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CAESAR KLEBERG WILDLIFE RESEARCH INSTITUTE
SOUTH TEXAS NATIVES
KINGSVILLE, TEXAS

And

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
E. "KIKI" DE LA GARZA PLANT MATERIALS CENTER
KINGSVILLE, TEXAS

NOTICE OF RELEASE OF RAMADERO GERMPLASM SPIKE LOVEGRASS
SELECTED PLANT MATERIAL

Texas A&M University-Kingsville, Caesar Kleberg Wildlife Research Institute, *South Texas Natives*, and the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), E. "Kika" de la Garza Plant Materials Center announce the release of a selected plant material of spike lovegrass (*Eragrostis spicata* Vasey) for the South Texas region.

This plant will be referred to as Ramadero Germplasm spike lovegrass, and is released as a selected plant material class of certified seed (natural track). Seed of Ramadero Germplasm spike lovegrass will be identified by USDA NRCS accession number 9093461.

This alternative release procedure is justified because there are no existing commercial sources of tested and adapted spike lovegrass for the South Texas region. The potential for immediate use is high, especially for rangeland restoration, wildlife plantings, critical site revegetation, and reclamation seedings.

A. Proposed Variety Name and Temporary Designation:

RAMADERO GERMPLASM SPIKE LOVEGRASS

B. Family, kind, genus and species:

Family: Poaceae

Kind: spike lovegrass

Genus and species: *Eragrostis spicata* Vasey

C. Origin and breeding history of the variety:

Collection Site Information: Ramadero Germplasm was collected by Keith Pawelek and Forrest Smith in 2008 from native plants located in La Salle County, Texas from a Mata gravelly sandy clay loam soil (Soil Survey Staff 2015).

Breeding history: Plants evaluated in the initial trials were grown from the original seed collection. Breeder seed of the accession was grown from an isolated increase plot that was derived from the original seed collection. All seed increase plots were grown in isolation from other spike lovegrass accessions and from wild populations of the species. No intentional breeding, selection or genetic manipulation was used in the development of this release.

D. Objective description of the variety:

Description: Spike lovegrass is a caespitose, robust perennial with short rhizomes. Culms are unbranched, erect, and glabrous, growing 80-120 cm (31-47 in) tall. The leaf blades are 2-7.5 mm (0.08-0.29 in) wide, 25-40 cm (9-16 in), and are flat, rolled (when desiccated), or involute. Leaf color is grayish green and leaves are glabrous with serrate margins. Ligules are a 0.5 mm (0.2 in) fringed membrane. Inflorescence sheaths are glabrous to ciliate-pilose near the ligules. Panicles range 20-50 cm (7-20 in) in length by 5 mm (0.2 in) wide, and are spike-like, linear, and have several branches per node. The spikelets are densely imbricate. Spikelets are small, less than 1 mm (0.03 in). (Everitt et al. 2011). There are about 4,000,000 seeds per 0.45 kg (1b). Spike lovegrass is mainly found in moist areas on deep sandy and clay loam soils from South Texas into Mexico, Paraguay, and Argentina.

Potential Uses: Spike lovegrass is native bunchgrass that provides good cover and copious amounts of seed that could be used as food resources for wildlife. Ramadero Germplasm spike lovegrass is adapted to clay, clay loam, saline clay, and moist soils in South Texas. It is a valuable restoration species in combination with other available native plant seeds in restoration plantings on rangelands, for wildlife habitat improvement, and reclamation of disturbed and degraded soil sites.

E. Evidence

Method of Breeding and Selection:

Initial Evaluation

Ramadero Germplasm was evaluated under accession number 9093461 as part of a common garden study to evaluate several species of dropseeds (*Sporobolus* spp.) and lovegrasses (*Eragrostis* spp.). Dropseed and lovegrass collections from the South Texas region collected by *South Texas Natives* and those available from the USDA NRCS Plant Materials Program seed collections were evaluated. Three dropseed releases made by the Plant Materials Program in Texas were also evaluated as standards for comparison, including Duck Creek Germplasm Texas dropseed, Borden County Germplasm sand dropseed, and Potter County Germplasm spike dropseed. In total, 26 populations of native dropseeds, 19 lovegrass collections, and 3 releases originating from Texas were evaluated. Ramadero Germplasm was initially identified as spike dropseed (*Sporobolus contractus* Hitchc.); however, following evaluation, specimens of the

accession were sent for verification to Dr. Stephen L. Hatch of the S.M Tracy Herbarium at Texas A&M University. The identification of the species was confirmed as spike lovegrass.

