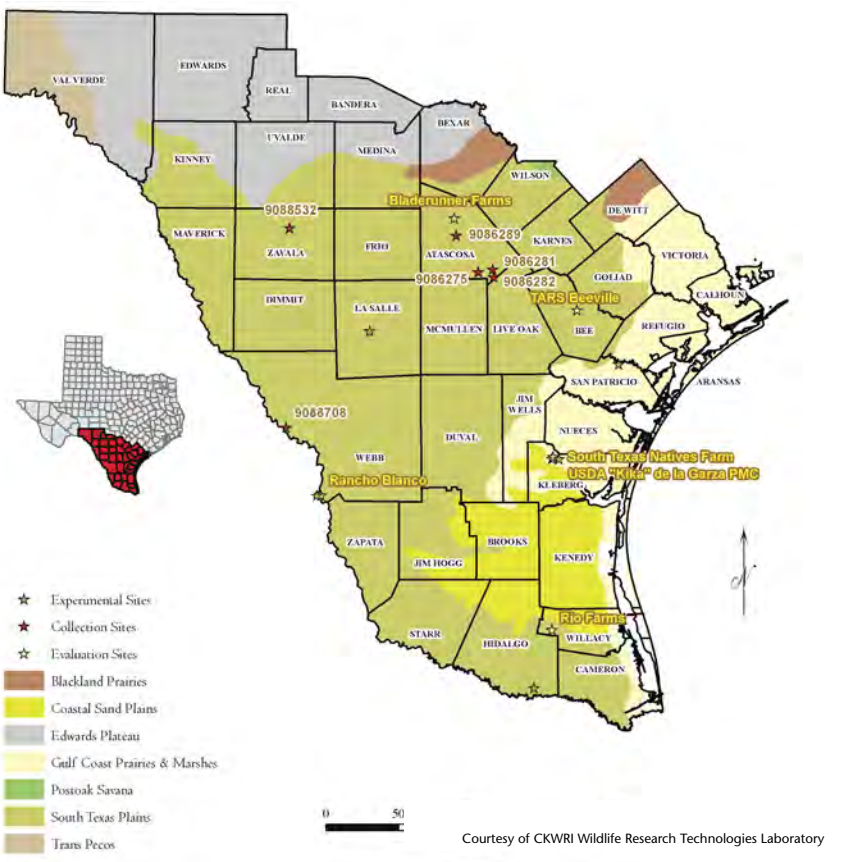
Atascosa Germplasm Texas grama (*Bouteloua rigidiseta* (Steud.) Hitchc. [Poaceae]) was released in 2007 as a Texas Selected Native Plant Germplasm. Texas grama was selected for evaluation by South Texas Natives and collaborators for potential use in rangeland seed mixes and as a component of revegetation mixes for highway rights-of-way in south Texas. An aggressive, low-growing, native bunchgrass, Texas grama grows well on a variety of soils including shallow, rocky, and gravelly sites.

Texas grama is commonly classified as an increaser or invader of disturbed sites and is commonly found in overgrazed rangelands, brush areas, and along roadsides (Correll and Johnston 1996). It is a component of a variety of sites in south Texas, from clay and clay loam soils in the Coastal Bend of Texas (Gould and Box 1965; Hatch and others 1999), to well-drained sands, loams, and clays in the Texas Hill County (Loflin and Loflin 2006). Texas grama can also be a dominant species of short-grass communities in central Texas (Fowler and Dunlap 1986). Texas grama is a short-lived perennial and is among the first warm-season grasses to flower each spring (Gould 1979).

A blend of accessions was desired for a Texas grama release to provide commercial producers and seed purchasers with seed possessing adaptations for good performance and persistence on a variety of planting sites and soils. Significant ecological studies conducted on *B. rigidiseta* by Miller and Fowler (1993, 1994) revealed that genetic differences strongly influenced reproductive traits in populations studied, genetic differentiation occurs for a variety of traits, and site-specific adaptation exists. Texas grama is self compatible but the breeding system has not been fully documented (Miller and Fowler 1993); chromosome number is 2n = 40 (Gould 1979). Cross pollination of accessions is possible, but stand life of 7 y on production fields should prevent significant genetic shifts in the release.

## JUSTIFICATION

Prior to release of Atascosa Germplasm, seed of this species was not available for commercial seed production or use in restoration and revegetation plantings in south Texas. Its characteristics make it an ideal native species to meet the goals of agencies, such as the Texas Department of Transportation, for native plants to stabilize roadsides following construction and to reduce mowing costs associated with taller vegetation.




Courtesy of CKWRI Wildlife Research Technologies Laboratory

## COLLECTION SITE INFORMATION

Atascosa Germplasm Texas grama comprises collections originating from 6 locations in the Rio Grande Plain of south Texas. Accessions 9089281 and 9089282 were collected from Weigang sandy clay loam soils on highway rights-of-way in Atascosa and Live Oak counties. Accession 9086289 and 9089275 were collected from Monteloa clay soil (USDA NRCS 2009b) on a private ranch in Atascosa County, and 9088532 from a private ranch in Zavala County on a Webb fine sandy loam soil (USDA NRCS 2009b). The final component of the blend, accession 9088708, was collected along a county road right-of-way in Webb County from a Maverick/Catarina clay soil complex (USDA NRCS 2009b). Original seed was hand-collected from as many plants as possible at each location.

## DESCRIPTION

Accessions constituting Atascosa Germplasm Texas grama have considerable variability in vegetative characteristics. Mature plants are 34 to 45 cm (13 to 17 in) tall; foliage height is 20 to 32 cm (7 to 12 in). Basal diameter of clumps varies among accessions from 5 to 12 cm (2 to 4 in), and diameter of foliage is 18 to 25 cm (7 to 10 in). Seed stalks bear 11 to 15 spikelets on the upmost 5 to 8 cm (2 to 3 in) of the spikes. Leaf width varies from 2 to 3 mm (0.07 to 0.11 in) and 13 to 21 cm (5 to 8 in) in length. Two accessions in the blend can be characterized as having narrow bases with long, thin leaves, while the other accessions have thicker bases, more robust tillers, and shorter, broader leaves. Texas grama is commonly one of the first native grasses to produce seed each spring, and plants rarely become fully dormant in the winter. Plants are extremely uniform within accessions, and morphological plant characteristics appear to be extremely stable. Because the exact mode of reproduction is unknown for *B. rigidiseta,* each of the breeder lines were increased in isolation. Following harvest, seed is blended by equal percentage of pure live seed (PLS) and distributed to commercial producers. On average in seed production settings, 53% of the seed is nondormant and germinates within 28 d; mean seed dormancy is 20%. Depending on production year and climatic conditions, PLS of mechanical harvests averages 40 to 70%. Maximum seed yields obtained to date are 60 kg/ha (55 lb/ac). The release name "Atascosa" was chosen because 3 of the 6 accessions originate from Atascosa County.

## METHOD OF SELECTION

Seed of 24 Texas grama collections from south Texas was planted in greenhouse flats in 2003. Transplants were planted in an irrigated, randomized complete block experiment with 2 repli-

cations of 10 plants per accession at Bladerunner Farms near Poteet, Texas. Of the 21 collections planted in this evaluation, 10 demonstrated strong perennial characteristics. Seed was collected from these accessions when ripe throughout the year and tested for seed germination and yield potential during the winter of 2003–2004. These tests identified 6 of the 10 strongly perennial collections as having good seed production characteristics.

Accessions with poor seed production or survival were removed from the experiment in 2004. Irrigation was discontinued in 2004. Visual evaluations conducted in fall 2004 showed the 6 remaining collections again had good vegetative performance and survival. These 6 accessions were subsequently planted for advanced evaluation at 3 locations. Vegetative characteristics were evaluated throughout 2005 at each location and showed good uniformity in seed maturation and seedhead height. Survival at all locations was very good. Seed germination was evaluated in this experiment and showed consistent germination among all accessions at 2 of the 3 sites. Following advanced evaluation, accessions 9089281 and 9089282 were combined, as were 9086275 and 9086289, because of identical plant characteristics and close proximity of collection sites. Because of a critical need for native seed for highway and rangeland revegetation projects, and strong indications of good performance of these accessions at multiple locations, a blend of the 4 lines was then made to release and attempt to commercialize.



Four breeder seed fields were established using transplants grown from seed harvested from isolated increases of the original seed collections. Each of the 0.1 ha (0.25 ac) seed fields was spatially separated from the others, because the mode of reproduction of this species is unknown. This method of increase was chosen to ensure that genetic erosion or adaptation to the increase site was minimized if outcrossing occurred. Seed harvested from these fields is blended following harvest by equal percentage of pure live seed and distributed to commercial producers.

Seeding trials of Atascosa Germplasm Texas grama have been conducted at several locations throughout south Texas. Good performance, especially during drought conditions, has been documented at plantings in the western Rio Grande Plain and Lower Rio Grande Valley regions of south Texas. Experimental plantings on a highway right-of-way near Kingsville, Texas, demonstrated good performance of Texas grama on extremely dry or shallow microsites. Atascosa Germplasm is one of the only native grasses evaluated that can establish and persist in plantings made on rocky, dry, or shallow soils. It should be used as a component of a seed mixture of native grasses when planted, as emergence and persistence appear to be limited to specific areas of most planting sites, and seed production potential (facilitating large amounts of commercially available seed) is relatively low. Hence, costs for large quantities of seed are anticipated to be higher than for many native species.

## ECOLOGICAL CONSIDERATION

Texas grama is a naturally occurring species in Texas and planting it would not constitute an introduction of an exotic species into local ecosystems. This release provides roadside planting materials for south Texas, and its use may help reduce the planting of exotic grasses that may spread into adjacent habitats and negatively affect native plant and animal species.

## ANTICIPATED CONSERVATION USE

Atascosa Germplasm is the first known release of Texas grama. It will be useful as a component of rangeland seed mixes and for highway right-of-way revegetation. Texas grama has potential use as a vegetative cover for non-mow areas of urban landscapes and in ornamental plantings. It will be an excellent plant for reclamation or stabilization of caliche, stony, or shallow upland soils.

## ANTICIPATED AREA OF ADAPTATION

Best performance of Atascosa Germplasm is anticipated in the major land resource area (MLRA) 83A-E and 150. Because several of the collections included in the blend originated near the southern extent of the Edwards Plateau, good performance may be observed in MLRA 81A-D, although this use has yet to be tested. Evaluation plantings of this germplasm in north central Texas and southern Oklahoma have had poor survival and seed quality indicating poor adaptation, despite *B. rigidiseta* being a common component of the natural vegetation of these areas.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by South Texas Natives and distributed through the Texas Foundation Seed Service. Limited quantities of seed for research and evaluation purposes are available on request from South Texas Natives (stn@tamuk.edu).

## ACKNOWLEDGMENT

This is Caesar Kleberg Wildlife Research Institute Manuscript 10-108.

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[USDA NRCS] USDA Natural Resources Conservation Service. 2009b. Web soil survey. URL: http//www.websoilsurvey.nrcs.gov (accessed 26 Aug 2009). Lincoln (NE): National Soil Survey Center.

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Representative plants of a component of Catarina blend bristlegrass.

Photo by Shelly D Maher

NOTICE OF RELEASE OF

# CATARINA BLEND BRISTLEGRASS

SELECTED CLASS OF NATURAL GERMPLASM

**John Lloyd-Reilley, Shelly D Maher, William R Ocumpaugh, Paula D Maywald, and Forrest S Smith**

## ABSTRACT

Four selected germplasms of bristlegrass (*Setaria vulpiseta* (Lam.) Roem. & Schult. and *S. leucopila* (Scribn. & Merr.) K. Schum. [Poaceae]) have been released for rangeland plantings and wildlife habitat enhancement plantings in the Rio Grande Plain of Texas. Catarina blend bristlegrass is a mix of 4 bristlegrass releases (Kika648 Germplasm, Kika819 Germplasm, Kika820 Germplasm, and Kika677 Germplasm) selected from an extensive evaluation at multiple sites in south Texas. Accessions included in the blend are increased in isolation and blended prior to sale in order to maintain the genetic integrity of each release. These germplasms represent the first commercially available release of bristlegrass that has been tested and is adapted to south Texas.

Lloyd-Reilley J, Maher SD, Ocumpaugh WR, Maywald PD, Smith FS. 2010. Notice of release of Catarina blend bristlegrass: selected class of natural germplasm. Native Plants Journal 11(3):305–309.

## KEY WORDS

*Setaria vulpiseta*, *Setaria leucopila*, Rio Grande Plain, Texas, Poaceae

## NOMENCLATURE

Plants: USDA NRCS (2005)
Major Land Resource Areas: USDA NRCS (2006)

## COLLABORATORS

USDA Natural Resources Conservation Service, E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; South Texas Natives, Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, Texas; and Texas AgriLife Research, Beeville, Texas.

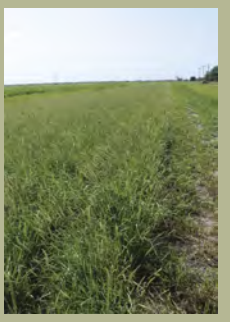


Photo by Forrest S Smith

**Species** | Blend of *Setaria vulpiseta* (Lam.) Roem. & Schult. and 3 lines of *S. leucopila* (Scribn. & Merr.) K. Schum.
**Common name** | plains bristlegrass, streambed bristlegrass
**Accession number** | 9029648, 9029677, 9038819, 9038820

Catarina blend bristlegrass represents the first commercially available release of this species that is adapted to south Texas. The blend is a mix of 4 releases evaluated at multiple sites, and has been released for rangeland plantings and wildlife habitat enhancement.