These initial evaluations were conducted from 2010-2011. Three sites were used for initial evaluation, including the *South Texas Natives* Farms at the Caesar Kleberg Wildlife Center in Kingsville, Texas (WLC); Rio Farms near Monte Alto, Texas; and Rancho Blanco near Laredo, Texas. These sites are representative of the three ecoregions in South Texas, and variations in soils and climate along a north to south and east to west gradients encompassing southern Texas. At each site we planted 2 replications of 10 plants in a genus-specific, completely randomized block. Spike lovegrass was included in the evaluation block of *Sporobolus*. Evaluation blocks of lovegrasses and dropseeds were adjacent at all sites.

Accession 9093461 was a widely successful plant at all 3 evaluation sites. At 2 of the 3 evaluation sites accession 9093461 received the best rankings amongst entries in the dropseed plot planting, and was the second best performing accessions at the third site for vigor, foliage density and forage production. Accession 9093461 greatly outperformed nearly all other accessions planted in all measurements (Tables 1, 2, and 3). Spike lovegrass was not comparable in performance to the other native lovegrass evaluated, as stature, phenology, and growth habitat were different.

In combination with the excellent performance and seed production characteristics of spike lovegrass, and with the emergence of numerous reclamation issues associated with the Eagle Ford Shale oil and gas field, and in particular on areas with saline and depressional soils where spike lovegrass naturally grows, we chose to release Ramadero Germplasm. There is a critical need for native plant materials to meet conservation concerns associated with Eagle Ford Shale development in South Texas, which is anticipated to impact rangelands in the region for decades to come. Numerous observations and available distribution information suggests spike lovegrass is a native species that is well adapted to moist soil areas and saline soils that result from oil and gas production activities and pipeline right-of-way construction.

While not compared to other populations of spike lovegrass prior to release, and thus we have no indications of superiority of performance within the species, Ramadero Germplasm has had excellent performance and longevity at 3 sites within the area of intended use. Our evaluations indicated this release can outperform many similar existing native seed sources including the three *Sporobolus* spp. releases from the USDA NRCS James E. ‘Bud’ Smith Plant Materials Center, Knox City, TX, which were used as standards of comparison in the initial evaluation. Because of the limited natural distribution, critical need it fills, and lack of any other existing commercial seed supplies of this species, we believe this release will help fulfill a critical conservation need.

Table 1. Plant performance of *Sporobolus* spp. and Ramadero Germplasm at the STN Farm near Kingsville, TX from 2010-2011. Rankings given for vigor, foliage density, seed production and forage production are the mean visual score (1 best, 10 worst) for each evaluation category over 2 years of evaluation.

Accession	# Plants	Vigor	Foliage density	Seed production	Forage production
9093461	10.0	2.6	2.3	4.1	2.3
9088993	7.4	4.0	3.9	4.3	4.0
9093511	8.7	4.1	3.8	4.6	4.0
9093376	9.4	5.2	4.4	4.0	4.5
9088997	6.3	4.0	4.6	4.8	4.9
9093209	8.1	4.9	4.3	4.6	4.7
9093458	7.3	4.9	5.0	4.6	5.0
9093188	8.5	5.3	5.3	4.2	5.2
9088909	7.3	5.4	5.0	4.8	5.0
9090366	8.7	5.5	5.4	4.5	5.2
9093427	9.3	5.8	5.4	4.2	5.3
9093377	8.0	5.3	4.4	6.2	4.9
9093431	7.8	5.3	5.8	4.1	5.8
9093536	8.2	5.3	5.8	4.6	5.5
9042838	7.3	5.3	5.0	5.5	5.4
9042767	8.7	5.8	5.2	5.2	5.5
9093426	7.9	6.1	6.0	3.9	5.9
9090321	8.0	5.9	6.1	4.1	6.0
9093451	8.8	5.8	6.1	4.5	5.9
9090461	8.5	5.6	6.2	4.4	6.2
9093433	6.9	5.8	5.6	5.4	5.6
9093450	7.5	5.3	6.3	4.7	6.1
9093457	5.7	6.0	6.5	6.2	6.6

Table 2. Plant performance of *Sporobolus* spp. and Ramadero Germplasm at Rio Farms near Monte Alto, TX from 2010-2011. Rankings given for vigor, foliage density, seed production and forage production are the mean visual score (1 best, 10 worst) for each evaluation category over 2 years of evaluation.