Catarina blend bristlegrass seed is a mechanical mix of 4 selected accessions, each a Texas Selected Native Plant Germplasm eligible for seed certification under the Texas Department of Agriculture and Texas Administrative Code guidelines (TAC 2007), and is available for use in the Rio Grande Plain of Texas. The 4 selected class releases are referred to as Kika648 plains bristlegrass (*Setaria vulpiseta* (Lam.) Roem. & Schult. [Poaceae]) and USDA Natural Resources Conservation Service (NRCS) accession number 9029648; Kika677 Germplasm streambed bristlegrass (*S. leucopila* (Scribn. & Merr.) K. Schum.) and USDA NRCS accession number 9029677; Kika819 Germplasm streambed bristlegrass and USDA NRCS accession number 9038819; and Kika820 Germplasm streambed bristlegrass and USDA NRCS accession number 9038820.

These germplasms are commercially marketed as a mechanical blend to overcome limitations and to incorporate important attributes of each accession into commercially available seed. Catarina blend bristlegrass is the only bristlegrass germplasm that originates from, has been tested in, and is adapted to the Rio Grande Plain of south Texas. The only other commercial release of bristlegrass is 'Stevan' (an Arizona cultivar), and it fails to meet current standards for use of native seed in the Rio Grande Plain as outlined by the USDA NRCS Range Planting Code 550 standards (USDA NRCS 2007).

## JUSTIFICATION

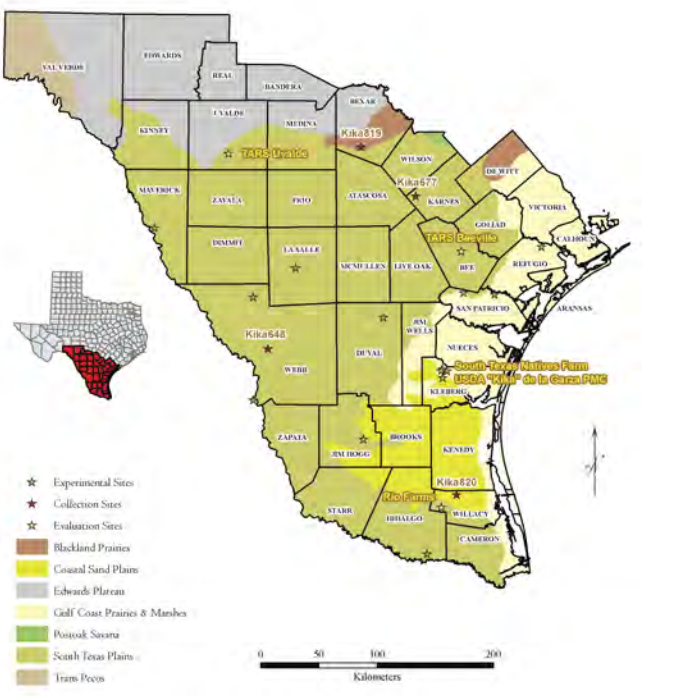
Catarina blend bristlegrass does meet the USDA NRCS Range Planting standards and is further justified for release because no commercial sources of bristlegrass are currently available and adapted for use in south Texas.

## COLLECTION SITE INFORMATION

Accessions making up the Catarina blend bristlegrass were collected from native plants at 4 locations throughout the Texas Rio Grande Plain (Webb, Karnes, Bexar, and Willacy counties). Original collections were hand-harvested from stands observed during seed collection efforts across the region. Seed was hand-stripped from as many plants as possible at the collection site, cleaned, assigned an individual accession number, and stored for evaluation. Accessions selected for the Catarina blend bristlegrass originate from a variety of range sites and soil types.

## DESCRIPTION

Catarina blend bristlegrass is a blend of 2 bristlegrass species, *Setaria vulpiseta*




Courtesy of CKWRI Wildlife Research Technologies Laboratory

(plains bristlegrass) and *S. leucopila* (streambed bristlegrass). Plains bristlegrass (Kika648 Germplasm) is a warm-season perennial bunchgrass with stiffly erect stems. Foliage height ranges from 60 to 120 cm (2 to 4 ft) tall, turning a pale yellow color at maturity. Stems are in dense clumps (Hitchcock 1971; Gould 1975; Correl and Johnston 1996). Plants of plains bristlegrass are long-lived and will produce seed from May through November under favorable conditions. Streambed bristlegrass (Kika677 Germplasm, Kika819 Germplasm, and Kika820 Germplasm) is a warm-season perennial bunchgrass with stiffly erect stems. Mature foliage height ranges from 60 to 120 cm (2 to 4 ft) tall and is usually pale or with a whitish or grayish color. Stems are in dense clumps, infrequently branched, and rough. Plants of streambed bristlegrass are long-lived and will produce seed from May through November under favorable conditions in south Texas (Hitchcock 1971; Gould 1975; Correl and Johnston 1996). Accessions constituting Catarina blend bristlegrass show genetic variation in plant size, leaf blade width, seedhead length, pubescence, and coloration. The 4 releases are increased in isolated fields to maintain their genetic integrity. Seed harvested from each increased accession is blended by proportions of pure live seed (PLS) following harvest. Accessions included in the release have shown superior performance in several ecological and agronomic performance categories, including a high proportion of full seed and lower mean seed dormancy, of accessions sampled from the target ecoregion of the release.

## METHOD OF SELECTION

Initial evaluations of bristlegrass began in 1984 at the USDA NRCS E "Kika" de la Garza Plant Materials Center (PMC), Kingsville, Texas. A total of 96 accessions of bristlegrass (*Setaria* spp.) were collected from throughout Texas. After initial evaluation, accessions 9038819 and 9038820 were determined to be the best accessions of bristlegrass for survival, vigor, growth form and development, and disease resistance.

An advanced evaluation plot was established at the PMC in 1994 that consisted of 4 replications of 10 plants each of 9038819, 9038820, 9003939 (Arizona PMC release 'Stevan'), and a Texas "common" commercial source. During 1996, we took biweekly seed harvests to determine total seed yield and in October 1996 evaluated the plots for total biomass production and survival. Accessions 9038819 and 9038820 showed superior performance. Despite numerous trials to obtain germination above 10%, work with bristlegrass was abandoned in the late 1990s due to poor laboratory germination results.

In 2001, in conjunction with the development of South Texas Natives, interest was revived in bristlegrass and a new initial evaluation was started on 30 accessions exclusively from south Texas. In 2003, 14 accessions were chosen from the PMC field evaluation plot and were taken to the Texas AgriLife Research Station at

Beeville for evaluation. Visual rankings (1 [best] to 9 [worst]) were recorded from May through November for each replication of each accession at both evaluation sites for plant vigor, foliage density, uniformity, development stage, seed production, biomass production, and plant height. Ripe seed was collected from each accession throughout the growing season and tested for seed germination in germination chambers (3 replications x 50 seeds per accession, 12 h light at 30 °C [86 °F], and 12 h dark at 18 °C [64 °F]). Germination was recorded for each accession for 28 d.

Four accessions were selected for seed increase and release based on analysis of visual field evaluation, proportion of full seed, level of seed dormancy, seed harvest, origin location, and soil type. Accession 9029648 was chosen based on its origin from a Catarina clay soil in Webb County, its cold tolerance, and it was one of only 2 accessions to show high germination (48%). Accession 9029677 was chosen because it consistently had the highest seed germination (72%), good cold tolerance, and its origin from a Monteola clay in Karnes County. Accession 9038819 was chosen based on its consistent field evaluations, longevity, and high seed yields of 308 kg/ha (275 lb/ac). It also came from a Lewisville silty clay from Bexar County. Accession 9038820 was chosen because it consistently had the highest forage yields and highest seed yields (610 kg/ha [544 lb/ac]) of any accession, and it was the only accession chosen from a Sarita fine sand soil in Willacy County. In addition, accessions 9038819 and 9038820 have very high seed dormancy (90 to 99%). Blending these 4 accessions provides for good stands of seeded bristlegrass, along with good forage, seed production, and long-term survival.

Following selection, accessions were increased using the tested seed. Transplants (1200) of each accession were grown and planted in isolated breeder blocks. Seed from these isolated breeder blocks of each accession is individually harvested to maintain genetic integrity and to minimize the potential for genetic drift or adaptation to the breeder field site. The individual accessions were released to commercial growers as Foundation Seed through the Texas Foundation Seed Service for establishment of certified seed fields of each bristlegrass accession. Catarina bristlegrass is the mechanical blending of these 4 bristlegrass accessions in appropriate proportions of PLS to provide commercial bristlegrass seed that is adapted to various soils and locations throughout south Texas.

## ECOLOGICAL CONSIDERATION

Bristlegrass is a naturally occurring species in Texas and planting it would therefore not constitute an introduction of an exotic species into local ecosystems. Any negative impacts on other native plant species would likely be minimal to nonexistent. Also, release of this species will make available a native species that is adapted for use in south Texas.

## ANTICIPATED CONSERVATION USE

Catarina blend bristlegrass will provide a native grass species for rangeland revegetation and wildlife habitat plantings in the Rio Grande Plain of south Texas.

## ANTICIPATED AREA OF ADAPTATION

Catarina blend bristlegrass is well adapted for use in the southern portions of Texas. This coincides with the major land resource area (MLRA) 83A-E and 150.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by the E "Kika" de la Garza Plant Materials Center and distributed through the Texas Foundation Seed Service. Certified seed may be grown within the State of Texas. Limited quantities of seed for research or evaluation purposes will be available on request from John Lloyd-Reilley (john.reilley@tx.usda.gov).

## ACKNOWLEDGMENT

This is Caesar Kleberg Wildlife Research Institute Manuscript 10-109.

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Representative plants of Welder Germplasm shortspike windmillgrass

NOTICE OF RELEASE OF

# WELDER GERMPLASM SHORTSPIKE WINDMILLGRASS

SELECTED CLASS OF NATURAL GERMPLASM

**John Lloyd-Reilley, Shelly D Maher, William R Ocumpaugh, Paula D Maywald, and Forrest S Smith**

ABSTRACT

A selected germplasm of shortspike windmillgrass (*Chloris* x *subdolichostachya* Müll. Berol. (pro sp.) [Poaceae]) has been released for roadside plantings, critical site revegetation, and rangeland plantings in the Rio Grande Plain of Texas. Welder Germplasm shortspike windmillgrass is a selected accession collected from San Patricio County, Texas, and evaluated at multiple sites across south Texas. This germplasm represents the first commercially available release of shortspike windmillgrass.

Lloyd-Reilley J, Maher SD, Ocumpaugh WR, Maywald PD, Smith FS. 2010. Notice of release of Welder Germplasm shortspike windmillgrass: selected class of natural germplasm. Native Plants Journal 11(3):317–320.

**KEY WORDS**

*Chloris* x *subdolichostachya*, Rio Grande Plain, Texas, Poaceae

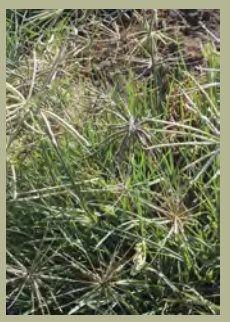
**NOMENCLATURE**

Plants: USDA NRCS (2005)
Major Land Resource Areas: USDA NRCS (2006)

**COLLABORATORS**

USDA Natural Resources Conservation Service, E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; South Texas Natives, Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, Texas; and Texas AgriLife Research, Beeville, Texas.

Photos by Shelly D Maher



**Species** | *Chloris* x *subdolichostachya* Müll. Berol. (pro sp.)
**Common name** | shortspike windmillgrass
**Accession number** | 9085260

This selected germplasm of shortspike windmillgrass was collected from San Patricio County and evaluated at multiple sites across south Texas. It is the first commercially available release of shortspike windmillgrass and is intended for roadside plantings, revegetation of critical sites, and rangeland plantings in the Rio Grande Plain of Texas.

Welder Germplasm shortspike windmillgrass (*Chloris* x *subdolichostachya* Müll. Berol. (pro sp.) [Poaceae]), a Texas Selected Native Plant Germplasm, is eligible for seed certification under the Texas Department of Agriculture and Texas Administrative Code guidelines (TAC 2007) and is available for use in the Rio Grande Plain of Texas. As a selected class release, this selection will be referred to as Welder Germplasm shortspike windmillgrass and USDA Natural Resources Conservation Service accession number 9085260.

## JUSTIFICATION

This germplasm is the first release of a shortspike windmillgrass germplasm that originates from the Rio Grande Plain of south Texas (USDA NRCS 2008). Welder Germplasm is justified for release because no commercial sources of shortspike windmillgrass are currently available in the State of Texas. It was selected and evaluated as a native alternative to bermudagrass (*Cynodon dactylon* (L.) Pers. [Poaceae]) for roadside plantings and critical site revegetation.

## COLLECTION SITE INFORMATION

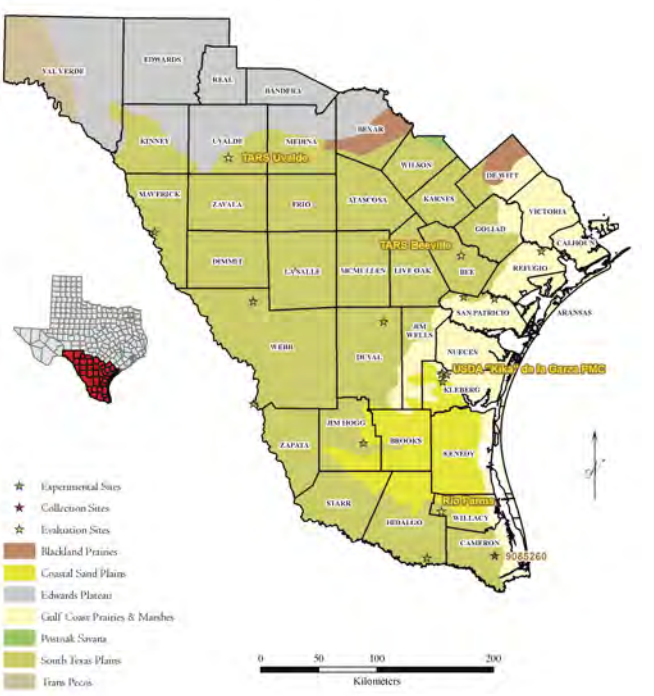
Welder Germplasm shortspike windmillgrass was collected from the Welder Wildlife Refuge in San Patricio County, Texas, on an Orelia sandy clay loam soil with a 1% slope. The original seed was hand-stripped from as many plants as possible at the collection site, cleaned, assigned an individual accession number, and stored for evaluation.

## DESCRIPTION

Welder Germplasm shortspike windmillgrass is a warm-season, native grass hybrid that according to Gould (1975) is formed when hooded windmillgrass (*Chloris cucullata* Bisch.) hybridizes with *Chloris verticillata* Nutt. or *Chloris andropogonoides* Fourn. in areas where their ranges overlap. The hybrids are generally intermediate morphologically between the parents. This species is a strongly stoloniferous perennial grass that grows 30 to 90 cm (1 to 3 ft) tall. Plants of shortspike windmillgrass will produce seed from May to October, with the majority coming in September and October (Hitchcock 1971; Correl and Johnston 1996). Welder Germplasm has shown superior performance in several ecological and agronomic performance categories as well as rapid seed germination rates in its evaluations across south Texas.

## METHOD OF SELECTION

Welder Germplasm was initially evaluated at the E "Kika" de la Garza Plant




Courtesy of CKWRI Wildlife Research Technologies Laboratory

Materials Center (PMC), Kingsville, Texas, in 2000 and 2001. A total of 43 accessions of windmillgrass were collected throughout Texas and were included in the study. Viability of original seed was determined by sowing seeds in a 98-cell seedling tray filled with commercially available potting medium. Trays were placed in a greenhouse with growing conditions of 12 h with daytime temperature maintained near 30 °C (86 °F), and 12 h with night temperature near 18 °C (64 °F), and watered daily to maintain adequate soil moisture for optimum germination. This greenhouse evaluation of original seed resulted in the selection of 35 accessions for field evaluation. Those selected had a minimum of 20 plants after 60 d in the greenhouse.

From the initial field evaluation plots of these 35 accessions, 2 accessions revealed superior characteristics based on vigor, growth form and development, and disease resistance. Advanced evaluation plots of these 2 accessions were established in 2002 at the PMC in Kingsville and the Texas AgriLife Research Station in Beeville. At each location 2 replications of 10 transplants of each accession were established in a randomized spaced plant (90 cm [36 in] between plants) complete block design on 90-cm (36-in) rows. Plants were irrigated to ensure establishment during the initial growing season. Plantings were not irrigated after the first year. In 2002, visual rankings (1 [best] to 9 [worst]) were given from May through November to each replication of each accession for plant vigor, foliage density, uniformity, development stage, seed production, biomass production, and plant height. In 2003, visual rankings were again recorded from March through November for each replication. Ripe seed was collected from each accession throughout the growing season in 2002 and 2003 and tested for seed germination (28 d) in germination chambers (3 replications x 50 seeds per accession, 12 h light at 30 °C [86 °F], and 12 h dark at 18 °C [64 °F]).

Welder Germplasm was selected for seed increase and release based on the rankings of its plant characteristic and germination tests in 2002–2003. The goal was to release a shortspike windmillgrass that would have a quick germination rate (typically within the first 3 d) while exhibiting a moderate germination percentage (roughly 70%) and with some dormant seed retention (20 to 30%) to deal with unpredictable weather conditions. Accessions were also evaluated for stoloniferous growth habit and seed production. All the shortspike windmillgrass collections exhibited these traits. Welder Germplasm was chosen over other accessions because of its superior seedling growth rate and aggressive stoloniferous growth habit. Observations quickly revealed that the Welder Germplasm possessed the traits needed to provide critical revegetation needs and was capable of competing with introduced species such as bermudagrass and old world bluestems (*Dichanthium* Willem. [Poaceae] and *Bothriochloa* Kuntze [Poaceae]) on roadside plantings. Thus, a single accession, Welder Germplasm, was released for the south Texas region.



Following selection, Welder Germplasm was increased by dividing up the original plant clumps from the observation plot at the PMC and planting 1300 divisions in an isolated seed increase plot. Seed collected from these plants was used to expand the plot. Seed from this breeder block is harvested and made available to commercial growers as Foundation Seed through the Texas Foundation Seed Service for establishment of certified seed fields of Welder Germplasm shortspike windmillgrass.

## ECOLOGICAL CONSIDERATION

Shortspike windmillgrass is a naturally occurring species in Texas and planting it would therefore not constitute an introduction of an exotic species into local ecosystems. Any negative impacts on other native plant species would likely be minimal to nonexistent. Also, release of this species will make available an additional native species for use in south Texas.

## ANTICIPATED CONSERVATION USE

Welder Germplasm shortspike windmillgrass will provide a native grass species for roadside plantings, critical area revegetation, and rangeland plantings.

## ANTICIPATED AREA OF ADAPTATION

Welder Germplasm shortspike windmillgrass is well adapted for use in the southern portions of Texas, coinciding with major land resource area (MLRA) 83A-E and 150.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by the E "Kika" de la Garza Plant Materials Center and distributed through the Texas Foundation Seed Service. Certified seed may be grown within the State of Texas. Limited quantities of seed for research or evaluation purposes will be available on request from John Lloyd-Reilley (john.reilley@tx.usda.gov).

## ACKNOWLEDGMENT

This is Caesar Kleberg Wildlife Research Institute Manuscript 10-111.

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Seedheads of hooded windmillgrass

NOTICE OF RELEASE OF

# MARIAH GERMPLASM HOODED WINDMILLGRASS

SELECTED CLASS OF NATURAL GERMPLASM

**John Lloyd-Reilley, Shelly D Maher, William R Ocumpaugh, Paula D Maywald, and Forrest S Smith**

ABSTRACT

A selected germplasm of hooded windmillgrass (*Chloris cucullata* Bisch. [Poaceae]) has been released for roadside plantings, critical site revegetation, and rangeland plantings in the Rio Grande Plain of Texas. Mariah Germplasm hooded windmillgrass is a selected accession collected from Kenedy County, Texas, and evaluated at multiple sites across south Texas. This germplasm represents the first commercially available release of hooded windmillgrass.

Lloyd-Reilley J, Maher SD, Ocumpaugh WR, Maywald PD, Smith FS. 2010. Notice of release of Mariah Germplasm hooded windmillgrass: selected class of natural germplasm. Native Plants Journal 11(3):311–315.

**KEY WORDS**

*Chloris cucullata,* Rio Grande Plain, Texas, Poaceae

**NOMENCLATURE**

USDA NRCS (2005)

**COLLABORATORS**

USDA Natural Resources Conservation Service, E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; South Texas Natives, Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, Texas; and Texas AgriLife Research, Beeville, Texas.

Photos by Forrest S Smith

**Species** | *Chloris cucullata* Bisch.
**Common name** | hooded windmillgrass
**Accession number** | 9085313

Collected from Kenedy County, this selected accession of hooded windmillgrass was evaluated at multiple sites across south Texas. Anticipated use of germplasm is roadside plantings, critical site revegetation, and rangeland plantings.

Mariah Germplasm hooded windmillgrass (*Chloris cucullata* Bisch. [Poaceae]), a Texas Selected Native Plant Germplasm, is eligible for seed certification under the Texas Department of Agriculture and Texas Administrative Code guidelines (TAC 2007) and is available for use in the Rio Grande Plain of Texas. As a selected class release, this selection will be referred to as Mariah Germplasm hooded windmillgrass and USDA Natural Resources Conservation Service (NRCS) accession number 9085313.

## JUSTIFICATION

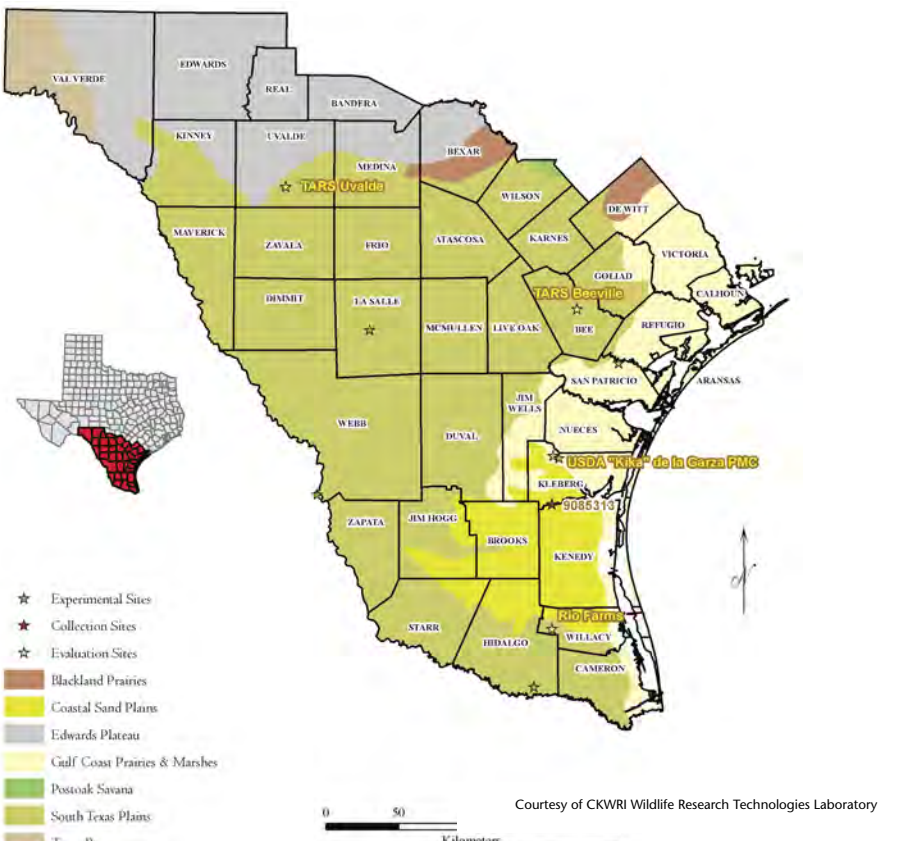
This germplasm is the first release of a hooded windmillgrass germplasm that originates from the Rio Grande Plain of south Texas (USDA NRCS 2008). Mariah Germplasm is justified for release because no commercial sources of hooded windmillgrass are currently available in Texas. It was selected and evaluated as a native alternative to bermudagrass (*Cynodon dactylon* (L.) Pers. [Poaceae]) for roadside plantings and critical site revegetation.

## COLLECTION SITE INFORMATION

Mariah Germplasm hooded windmillgrass was collected from a ranch in Kenedy County, Texas, on a Delfina loamy fine sand soil with a 1% slope. The original seed was hand-stripped from as many plants as possible at the collection site, cleaned, assigned an individual accession number, and stored for evaluation.

## DESCRIPTION

Mariah Germplasm hooded windmillgrass is a warm-season, native perennial grass that grows 15 to 60 cm (0.5 to 2 ft) in height (Hitchcock 1971; Gould 1975). Plants of hooded windmillgrass will produce seed monthly May to November under favorable conditions (Correl and Johnston 1996). Mariah Germplasm produces monthly summer seed crops typical of most hooded windmillgrass accessions but also reveals a moderate stoloniferous growth habit. This characteristic provides greater foliar coverage and additional erosion control benefits. Mariah Germplasm has shown superior performance in several ecological and agronomic performance categories as well as high and rapid seed germination rates in its evaluations across south Texas.




Courtesy of CKWRI Wildlife Research Technologies Laboratory

## METHOD OF SELECTION

Mariah Germplasm was initially evaluated at the E "Kika" de la Garza Plant Materials Center (PMC), Kingsville, Texas, in 2000 and 2001. A total of 43 accessions of windmillgrass were collected throughout Texas and were included in the study. Viability of original seed was determined by sowing seeds in a 98-cell seedling tray filled with commercially available potting medium. Trays were placed in a greenhouse with growing conditions of 12 h with daytime temperature maintained near 30 °C (86 °F), and 12 h with night temperature near 18 °C (64 °F), and were watered daily to maintain adequate soil moisture for optimum germination. This greenhouse evaluation of original seed resulted in the selection of 35 accessions for field evaluation. Those selected had a minimum of 20 plants after 60 d in the greenhouse.

From the initial field evaluation plots of these 35 accessions, 2 accessions revealed superior characteristics based on vigor, growth form and development, and disease resistance. Advanced evaluation plots of these 2 accessions were established in 2002 at the PMC in Kingsville and the Texas AgriLife Research Station in Beeville. At each location, 2 replications of 10 transplants of each accession were established in a randomized spaced plant (90 cm [36 in] between plants) complete block design, on 90-cm (36-in)

rows. Plants were irrigated to ensure establishment during the initial growing season. Plantings were not irrigated after the first year. In 2002, visual rankings (1 [best] to 9 [worst]) were given from May through November to each replication of each accession for plant vigor, foliage density, uniformity, development stage, seed production, biomass production, and plant height. In 2003, visual rankings were again recorded from March through November for each replication. Ripe seed was collected from each accession throughout the growing season in 2002 and 2003 and tested for seed germination (28-d) in germination chambers (3 replications x 50 seeds per accession, 12 h light at 30 °C [86 °F], and 12 h dark at 18 °C [64 °F]).

Mariah Germplasm was selected for seed increase and release because of its unique plant characteristics and analysis of germination tests in 2002–2003. The goal was to release a hooded windmillgrass that would have low seed dormancy (< 10%), high 3-d germination rate, produce multiple seed crops, and produce satisfactory seed yields. Mariah Germplasm had all these characteristics; however, it also had the singular characteristic of a stoloniferous growth habit that set it apart from the other hooded windmillgrass accessions. Because hooded windmillgrass was targeted for roadside plantings and erosion control, and because the spreading growth habit exhibited by Mariah Germplasm enhanced its abilities for its targeted purpose, a single accession was released for the south Texas region.