Accession	# Plants	Vigor	Foliage density	Seed production	Forage production
9093461	10.0	2.1	2.6	3.9	2.6
9093511	9.9	2.9	3.3	4.6	3.6
9088997	9.1	2.9	3.4	5.5	4.1
9093458	8.4	3.5	4.0	4.8	4.1
9088909	10.0	4.4	3.8	4.9	4.1
9088993	9.0	3.8	4.1	5.0	4.4
9093377	9.8	4.3	4.1	5.0	4.2
9093188	9.6	4.3	4.8	3.8	4.8
9093209	9.8	4.0	4.2	5.1	4.7
9093457	7.9	4.2	4.4	5.1	4.3
9093427	9.7	4.2	5.1	4.3	5.1
9090366	9.5	4.5	4.6	4.9	4.8
9093431	9.4	4.5	5.2	4.2	5.3
9093426	10.0	5.0	5.6	3.8	5.3
9093376	9.8	5.0	4.6	4.9	5.3
9093451	7.6	5.0	5.4	4.1	5.3
9090461	8.5	4.7	5.4	4.3	5.6
9093536	8.2	5.0	5.4	4.3	5.3
9090321	8.9	4.8	5.4	4.6	5.5
9042838	7.4	5.6	5.6	5.1	6.1
9029932	5.3	6.0	5.5	5.6	6.4
9042767	9.0	6.0	5.6	5.6	6.4
9093450	9.4	5.2	5.3	5.5	5.4

Table 3. Plant performance of *Sporobolus* spp. and Ramadero Germplasm at Rancho Blanco near Laredo, TX from 2010-2011. Rankings given for vigor, foliage density, seed production and forage production are the mean visual score (1 best, 10 worst) for each evaluation category over 2 years of evaluation.

Accession	# Plants	Vigor	Foliage density	Seed production	Forage production
9088993	6.5	4.0	3.3	3.8	3.3
9093461	8.2	4.3	3.6	4.6	3.8
9093511	8.8	4.2	4.3	4.7	4.4
9093458	8.0	4.4	4.2	4.9	4.4
9093376	7.2	4.5	4.5	4.6	4.5
9088909	8.8	4.6	4.6	4.6	4.6
9093209	6.8	4.9	4.6	4.6	4.8
9093188	7.4	5.0	4.9	4.0	5.2
9090461	8.5	4.4	5.6	4.2	5.3
9093427	9.1	4.8	5.3	4.4	5.1
9093426	9.0	4.8	5.1	4.6	5.2
9090366	8.8	4.8	4.9	5.1	5.0
9093377	6.7	5.5	4.8	5.3	4.9
9088997	6.0	5.0	5.3	5.0	5.3
9093457	7.3	5.0	5.1	5.5	5.1
9029932	1.8	4.7	5.3	4.7	6.3
9090321	8.5	4.8	5.7	4.9	5.8
9093536	8.0	5.0	5.5	5.5	5.5
9093451	7.7	5.4	5.8	4.6	5.8
9093450	7.5	5.5	6.1	5.2	6.1
9042838	5.7	5.7	5.6	5.8	5.9
9042767	7.2	5.9	5.6	5.9	6.0
9093433	10.0	5.5	5.5	7.0	5.5
9093431	8.1	5.8	6.2	5.5	6.1

Seed Increase

Seed was harvested from a small seed increase plot averaging 200 plants in 2012, 2013, and 2014 of accession 9093461. From these 200 plants there was an average of 1.1 pounds of seed produced. The harvested seed was tested for seed quality and averaged extremely high percent pure live seed (PLS) (93.58%) with 95% active germination. Yields were estimated at 80 pounds of PLS per acre per year per acre on 36" bedded rows with a plant population of 14,000 plants per acre (plants established using transplants spaced 1').