Following selection, Mariah Germplasm was increased by dividing original plant clumps from the observation plot at the PMC and planting 1300 divisions in an isolated seed increase plot. Seed collected from these plants was used to expand the plot. Seed from this breeder block is harvested and made available to commercial growers as Foundation Seed through the Texas Foundation Seed Service for establishment of certified seed fields of Mariah Germplasm hooded windmillgrass.

## ECOLOGICAL CONSIDERATION

Hooded windmillgrass is a naturally occurring species in Texas and planting it would therefore not constitute an introduction of an exotic species into local ecosystems. Any negative impacts on other native plant species would likely be minimal to nonexistent. Also, release of this species will make available an additional native species for use in south Texas.

## ANTICIPATED CONSERVATION USE

Mariah Germplasm hooded windmillgrass is well adapted for use in the southern and central portions of Texas.

## ANTICIPATED AREA OF ADAPTATION

Mariah Germplasm hooded windmillgrass will provide a native grass species for roadside plantings, critical area revegetation, and rangeland plantings. This coincides with the major land resource area (MLRA) 78A-C, 80A-B, 81A-D, 82A-B, 83A-E, and 150.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by the E "Kika" de la Garza Plant Materials Center and distributed through the Texas Foundation Seed Service. Certified seed may be grown within Texas. Limited quantities of seed for research or evaluation purposes will be available on request from John Lloyd-Reilley (john.reilley@tx.usda.gov).


## ACKNOWLEDGMENT

This is Caesar Kleberg Wildlife Research Institute Manuscript 10-110.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Representative example of pink pappusgrass

NOTICE OF RELEASE OF

# MAVERICK GERMPLASM PINK PAPPUSGRASS

SELECTED CLASS OF NATURAL GERMPLASM

**Forrest S Smith, William R Ocumpaugh, John Lloyd-Reilley, Keith A Pawelek, Shelly D Maher, Andrew W Scott Jr, and Juan Garza**

## ABSTRACT

A selected germplasm of pink pappusgrass (*Pappophorum bicolor* Fourn. [Poaceae]) has been released for rangeland seeding, highway rights-of-way revegetation, and wildlife habitat restoration plantings in south Texas. Maverick Germplasm pink pappusgrass is a blend of 7 accessions selected from an evaluation at multiple sites in the intended area of use. Selections were made based on multi-year evaluation of plant characteristics and germination tests of seed collected from each location. Following selection, components of the germplasm were increased in isolation and blended following harvest to ensure seed was included from each of the selected accessions. Accessions included in the blend originate from 7 different counties and distinct soil types. This germplasm represents the first commercial release of pink pappusgrass, an important component of native rangeland plant communities in south Texas.

Smith FS, Ocumpaugh WR, Lloyd-Reilley J, Pawelek KA, Maher SD, Scott AW Jr, Garza J. 2010. Notice of release of Maverick Germplasm pink pappusgrass: selected class of natural germplasm. Native Plants Journal 11(3):283–288.

## KEY WORDS

*Pappophorum bicolor,* Texas, Poaceae

## NOMENCLATURE

Plants: USDA NRCS (2009a)
Major Land Resource Areas: USDA NRCS (2006)

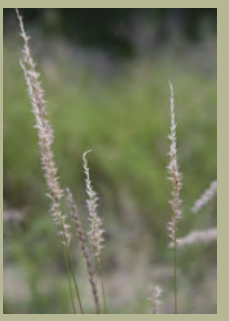
## COLLABORATORS

South Texas Natives, Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, Texas; USDA Natural Resources Conservation Service E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; Texas AgriLife Research, Beeville and Uvalde, Texas; Rio Farms Inc, Monte Alto, Texas; and Rancho Blanco, Laredo, Texas.

Photos by Forrest S Smith

## DESCRIPTION

Maverick Germplasm pink pappusgrass is a warm-season perrenial bunchgrass that grows 60 to 91 cm (24 to 36 in) tall. Basal circumference of mature plants is 25 to 38 cm (10 to 15 in) with the canopy commonly 38 to 60 cm (15 to 24 in) wide. Individual leaves are 43 to 60 cm (17 to 24 in) long and 0.5 to 1.5 cm (0.25 to 0.75 in) wide. Foliage is dark green in color, covered in a waxy cuticle, and stem nodes are purple. Seedheads are 15 to 22 cm (6 to 9 in) in length with purple or pink-tinged individual spikelets. Pink pappusgrass will produce seeds and foliage year-round in south Texas if adequate soil moisture is present and freezing temperatures do not occur. Maverick Germplasm has some variation in height, seedhead density, and foliage density because of the blending of accessions. Seed maturation and general growth stage of all 7 accessions is extremely similar. Accessions that make up the release were increased by plantings grown from original seed collections; transplants of each accession were spatially isolated from one another and from wild populations of *Pappophorum*. Seed harvested from these isolated fields is blended after harvest by equal percentage of pure live seed (PLS) to constitute Maverick Germplasm Breeder Seed, which is distributed to commercial seed growers. Accessions included in the release have superior performance in several ecolog-



**Species** | *Pappophorum bicolor* Fourn.
**Common name** | pink pappusgrass
**Accession number** | 9093444

Seven accessions, evaluated at multiple sites, have been blended to create a selected germplasm of pink pappusgrass for seeding on rangelands and rights-of-way, and to restore wildlife habitat.

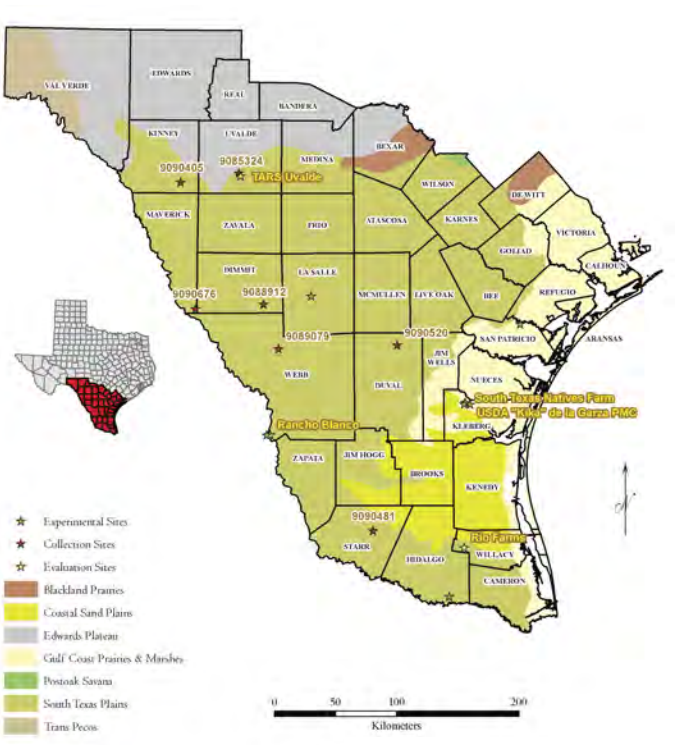
Maverick Germplasm pink pappusgrass (*Pappophorum bicolor* Fourn. [Poaceae]) was released as a Texas Selected Native Plant Germplasm in 2010. Maverick Germplasm will be identified by the USDA Natural Resources Conservation Service (NRCS) accession number 9093444. Pink pappusgrass is a widespread native grass species found throughout the Gulf Prairies and Marshes, Sand Sheet, and Rio Grande Plain ecoregions and southern portions of the Edwards Plateau, and eastern Trans-Pecos Mountains and Basins ecoregions of Texas, and adjacent areas of northern Mexico. It is often a codominant native grass species of grassland and savanna plant communities in south Texas (Meyer and Brown 1985) with grass species (Poaceae) such as Arizona cottontop (*Digitaria californica* (Benth.) Henr.), bristlegrasses (*Setaria* P. Beauv.), gramas (*Bouteloua* Lag.), windmillgrasses (*Chloris* Sw.), and false Rhodesgrass (*Trichloris* Fourn. ex Benth.). Pink pappusgrass provides fair forage for livestock (Hatch and others 1999). It commonly grows on gravelly and sandy soils (Hatch and Pluhar 1993) and is also found on saline range sites (Fanning and others 1965).

## JUSTIFICATION

Wild harvests of pink pappusgrass seed have been occasionally marketed by commercial seed producers in south Texas; however, prior to this release, tested, source-identified seed of pink pappusgrass was not available for restoration and revegetation use. Landowners, government agencies, and conservation programs in south Texas have a critical need for certified native seed with known origin, quality, and adaptation.

## COLLECTION SITE INFORMATION

Accessions constituting Maverick Germplasm pink pappusgrass were collected from native plants at 7 locations in south Texas. Original collections were hand-harvested during 2000–2004 from stands encountered in extensive seed collection efforts in the region. Collections were cleaned, assigned individual accession numbers, and stored for evaluation. Maverick Germplasm components originate from private ranches in Maverick, Webb, Kinney, Uvalde, Dimmit, Starr, and Duval counties and from Jimenez gravelly loam, Moglia clay loam, Ector Stony clay, unknown silty clay loam, Brundage fine sandy loam, McAllen fine sandy loam, and Pernitas fine sandy loam soil types (USDA NRCS 2009b).




Courtesy of CKWRI Wildlife Research Technologies Laboratory

ical and agronomic performance categories, and have a higher proportion of full seed combined with lower seed dormancy than that of other collections of pink pappusgrass evaluated. Pink pappusgrass and other *Pappophorum* species are assumed to have an apomictic or self-pollinated mode of reproduction. Chromosome number is reported as 2n = 100 (Gould 1975). Genetic recombination among different populations is thought to be limited (Garner and others 2006). This assumption supports the release of a blend of populations for use across a broad geographic area, as single populations may be poorly adapted to some sites (ecotypic specialists) or well adapted to a wide range of sites (ecotypic generalist). Our evaluation of accessions indicated that both types of adaptation may exist in the species.

## METHOD OF SELECTION

Seed of 70 original collections of *Pappophorum* obtained from south Texas was planted in the greenhouse in winter 2004. The accessions included pink pappusgrass (55), whiplash pappusgrass (*P. vaginatum* Buckley) (6) (see Smith and others 2010), and mixed collections of both species (9). Because these 2 species grow together in similar habitats (Reeder 2008), all accessions were evaluated together. Sixty-eight of the 70 collections produced enough plants for the establishment of 2 replications of 10 plants for evaluation plots at 3 Texas locations (60 plants/accession total) in 2005. These transplants were grouped in randomized split block evaluation plots at Rio Farms (near Monte Alto on sandy loam soil), Texas AgriLife Research Station–Uvalde (near Uvalde on silty clay loam soil), and Rancho Blanco (near Laredo on silt loam soil). Additional seedlings were planted in nursery plots at the E "Kika" de la Garza Plant Materials Center (near Kingsville on clay soil). Evaluation sites represent a variety of soils where pappusgrasses occur, and broad climatic variability in rainfall and temperature. This variety of evaluation sites was desired to facilitate selection of pappusgrass accessions that performed well across the south Texas region and to identify plant material that might be superiorly adapted to all sites or to a single location for inclusion in a commercial release.

Evaluation data were collected monthly in 2005 by visually ranking the performance of the accessions in a number of categories relating to plant performance and commercial seed production potential. All plantings were fully irrigated in 2005 to ensure establishment and expression of growth potential and seed production of each accession. Ripe seed was harvested from each accession at each evaluation location during the growing season and tested for seed germination (3 replications of 50 seeds per accession per site) during the winter of 2005–2006. In 2006, plots were not irrigated allowing accessions to be evaluated under natural conditions. Exceptional-to-extreme drought conditions at most of the evaluation sites prevented collection of seed for testing in 2006 but facilitated evaluation of the accessions under adverse growing conditions common in the region.

Analysis of evaluation data and germination test results revealed accessions with good plant performance at all sites, others with good performance at a single site, and considerable variation in proportion of full seed and seed dormancy. Final selections to be evaluated further included 3 accessions that performed well at all sites, superior performing accessions from each site (3), and one accession with an exceptionally high proportion of full seed and low seed dormancy. Averaged across all evaluations, selected accessions collectively have more full seed, higher percentage seed germination (low seed dormancy), and greater seed production potential than nonselected accessions.

Advanced evaluation plots of the 7 selected accessions were planted in isolated seed increase blocks for further evaluation in 2007. Timing of seed maturity, seedhead height, and performance in an intensive production setting were monitored closely to ensure that commercial production of these selections would be possible. All accessions exhibited similar seedhead heights and maturity dates that would facilitate growing them as blended germplasm in a common field. Seed was harvested from these plots to compare seed dormancy and germination of the accessions in a common setting and to assess seed yield potential. This seed was also used to grow 0.13 ha (0.34 ac) breeder seed blocks of each accession to produce seed for the released blend. All seed increase plots were grown in isolation because conclusive evidence of the reproductive biology of *Pappophorum* is unavailable. Following harvest, seed of each breeder field was tested for quality, blended in equal quantities based on percentage of pure live seed (PLS), and distributed to commercial seed producers as Foundation Seed. Only seed harvested from plantings of Foundation Seed can be used to establish certified seed production fields.

Extensive seeding trials of pappusgrasses were conducted in the development of Maverick Germplasm. Mix-tures of pink and whiplash pappusgrass were seeded in experiments at 4 locations from 2005–2008. Best results have been obtained when pappusgrasses were seeded at a rate of 3.4 kg PLS per ha (3.0 lb PLS per ac). Pappusgrasses emerge best from seed in early-mid fall in south Texas. Seed can be covered with a talc-based coating to facilitate planting, as uncoated seed is difficult to plant and meter accurately. Both broadcast and drill seedings have produced acceptable results. The inclusion of both Maverick Germplasm and Webb Germplasm whiplash pappusgrass in seed mixes is recommended to ensure good performance on most sites.

## ECOLOGICAL CONSIDERATION

Pink pappusgrass is a naturally occurring species in Texas and planting it would therefore not constitute an introduction of an exotic species into local ecosystems. Any negative impacts to other native plant species would likely be minimal to nonexistent. Availability of ecotypic seed of this species provides an additional native species for revegetation and restoration seed mixes in the region; it also provides a native species useful in efforts to diversify exotic grass–dominated habitats and thereby increase habitat quality for wildlife. Maverick Germplasm is anticipated to be used extensively in highway rights-of-way plantings in the region, potentially replacing the use of exotic species such as buffelgrass (*Pennisetum ciliare* (L.) Link [Poaceae]) in roadside seed mixes.

## ANTICIPATED CONSERVATION USE

Maverick Germplasm will be useful for rangeland, highway right-of-way, and upland wildlife habitat plantings. It has demonstrated good competitive ability in areas dominated by the exotic plants buffelgrass and Kleberg's bluestem (*Dichanthium annulatum* (Forssk.) Stapf [Poaceae]) and may be useful in efforts to restore or diversify these areas to improve native ecological conditions.

## ANTICIPATED AREA OF ADAPTATION

Maverick Germplasm is known to be adapted to the region south of lat 29°27'N, bounded by the Gulf of Mexico on the east, and Rio Grande River to the west and south. This area encompasses major land resource area (MLRA) 83A-E and 150. Good adaptation and performance is likely in adjacent areas, such as MLRA 42, 81A, 81B, and 81D.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by South Texas Natives and distributed through the Texas Foundation Seed Service to commercial growers. Limited quantities of seed for research and evaluation purposes are available on request from South Texas Natives (stn@tamuk.edu).

## ACKNOWLEDGMENT

This is Caesar Kleberg Wildlife Research Institute Manuscript 10-105.

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SDA NRCS] USDA Natural Resources Conservation Service. 2009b. Web soil survey. URL: http//www.websoilsurvey.nrcs.gov (accessed 26 Aug 2009). Lincoln (NE): National Soil Survey Center.

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Seedhead of whiplash pappusgrass

NOTICE OF RELEASE OF

# WEBB GERMPLASM WHIPLASH PAPPUSGRASS

SELECTED CLASS OF NATURAL GERMPLASM

**Forrest S Smith, William R Ocumpaugh, John Lloyd-Reilley, Keith A Pawelek, Shelly D Maher, Andrew W Scott Jr, and Juan Garza**

ABSTRACT

A selected germplasm of whiplash pappusgrass (*Pappophorum vaginatum* Buckley [Poaceae]) has been released for rangeland seeding, saline soil revegetation, and wildlife habitat restoration plantings in south Texas. Webb Germplasm whiplash pappusgrass is a blend of 3 accessions selected from an evaluation at multiple sites in the intended area of use. Selections were made based on visual evaluations of plant characteristics and germination tests of seed collected from each location. Following selection, components of the germplasm were increased in isolation and blended following harvest to ensure inclusion of seed of each selected accession. Accessions included in the blend originate from 3 counties and distinct soil types. This germplasm represents the first commercial release of a whiplash pappusgrass ecotype originating from south Texas.

Smith FS, Ocumpaugh WR, Lloyd-Reilley J, Pawelek KA, Maher SD, Scott AW Jr, Garza J. 2010. Notice of release of Webb Germplasm whiplash pappusgrass: selected class of natural germplasm. Native Plants Journal 11(3):275–280.

## KEY WORDS

*Pappophorum vaginatum,* Texas, Poaceae

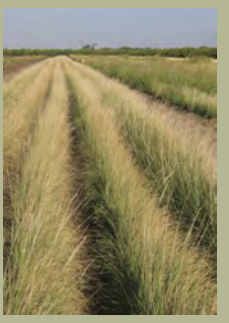
## NOMENCLATURE

Plants: USDA NRCS (2009a)
Major Land Resource Areas: USDA NRCS (2006)

## COLLABORATORS

South Texas Natives, Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, Texas; USDA Natural Resources Conservation Service E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; Texas AgriLife Research, Beeville and Uvalde, Texas; Rio Farms Inc, Monte Alto, Texas; and Rancho Blanco, Laredo, Texas.

Photos by Forrest S Smith



**Species** | *Pappophorum vaginatum* Buckley
**Common name** | whiplash pappusgrass
**Accession number** | 9093443

A selected germplasm of whiplash pappusgrass, representing a blend of 3 accessions collected from a variety of soil types, has been released for revegetation and wildlife habitat restoration plantings in south Texas.

Webb Germplasm whiplash pappusgrass (*Pappophorum vaginatum* Buckley [Poaceae]) was released as a Texas Selected Native Plant Germplasm in 2010. Webb Germplasm will be identified by the USDA Natural Resources Conservation Service (NRCS) accession number 9093443.

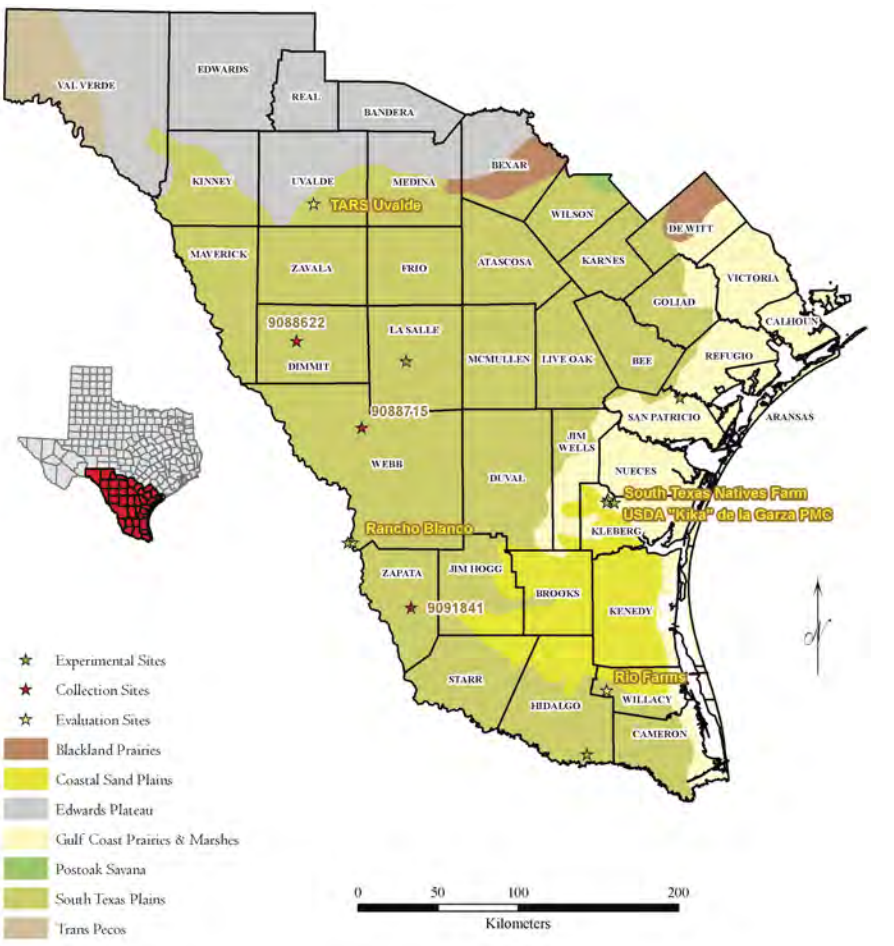
Whiplash pappusgrass is a widespread native grass species found throughout the Gulf Prairies and Marshes, Sand Sheet, and Rio Grande Plain ecoregions of Texas. It can also be found in the southern portions of the Edwards Plateau and eastern Trans-Pecos Mountains and Basins ecoregions and in adjacent areas of northern Mexico west to Arizona (USDA NRCS 2009a). Whiplash pappusgrass is often found growing with pink pappusgrass (*P. bicolor* Fourn. [Poaceae]) and is often misidentified as such. Plants from Texas have also historically been identified as *P. mucronulatum* Nees. (Gould and Box 1965; Gould 1975); however, Reeder and Toolin (1989) suggest *P. vaginatum* as the correct name for North American populations. Whiplash pappusgrass is often found growing on coastal, saline, and alkaline sites in low areas (Hitchcock 1950), on calcareous soils (Gould and Box 1965), and near ship channels and spoil islands of the lower coast of the Gulf of Mexico (Hatch and others 1999). We also obtained collections of populations from a variety of upland sites, where *P. vaginatum* is present as a minor component of the vegetation community with the more dominant upland species *P. bicolor*.

## JUSTIFICATION

Prior to this release, ecotypic seed of whiplash pappusgrass for restoration and revegetation use in south Texas was not commercially available. A critical need for certified native seed with known origin, quality, and adaptation for use by landowners, agencies, and in conservation programs exists in south Texas.

## COLLECTION SITE INFORMATION

Accessions constituting Webb Germplasm whiplash pappusgrass were collected from native plants at 3 locations in south Texas. Original collections were hand-harvested from stands encountered during extensive seed collection efforts across the region from




Courtesy of CKWRI Wildlife Research Technologies Laboratory

2000–2004. Collections were cleaned, assigned individual accession numbers, and stored for evaluation following collection. Collections that make up Webb Germplasm were obtained from Copita fine sandy loam, Catarina clay, and Brundage fine sandy loam soil types (USDA NRCS 2009b) in Webb, Zapata, and Dimmit counties.

## DESCRIPTION

Webb Germplasm whiplash pappusgrass is a warm-season perennial bunchgrass that grows 55 to 106 cm (22 to 42 in) tall. Basal circumference of mature plants is 25 to 38 cm (10 to 15 in) with a canopy commonly 45 to 66 cm (18 to 26 in) wide. Individual leaves are 43 to 60 cm (17 to 24 in) long and 0.5 to 1.5 cm (0.25 to 0.75 in) wide. Foliage is usually a lime-green color; leaves are covered in a waxy cuticle and stem nodes lack color. Seedheads are 15 to 25 cm (6 to 10 in) in length, and individual spikelets are a cream or white color. Whiplash pappusgrass will produce foliage and seed year-round in south Texas if adequate soil moisture is present and freezing temperatures do not occur. Webb Germplasm is uniform in height, seedhead density, and foliage density because of the similar morphology of the selected accessions. Accessions were increased by planting transplants grown from seed of the original seed collections and were spatially isolated from one another and from wild populations of *Pappophorum*. Seed harvested from these isolated fields is blended after harvest by equal percentage of pure live seed (PLS) to constitute Webb Germplasm Breeder Seed that is distributed to commercial seed growers. Accessions selected for inclusion in the release have shown greater performance in vegetative evaluation categories and evidence of a greater proportion of full seed with low seed dormancy at multiple evaluation locations within the intended area of use. Chromosome number of the species is reported as 2n = 40 or 60 (Reeder and Toolin 1989). Whiplash pappusgrass and other *Pappophorum* species are assumed to have an apomictic or self-pollinated mode of reproduction. Genetic recombination among different populations is thought to be limited (Garner and others 2006). Our evaluation of accessions indicates a high degree of uniformity in whiplash pappusgrass ecotypes from south Texas, but the species naturally grows across a wide gradient of soil textures and properties. Ecotypes selected from Catarina clay and Brundage fine sandy loams may be well adapted to high salinity and sodium concentrations present on mesic sites in the region, whereas the accession originating from a Copita fine sandy loam may be better adapted for well-drained, upland sites.

## METHOD OF SELECTION

Seed of 70 original collections of *Pappophorum* obtained from south Texas was planted in the greenhouse in winter 2004. The evaluated population of accessions included whiplash pappusgrass (6), pink pappusgrass (55) (see Maverick Germplasm pink pappusgrass [Smith and others 2010]), and mixed collections of both species (9). Because these 2 species grow together in similar habitats (Reeder 2008), all accessions were evaluated together. Sixty-eight of the 70 collections produced enough plants for establishment of 2 replications of 10 plants for evaluation plots at 3 Texas locations (60 plants total) in 2005. These transplants were planted in randomized split block evaluation plots at Rio Farms (near Monte Alto on sandy loam soil), Texas AgriLife Research Station–Uvalde (near Uvalde on silty clay loam soil), and Rancho Blanco (near Laredo on silt loam soil). Additional seedlings were planted in nursery plots at the E "Kika" de la Garza Plant Materials Center (near Kingsville on clay soil). Evaluation sites represent a variety of soils where pappusgrasses grow and broad variability in rainfall and temperature, desired characteristics to facilitate selection of pappusgrass accessions that perform well across south Texas and that identify plant material superiorly adapted to all sites or a single location for inclusion in this release.

Evaluation data were collected monthly in 2005 on all accessions by visually ranking the performance of the accessions in a number of categories relating to plant performance and commercial seed production potential. All plantings were fully irrigated in 2005 to ensure establishment and expression of growth potential and seed production. Ripe seed was harvested from each accession at each evaluation location during the growing season and tested for seed germination (3 replications of 50 seeds per accession per evaluation site) in winter of 2005–2006. In 2006, plots were not irrigated and accessions were evaluated under natural conditions. Exceptional-to-extreme drought conditions at most of the evaluation sites prevented the collection of seed for testing in 2006 but did facilitate evaluation of the accessions under adverse growing conditions common in the region.

Analysis of evaluation data and germination test results of the 6 collections of whiplash pappusgrass resulted in selection of 3 accessions for further evaluation. Morphologically, the 6 accessions were very uniform. We selected accessions exhibiting good survival at all evaluation locations, consistent vegetative performance, a high proportion of full seed, and low seed dormancy. One of the non-selected accessions had consistently poor performance in most evaluation categories, and another had a high proportion of full seed and low seed dormancy but poor vegetative performance. A third accession was eliminated from consideration because it performed well at only one site, in contrast to the selected accessions that had above average performance at 2 or more sites.

Advanced evaluation plots of the 3 selected accessions were planted in 2007 as isolated seed increase blocks. Timing of seed maturity, seedhead height, and performance in an intensive production setting were monitored closely to ensure that commercial seed production would be possible. All accessions exhibited similar seedhead heights and maturity dates that would facilitate growing them as a blended germplasm in a common field. Seed was harvested from these plots to compare seed germination of the accessions in a common setting and assess seed yield potential. This seed was also used to establish 0.13 ha (0.34 ac) breeder seed blocks of each accession to produce seed for the released blend. All seed increase plots were grown in isolation from one another because conclusive evidence of the reproductive biology of *Pappophorum* is unavailable. Following harvest, seed of each breeder field was tested for quality, blended by equal percentage of pure live seed (PLS), and distributed to commercial seed producers as Foundation Seed. Only seed harvested from plantings of this Foundation Seed can be sold or used to establish certified seed fields.

Extensive seeding trials of pappusgrasses were also conducted in the development of Webb Germplasm. Mixtures of pink and whiplash pappusgrass were planted in experiments at 4 locations from 2005–2008. Best results have been obtained when pappusgrasses were seeded at a rate of 3.4 kg PLS per ha (3 lb PLS per ac). Pappusgrasses germinate best in early-to-mid fall in south Texas. Seeds can be covered with a talc-based coating to facilitate planting, as uncoated seed is difficult to plant and meter accurately. Broadcast and drill seedings have produced acceptable results. The inclusion of both Webb Germplasm whiplash pappusgrass and Maverick Germplasm pink pappusgrass in seed mixes is recommended to ensure good performance on most sites.

## ECOLOGICAL CONSIDERATION

Whiplash pappusgrass is a naturally occurring species in Texas and planting it would therefore not constitute an introduction of an exotic species into local ecosystems. Any negative impacts to other native plant species would likely be minimal to nonexistent. Availability of ecotypic seed of this species provides an additional native species for revegetation and restoration seed mixes in the region, as well as provides a native species useful in efforts to diversify exotic grass–dominated habitats to increase habitat quality for wildlife. Release of whiplash pappusgrass also provides restoration material appropriate for use on coastal areas such as dredge spoil islands and disposal sites and on widespread saline and alkaline soils in the western Rio Grande plains.

## ANTICIPATED CONSERVATION USE

Webb Germplasm will be useful for rangeland and upland wildlife habitat plantings. It has demonstrated good competitive ability in areas dominated by the exotic plants buffelgrass (*Pennisetum ciliare* (L.) Link [Poaceae]) and Kleberg's bluestem (*Dichanthium annulatum* (Forssk.) Stapf [Poaceae]) and may be useful in efforts to restore or diversify these areas to improve native ecological conditions. Webb Germplasm may also be useful in the revegetation of mesic, saline, and alkaline sites.

## ANTICIPATED AREA OF ADAPTATION

Webb Germplasm is known to be adapted to the region south of lat 29°27'N, bounded by the Gulf of Mexico on the east, and Rio Grande River to the west and south. Good adaptation exists in major land resource area (MLRA) 83A-E, 150, and 151 with good performance likely in MLRA 42, 81A, 81D, and adjacent areas of northern Mexico. Adaptation of this release to other areas where *P. vaginatum* is found is unknown.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by South Texas Natives and distributed through the Texas Foundation Seed Service to a single commercial grower. Limited quantities of seed for research and evaluation purposes are available on request from South Texas Natives (stn@tamuk.edu).

## ACKNOWLEDGMENT

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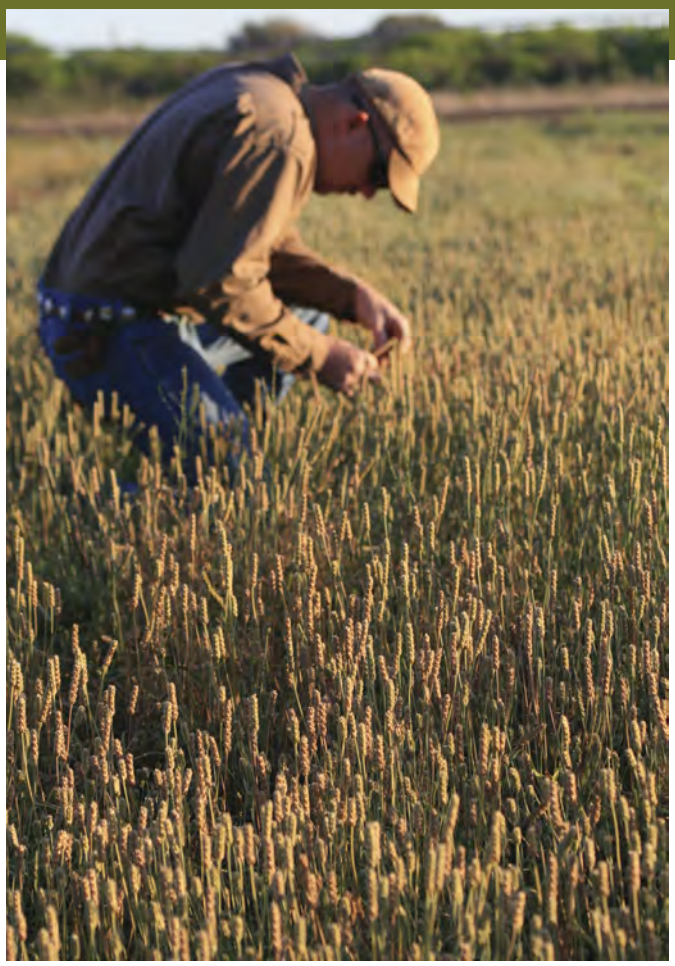


Breeder seed field of STN-561 Germplasm Hookers plantain

Photos by Forrest S Smith

NOTICE OF RELEASE OF

# DIVOT TALLOW WEED BLEND

SELECTED CLASS OF NATURAL GERMPLASMS

**Forrest S Smith, Paula D Maywald, William R Ocumpaugh, John Lloyd-Reilley, Shelly D Maher, and Keith A Pawelek**

ABSTRACT

A blend of 2 selected germplasms of tallow weed or plantain (*Plantago* spp. [Plantaginaceae]) has been released for wildlife habitat restoration, rangeland seed mixes, and wildlife food plot plantings in south Texas. Divot Tallow Weed Blend comprises the releases STN-561 Germplasm Hookers plantain (*Plantago hookeriana* Fisch. & C.A. Mey.) and STN-496 Germplasm redseed plantain (*Plantago rhodosperma* Decne.). Tallow weeds are cool-season, annual native plants that provide winter forage to wildlife and livestock and produce seed eaten by game birds and other wildlife. These releases are being marketed as a blend to facilitate commercial production and ease of use for consumers. Selection of STN-496 and STN-561 Germplasms was based on seedling vigor, superior seed production in comparison with other collections from the target ecoregion, and growth characteristics facilitating commercial seed production and harvest. Commercial seed producers are required to grow the releases that make up Divot Tallow Blend separately and to blend seed in equal quantities following harvest. The releases can also be marketed independently as source-identified seed.

Smith FS, Maywald PD, Ocumpaugh WR, Lloyd-Reilley J, Maher SD, Pawelek KA. 2010. Notice of release of Divot tallow weed blend: selected class of natural germplasms. Native Plants Journal 11(3):289–294.

**KEY WORDS**

*Plantago rhodosperma, Plantago hookeriana,* redseed plantain, Hookers plantain, Texas, Plantaginaceae

**NOMENCLATURE**

Plants: Hatch and others (2001)
Animals: ITIS (2009)
Major Land Resource Areas: USDA NRCS (2006)

**COLLABORATORS**

South Texas Natives, Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, Texas; USDA Natural Resources Conservation Service E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; Texas AgriLife Research, Beeville and Uvalde, Texas; Rio Farms Inc, Monte Alto, Texas; and Rancho Blanco, Laredo, Texas.

**Species** | *Plantago* spp. *hookeriana* and *P. rhodosperma*
**Common name** | tallow weed, plantain
**Accession number** | equal portions of 9088561 and 9090496

Divot tallow weed blend comprises equal amounts of the releases of STN-561 Germplasm Hookers plantain and STN-496 Germplasm redseed plantain for revegetation and wildlife food plot use in south Texas.

Divot Tallow Weed Blend is a blend of selected germplasms of Hookers plantain (*Plantago hookeriana* Fisch. & C.A. Mey.) and redseed plantain (*Plantago rhodosperma* Decne.) (Plantaginaceae). Seed sold as Divot Tallow Weed Blend must contain equal portions of the release STN-496 Germplasm redseed plantain and STN-561 Germplasm Hookers plantain. The blend is eligible for certification as a Texas Selected Native Plant Germplasm. Both germplasms were originally evaluated under the USDA Natural Resources Conservation Service (NRCS) accession numbers 9088561 and 9090496. Divot was chosen for the blend name because one of the germplasms originated from a Divot clay loam soil type. Tallow weed is used for the name because it is a regionally recognized plant name familiar to consumers and should aid marketing efforts.

## JUSTIFICATION

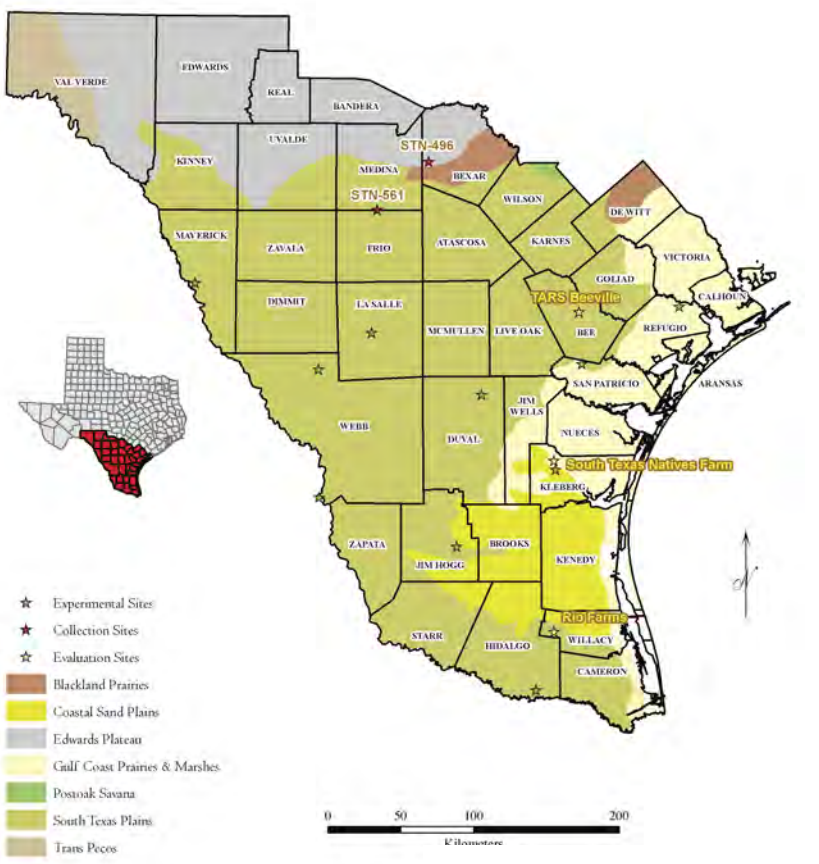
This release provides 2 native forb species for restoration and conservation plantings. These plants produce forage for wildlife and livestock, and seed is consumed by wildlife. This release is recommended for use in upland rangeland plantings, as a wildlife food plot component, and as a temporary cool-season native cover crop on reclamation sites.

## COLLECTION SITE INFORMATION

STN-496 Germplasm redseed plantain was collected from a native population growing in Bexar County, Texas, on an Ekrant cobbly clay soil type. STN-561 Germplasm Hookers plantain was collected from a native population growing in Medina County, Texas. Collectors noted this collection growing on a sandy loam soil; however, GPS coordinates and USDA NRCS soil data suggest the site is a Divot clay loam soil type (USDA NRCS 2009).

## DESCRIPTION

Redseed and Hookers plantains are cool-season, annual plants. Size and foliage characteristics vary depending on moisture availability, but mature plants of both species are commonly 15 to 30 cm (6 to 12 in) tall. Plantains emerge from seed in mid to late fall in south Texas.




Courtesy of CKWRI Wildlife Research Technologies Laboratory

Redseed plantain forms a prostrate winter rosette at ground level at emergence. Redseed plantain is found on rocky soils in brushlands and on slopes, and occasionally on sandy soils and gravel bars of washes and streams (Correll and Johnston 1996). It is common on clay or heavier sands in prairies and openings in the Rio Grande Plains and Coastal Prairies of south Texas (Everitt and others 1999). Hookers plantain forms a grasslike winter rosette after emergence. It is found on sandy, gravelly, or rocky soils in open woods, dunes, savannas, and clay flats (Correll and Johnston 1996). It is frequent on sandy soils in prairies, openings, and waste places in the Rio Grande Plains and Coastal Prairies of south Texas (Everitt and others 1999). Significant foliage and seed stalk growth typically initiate in mid-February in south Texas for both species, with variable maturity and seed ripening between March and June depending on moisture availability. The pollination biology of these species is unknown; however, evaluations show a strong likelihood for apomictic breeding, as no off types or change in plant characteristics have been noted in multiple species and accession plots in 3 generations of observation. Plants within accessions are extremely uniform. Seed increases of each accession were begun with seed from the original collections to ensure genetic integrity of the release. Commercial producers are required to grow each germplasm separately and to blend seed following harvest. STN-561 and STN-496 germplasms typically ripen at different intervals, preventing seed production of the blend in a single field.

## METHOD OF SELECTION

Plantains were selected for evaluation and possible use in restoration in south Texas because of their region-wide distribution, importance to wildlife, and ease of commercial production and establishment. Plantains have the potential to provide cool-season forage and may be useful in food plot plantings for wildlife. Personnel from South Texas Natives obtained 27 collections of plantain from south Texas during 2001–2004. Collections included 3 *Plantago* species: *P. aristata* Michx., *P. rhodosperma,* and *P. hookeriana.* Each species is commonly restricted to specific soils, with *P. rhodosperma* found on clay and fine-textured soils, *P. hookeriana* found on sandy loam and loam soils, and *P. aristata* found on sand or coarse-textured soils. Consultation with commercial producers yielded concerns in marketability of a number of separate releases of this genus. Therefore the decision was made to evaluate all species concurrently and attempt to select accessions representative of each species for a multiple species blend, beneficial to seed producers and consumers in south Texas.

Initial evaluations consisted of laboratory germination tests to assess seed quality of the original collections and populations of each species. These tests suggested broad variability in seed fill and seed dormancy. Subsequently, accessions were planted for field evaluation (split plot design with 2 replications of 10 plants per accession). From this initial evaluation, we selected 7 accessions for advanced evaluation and initial seed increase. Selections were made using observations on plant vigor, seed production, and vegetative characteristics facilitative of commercial production.

Advanced evaluations consisted of isolated seed production rows, of which subplots were sampled to estimate seed production. Two *P. rhodosperma* accessions and single accessions of *P. aristata* and *P. hookeriana* were identified as superior seed producers in this trial. Increase of these 4 accessions the subsequent year on 0.1 ha (0.25 ac) increase fields resulted in final selection between the *P. rhodosperma* accessions, principally because of STN-496 Germplasm's high seed yield. The *P. aristata* accession was dropped from consideration because of the species' designation as a prohibited weed seed in Texas seedlots, despite excellent performance.

Seeding trials and experimental plantings have shown good emergence in rangeland plantings of the Divot Blend. In a series of plantings at 8 locations throughout south Texas, initial data indicate that emergence is strongly correlated to soil type, with STN-496 Germplasm emerging on fine-textured soils and STN-561 Germplasm emerging on coarse-textured soils. The recommended seeding rate for pure stands is 11 kg pure live seed (PLS) per ha (10 lb PLS per ac).

## ECOLOGICAL CONSIDERATION

Redseed and Hookers plantains are naturally occurring species in Texas and planting would not constitute an introduction of an exotic species into local ecosystems. These plants provide forage and seed that are consumed by many wildlife species. This release also makes available 2 native forb species for restoration and conservation plantings and provides a native plant option for wildlife food plots.

## ANTICIPATED CONSERVATION USE

Divot Tallow Weed Blend will provide a cool-season, native, annual forb for restoration and wildlife habitat plantings in south Texas. This release may have potential for use in efforts to diversify areas dominated by exotic grasses and to provide food sources to livestock and wildlife such as white-tailed deer (*Odocoileus virginianus*) and game birds such as Bobwhite Quail (*Colinus virginianus*), Mourning Dove (*Zenaida macroura*), and Rio Grande

Wild Turkey (*Meleagris gallopavo intermedia*). The blend may also be useful as a native annual plant for use as a cool-season cover crop on erodible soils and reclamation sites.

## ANTICIPATED AREA OF ADAPTATION

Divot Tallow Weed Blend should be adapted to a variety of sites throughout south Texas. This blend has shown good adaptation for use in major land resources area (MLRA) 83A-E and 150. Because selections constituting the blend originate within 80 km (50 mi) from the southern extent of the Edwards Plateau, good performance is likely in MLRA 81A-D. Current testing has not completely substantiated the northern or western limits of adaptability of these germplasms.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by South Texas Natives in conjunction with the Texas Foundation Seed Service. Certified seed must be grown from seed obtained from South Texas

Natives. Limited quantities of seed can be obtained for research or evaluation purposes by contacting South Texas Natives (stn@tamuk.edu).

## ACKNOWLEDGMENT

This is Caesar Kleberg Wildlife Research Institute Manuscript 10-106.

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Breeder field of Zapata Germplasm

NOTICE OF RELEASE OF

# ZAPATA GERMPLASM RIO GRANDE CLAMMYWEED

SELECTED CLASS OF NATURAL GERMPLASM

**Forrest S Smith, Paula D Maywald, John Lloyd-Reilley, Shelly D Maher, Keith A Pawelek, Andrew W Scott Jr, and Juan Garza**

## ABSTRACT

A selected germplasm of Rio Grande clammyweed (*Polanisia dodecandra* (L.) DC. ssp. *riograndensis* Iltis [Capparaceae]) has been released for rangeland restoration and wildlife habitat enhancement plantings in south Texas. Zapata Germplasm Rio Grande clammyweed is a warm-season annual forb originating from seed collected from native plants in Dimmitt and Zapata counties of south Texas. Collections were selected based on high proportion of full seed, low levels of seed dormancy, and high seed production potential. Zapata Germplasm is a fast-establishing native plant in rangeland plantings, provides excellent habitat to butterflies and other pollinators, and produces seed eaten by a variety of game birds. This release will provide a competitive annual forb useful for providing quick cover in rangeland plantings and will contribute to quality habitat for many wildlife species and pollinators. Zapata germplasm represents the first release of this species.

Smith FS, Maywald PD, Lloyd-Reilley J, Maher SD, Pawelek KA, Scott AW Jr, Garza J. 2010. Notice of release of Zapata Germplasm Rio Grande clammyweed: selected class of natural germplasm. Native Plants Journal 11(3):269–273.

## KEY WORDS

*Polanisia dodecandra*, *riograndensis*, restoration, Texas, Capparaceae

## NOMENCLATURE

Plants: USDA NRCS (2009a)
Birds: ITIS (2009)
Major Land Resource Areas: USDA NRCS (2006)

## COLLABORATORS

South Texas Natives, Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, Texas; USDA Natural Resources Conservation Service, E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; Rio Farms Inc, Monte Alto, Texas.

Photos by Forrest S Smith

**Species** | *Polanisia dodecandra* (L.) DC. ssp. *riograndensis* Iltis
**Common name** | Rio Grande clammyweed
**Accession number** | 9093442

A selected germplasm of Rio Grand clammyweed, a warm-season annual forb, has been released for rangeland restoration and wildlife habitat enhancement plantings in south Texas.

Zapata Germplasm Rio Grande clammyweed (*Polanisia dodecandra* (L.) DC. ssp. *riograndensis* Iltis [Capparaceae]) was released as a Texas Selected Native Plant Germplasm by the South Texas Natives program of the Caesar Kleberg Wildlife Research Institute at Texas A&M University-Kingsville, the USDA Natural Resources Conservation Service (NRCS) E "Kika" de la Garza Plant Materials Center, and Rio Farms Inc in 2009. Zapata Germplasm Rio Grande clammyweed has been assigned the USDA NRCS accession number 9093442. The name Zapata Germplasm was chosen because one of the accessions included in the blend originated from Zapata County, Texas.

Rio Grande clammyweed is an early-successional native forb that rapidly colonized disturbed sites in south Texas. Commercially available seed of this species may be used in a variety of areas and soils, including sand, clay, and gravel soils on upland sites (Richardson 1995), as well as sand and sandy clay sites along south Texas beaches and islands (Richardson 2002).

## JUSTIFICATION

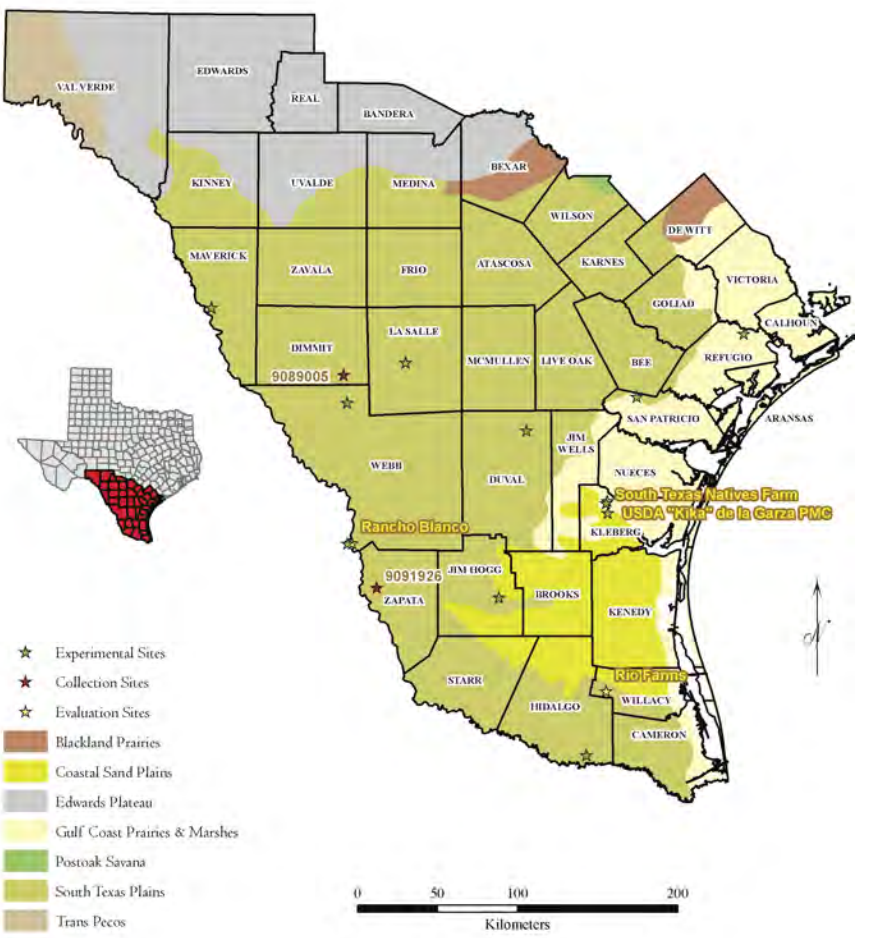
As a colonizing native species, Rio Grande clammyweed establishes easily from seed and provides excellent soil stabilization benefits rapidly after planting on disturbed sites. It is competitive with many invasive exotic grasses found in south Texas.

## COLLECTION SITE INFORMATION

Accessions comprising Zapata Germplasm Rio Grande clammyweed were collected from native populations at 2 Texas locations in the Rio Grande Plain Ecoregion. This release is a blend of accession 9089005 collected from a Brundage fine sandy loam soil in Dimmitt County and accession 9091926 from a loamy sand soil in Zapata County (USDA NRCS 2009b).

## DESCRIPTION

Zapata Germplasm Rio Grande clammyweed is a warm-season, annual herbaceous plant that grows 30 to 90 cm (1 to 3 ft) tall. Rio Grande clammyweed produces pink- to rose-colored




Courtesy of CKWRI Wildlife Research Technologies Laboratory

flowers from March through November in south Texas. Seed is produced in narrow capsules that ripen indeterminately and split upon maturity. Seed of Rio Grande clammyweed can easily be distinguished from other clammyweeds by characteristic blisters and ridges (Iltis 1969). Clammyweed commonly occurs in sandy, gravelly (sometimes limestone), or alluvial silty soil, near riverbanks, coastal dunes, and open areas in coastal live oak forests, bottoms of washouts, in semi-desert Opuntia-Mesquite scrub and shrub thickets, roadsides, chaparral pastures, fallow fields, or other disturbed areas on both sides of the lower Rio Grande River and adjacent areas of south Texas (Correll and Johnston 1996). Rio Grande clammyweed is typically found in early successional or pioneer seral stage plant communities and is often one of the first native plants to colonize an area following soil disturbance. Observations and flower structure suggest that Rio Grande clammyweed is an open pollinated species, evidenced by large populations of pollinating insects that utilize flowering plants.

Accessions comprising Zapata Germplasm Rio Grande clammyweed were increased from the original seed collections. Seed increase blocks were geographically isolated to prevent crossing of the accessions during increase. Seed from increase blocks is harvested separately, bulked by equal percentage of (+/– 10%) pure live seed (PLS), and distributed to interested growers.

## METHOD OF SELECTION

Rio Grande clammyweed was identified as having potential to benefit native plant restoration efforts and for use as a wildlife food source. Seven Rio Grande clammyweed collections were obtained from private ranches in south Texas from 2001–2004. From each collection, transplants were evaluated in a split plot design with a minimum of 2 replications of 10 plants of each accession at 3 Texas sites: Rio Farms near Monte Alto, Rancho Blanco near Laredo, and the USDA NRCS E "Kika" de la Garza Plant Materials Center near Kingsville. Plantings were irrigated to ensure establishment and weeded as necessary. Plots were examined monthly, or when significant changes in survival, growth, or vigor were noted among the population. Evaluation criteria included measures of survival, vigor (foliage density, biomass production, and seed production), and commercial production potential (uniformity, development stage, and plant height). Seed was collected from each planting to assess seed fill and germination in comparative environments. Results of our evaluations indicated that 3 of the accessions had similar characteristics and good seed production potential (that is, growth forms facilitating mechanical harvest, high proportion of full seed, and low seed dormancy), warranting further increase. Isolated seed increase plots were established with transplants grown from the original seed collections at Rio Farms Inc to evaluate these accessions in a seed production setting for potential release. One of the planted

accessions exhibited a shorter growth period and lower seed production than the other 2 accessions and was eliminated from consideration. Accessions 9089005 and 9091926 were subsequently selected for release.

Isolated seed increase fields of these 2 accessions were direct-seeded in 2008. Seed harvested from this and future increases of accession 9089005 and 9091926 will be bulked by equal percentage PLS and released as Zapata Germplasm Rio Grande clammyweed to interested commercial growers. This strategy has been devised in an attempt to provide to commercial producers seed having representative genetic diversity of selections with proven performance at a variety of locations across the ecoregion. Commercial seed fields have a 7-y limit on production to prevent significant genetic shifts in the release.

Field plantings using Zapata Germplasm Rio Grande clammyweed have documented its ease of establishment and utility in restoration efforts. Plantings in the Lower Rio Grande Valley documented this release as the first of 31 planted native species to emerge, flower, and produce seed. In a series of 7 rangeland plantings seeded in the late summer and fall of 2008, and despite being only 5% of the seed mixture, Zapata Germplasm Rio Grande clammyweed was the second most abundant planted species 30 d after planting.

## ECOLOGICAL CONSIDERATION

Rio Grande clammyweed is a naturally occurring species in Texas and planting it would not constitute an introduction of an exotic species into local ecosystems. This plant provides exceptional habitat to a variety of pollinators, provides food to numerous wildlife species, and its release makes available a native species that will aid in restoration and wildlife habitat plantings in south Texas.

## ANTICIPATED CONSERVATION USE

Zapata Germplasm Rio Grande clammyweed will provide an annual, warm-season forb for restoration plantings and wildlife habitat plantings. Clammyweed also has potential for use in horticultural or wildflower plantings because of its showy flowers and ability to attract large numbers of butterflies and pollinators. Rio Grande clammyweed is an excellent native plant species for food plot plantings to benefit or attract economically important game birds such as White-winged Doves (*Zenaida asiatica*), Mourning Doves (*Zenaida macroura*), and Bobwhite Quail (*Colinus virginianus*), all of which readily consume the seed. Rio Grande clammyweed is seasonally competitive with many invasive exotic grasses found in south Texas. This plant may be useful in efforts to diversify stands of these grasses for wildlife, especially with the aid of monocot-specific herbicides.

## ANTICIPATED AREA OF ADAPTATION

Rio Grande clammyweed grows in a variety of sites throughout south Texas. Zapata Germplasm Rio Grande clammyweed is well adapted for use in major land resource area (MLRA) 83A-E and 150. Current testing has not completely substantiated the northern or western limits of adaptability.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by South Texas Natives and the Texas Foundation Seed Service. Certified seed may be grown within the State of Texas, from seed obtained from South Texas Natives. Limited quantities of seed can be obtained for research or evaluation purposes from South Texas Natives (stn@tamuk.edu).


## ACKNOWLEDGMENT

This is Caesar Kleberg Wildlife Research Institute Manuscript 10-103.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Orange zexmenia flower and Desert Checkered-Skipper (*Pyrgus philetas* W.H. Edwards [Lepidoptera:Hesperiideae:Pyrginae]). Photo by Shelly D Maher

NOTICE OF RELEASE OF

# GOLIAD GERMPLASM ORANGE ZEXMENIA

SELECTED CLASS OF NATURAL GERMPLASM

**John Lloyd-Reilley, Shelly D Maher, Paula D Maywald, and Forrest S Smith**


## ABSTRACT

A selected germplasm of orange zexmenia (*Wedelia texana* (A. Gray) B.L. Turner [Asteraceae]) has been released for rangeland plantings and wildlife habitat enhancement plantings in the central and southern regions of Texas. Goliad Germplasm orange zexmenia is a blend of 7 selected accessions from an extensive evaluation at multiple sites in south Texas. Accessions constituting the release are increased from the original seed collections of native populations to maintain the genetic integrity of each accession. This germplasm represents the first commercially available release of orange zexmenia that has been tested and adapted to its intended area of use.


Lloyd-Reilley J, Maher SD, Maywald PD, Smith FS. 2010. Notice of release of Goliad Germplasm orange zexmenia: selected class of natural germplasm. Native Plants Journal 11(3):321–326.

## KEY WORDS

*Wedelia texana,* Texas, Asteraceae

## NOMENCLATURE

Plant: USDA NRCS (2008)
Butterfly: ITIS (2009)
Major Land Resource Areas: USDA NRCS (2006)

## COLLABORATORS

USDA Natural Resources Conservation Service, E "Kika" de la Garza Plant Materials Center, Kingsville, Texas; and South Texas Natives, Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, Texas.

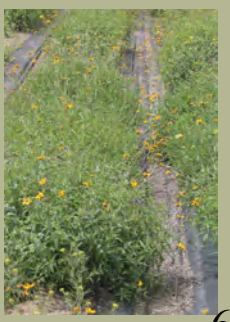


Photo by Forrest S Smith62

**Species** | *Wedelia texana* (A. Gray) B.L. Turner
**Common name** | orange zexmenia
**Accession number** | 9093441

Based on an extensive evaluation at multiple sites across south Texas, this selected germplasm, a blend of 7 accessions, is the first commercially available release. It is intended for rangeland and wildlife enhancement plantings in the central and southern portions of Texas.

Orange zexmenia (*Wedelia texana* (A. Gray) B.L. Turner [Asteraceae]), a Texas Selected Native Plant Germplasm, is eligible for seed certification under the Texas Department of Agriculture and Texas Administrative Code guidelines (TAC 2007). It is available for use in the central and southern regions of Texas. As a selected class release, this selection will be referred to as Goliad Germplasm orange zexmenia and USDA Natural Conservation Resources Service (NRCS) accession number 9093441.

## JUSTIFICATION

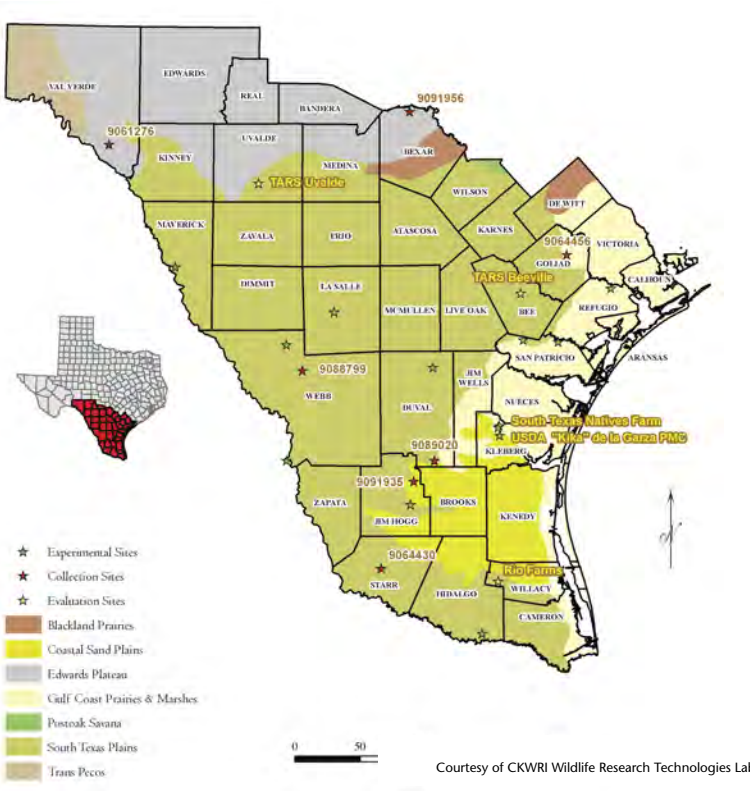
This germplasm is the first release of an orange zexmenia germplasm that originates from Texas. It has been tested and is adapted to the central and southern regions of the state. It has potential for immediate use in range seedings (Everitt and Drawe 1974; Arnold and Drawe 1979; Schweitzer and others 1993; Nelle 1994) for restoration, diversification, and wildlife habitat (Gould 1975; Ajilvsgi 1984). As such, it meets the USDA NRCS Range Planting Code 550 standards (USDA NRCS 2007). The name Goliad Germplasm was chosen because one of the 7 accessions constituting the germplasm originated from a native population in Goliad County, Texas, and the name represents the central region of Texas.

## COLLECTION SITE INFORMATION

Accessions making up Goliad Germplasm orange zexmenia were collected from native stands at 7 locations throughout the central and southern regions of Texas representing a variety of range sites and soil types. Seed was hand-stripped from as many plants as possible at each collection site. Collections were cleaned, assigned individual accession numbers, and stored for evaluation at the E "Kika" de la Garza Plant Materials Center in Kingsville, Texas.

## DESCRIPTION

Goliad Germplasm orange zexmenia is a native Texas sub-shrub that grows 50 to 100 cm (19 to 39 in) tall (Ajilvsgi 1984; Correll and Johnston 1996). This perennial produces seed from March to December. Accessions constituting Goliad Germplasm show some genetic variation in plant size, leaf characteristics, pubescence, and coloration. Accessions are increased from the original collection of a native population to maintain their genetic integrity. Accessions included in the release have shown superior performance in several ecological and agronomic performance categories.




Courtesy of CKWRI Wildlife Research Technologies Laboratory

## METHOD OF SELECTION

Viability of original seed, geographic origin, and soil type of collection location were criteria for initial evaluation of each of 42 accessions of orange zexmenia collected by Texas NRCS Field Offices and the South Texas Natives program from 1990–2003. Other evaluation information included specific collection locale (ranch, county road, and so on), county of the collection site, and major soil type where plants were found.

Viability of original seed was determined by sowing seeds in 98-cell seedling flats filled with commercially available potting medium. Trays were placed in greenhouses with growing conditions of 12 h with daytime temperature maintained near 30 °C (86 °F), and 12 h with night temperature near 18 °C (64 °F), and watered as necessary to maintain adequate soil moisture for optimum germination. The greenhouse planting produced the seedlings for all the initial evaluation plots.

Initial evaluations of orange zexmenia began in 1994 at the USDA NRCS E "Kika" de la Garza Plant Materials Center (PMC), Kingsville, Texas. From these initial evaluations, accession 9064456 was one of the top-performing accessions of orange zexmenia for survival, vigor, growth form and development, and disease resistance. In conjunction with the development of the South Texas Natives Project, renewed interest and priority status was revived for

orange zexmenia. A new evaluation was started in spring 2001. Fourteen collections of orange zexmenia were transplanted to field plots at the PMC. Seed was collected from these accessions and germination tests were performed for 2001 and 2002 harvests.

The field plot was evaluated for plant performance from 2001 through 2003. Plant characteristics evaluated were survival, density, resistance, uniformity, and seed production. Based on plant performance during the 1994 and 2001 evaluations, 3 accessions were selected for release by the PMC: 9061276-Val Verde County, 9064430-Starr County, and 9064456-Goliad County.

South Texas Natives also planted evaluation plots in 2005. Seventeen accessions were planted at Rio Farms (8 Apr 2005, Delfina fine sandy loam soil) and 22 accessions at AgriLife Research Station–Uvalde (6 Apr 2005, Uvalde silty clay loam soil). Seed was collected 3 times during the summer of 2005 at AgriLife Research Station–Uvalde, bulked by accession, and tested 27 Jun 2006 for germination. No germination tests were conducted on seed grown at Rio Farms.

These sites represent a broad geographic distribution (125 to 355 km [77 to 220 mi] between sites), differing climatic conditions, and 3 common soil types (sandy loam, silty clay loam, and clay) where native populations of orange zexmenia commonly occur. At each location a minimum of 2 replications of 10 transplants of each accession were established in a randomized spaced plant (30 cm [12 in] between plants) complete block design on 90-cm (36-in) rows. Plants were irrigated to ensure establishment during the initial growing season. Plantings were not irrigated after the first year of establishment. Visual rankings (1 [best] to 9 [worst]) were taken monthly from May through November on each replication of each accession at each planting site for plant vigor, foliage density, uniformity, development stage, seed production, biomass production, and plant height. Ripe seed was collected from each accession throughout the growing season and tested for seed germination in germination chambers (3 replications x 50 seeds per accession, 12 h light at 30 °C [86 °F], and 12 h dark at 18 °C [64 °F]). Seed germination was recorded for each accession at 3-d intervals for 30 d.

Accessions were ranked by performance in field evaluations and seed germination. South Texas Natives chose accessions 9088799-Webb County, 9091935-Jim Hogg County, 9089020-Duval County, and 9091956-Bexar County for release because these accessions had greater than mean performance in the most evaluation categories.

Following selection by South Texas Natives and the PMC, the 7 accessions were increased using the original seed (G0) in isolated seed increase fields to maintain genetic diversity. Transplants (450) of each accession were then grown from G1 seed and planted side-by-side in a foundation block. Seed from the foundation field is maintained on an accession basis and is harvested individually and blended with proportions of each accession to maintain the genetic representation of each accession. The foundation blend is released to commercial growers through the Texas Foundation Seed Service for establishment of certified seed fields of Goliad Germplasm orange zexmenia.

## ECOLOGICAL CONSIDERATION

Orange zexmenia is a naturally occurring species in Texas and planting it would therefore not constitute an introduction of an exotic species into local ecosystems. Any negative impacts on other native plant species would likely be minimal to nonexistent. Also, release of this species will make available an additional native species for rangeland planting.

## ANTICIPATED CONSERVATION USE

Goliad Germplasm orange zexmenia will provide a native forb species for rangeland revegetation and wildlife habitat plantings in the central and southern regions Texas.

## ANTICIPATED AREA OF ADAPTATION

Orange zexmenia is hardy in dry and moist conditions. It grows on varied soil types, brushy sites, and in open spaces. It is found in parts of Texas and Mexico. Goliad germplasm orange zexmenia is well adapted for use in major land resource area (MLRA) 42, 81A-D, 83A-E, and 150.

## AVAILABILITY OF PLANT MATERIALS

Foundation Seed is produced by the USDA NRCS E "Kika" de la Garza Plant Materials Center and distributed through the Texas Foundation Seed Service. Certified seed may be grown within the State of Texas. Limited quantities of seed for research or evaluation purposes will be available on request from John Lloyd-Reilley (john.reilley@tx.usda.gov).

## ACKNOWLEDGMENT

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