Seed Production, Harvest, and Cleaning

Seed production for Ramadero Germplasm can be started from transplants or direct seeded on beds or flat ground. Well maintained transplant plots can be expected to produce a marketable crop in the first production year. Direct seeded fields are unlikely to produce a seed crop in the planting year. Seed is best harvested using a Woodward Flail-Vac Seed Stripper (Ag-renewal, Inc., Weatherford, Oklahoma). Following harvest, trash can be removed using a Clipper seed cleaner (A. T. Farrell, Bluffton, Indiana).

G. Area of Adaptation

Based on location of the original seed collection, and evaluation studies completed to date, Ramadero Germplasm is adapted to the Rio Grande Plains (MLRA 83A, B, C and D), Coastal Sand Plain (MLRA 83E) and Gulf Coast Prairies and Marshes (MLRA 150A and B). Spike lovegrass does not naturally occur north of the Rio Grande Plains in North America, and use of the species beyond this limit of distribution of the species is unlikely to be successful. Adaptation of this release to areas south of the suggested areas of adaptation that are within the natural range of the species is untested.

H. Procedure for maintaining stock classes of seed

G0 seed of Ramadero Germplasm will be maintained by *South Texas Natives*. G0 seed is the seed harvested from isolated plantings of the original seed collection. G1 seed is the seed harvested from plantings made using the G0 seed. G1 seed can be replanted for production of G2 seed. Increase of Ramadero Germplasm spike lovegrass from G2 seed is prohibited.

I. Additional restrictions, etc.

All commercial seed fields of Ramadero Germplasm must be isolated from other cultivated varieties and wild populations of *Eragrostis spicata* by a minimum of 900 feet. Seed is made available to growers who agree to produce seed meeting Texas Department of Agriculture seed certification provisions for Texas Selected Native Plant Germplasm. Seed must be produced within the ecoregion of known adaptation. G0 and G1 production stands will have a 7 year restriction on stand life. Certification through G2 will be allowed, but increase for seed production using G2 seed is prohibited. Rights to production and distribution of seed for commercial purposes will be limited to growers participating in production license agreements

negotiated with the originating institutions. Seed for scientific research, selection, or testing purposes can be obtained by writing the corresponding author.

Will application be made to the Plant Variety Protection Office? YES__ NO_X

If yes will the application specify that the variety is to be sold by variety name only as a class of certified seed? YES__ NO__

Ecological Considerations and Evaluation: An Environmental Evaluation of Plant Materials Releases was completed using guidelines established by NRCS, and the best available information for this species. Results of this evaluation determined that Ramadero Germplasm spike lovegrass was suitable for release based on the criterion contained in this document. This conclusion is mainly because spike lovegrass 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 non-existent. Also, release of this species will make available an additional native species for rangeland planting, will provide a good source of forage for cattle, and provide ecological benefits by maintaining and contributing to saline habitats that are often difficult to revegetate.

Spike lovegrass is a native to the area of intended use, thus no potential negative impacts of planting the species in this region are anticipated. This species has a limited natural distribution, and plants are unlikely to persist or spread beyond locations where the plant was historically distributed under pre-disturbance conditions. Efforts to restore novel sites that have been created in South Texas because of soil degradation through spills of saline water, soil horizon mixing, or that have been denuded because of disturbance activities may be benefit from revegetation using this seed release. Spike lovegrass reproduces readily from seed, but does not show aggressive or rapid spread via seed associated with invasive grass species in this region. There is no apparent vegetative reproduction by spike lovegrass, except for tillering culms attached to the primary root crown.

At the original collection site, spike lovegrass readily competed with and provided for vegetation diversity in stands of problematic, monoculture-forming-non-native grasses buffelgrass and Kleberg's bluestem. Regional efforts to diversify such stands for wildlife could benefit from the inclusion of Ramadero Germplasm in seeding mixtures for habitat restoration. Release of spike lovegrass also provides locally-adapted plant material for use in reclamation efforts associated with the Eagle Ford Shale oil and gas fields. Soil disturbances associated with this and oil and gas activities are conservation concerns impacting wildlife habitats, watersheds, and water quality throughout southern Texas.

Conservation Use: Ramadero Germplasm spike lovegrass is recommended for upland wildlife plantings, critical site revegetation, bank stabilization, and inclusion in range seeding mixes in the Rio Grande Plains, Gulf Coast Prairies and Marshes, and Coastal Sand Plains ecoregions.

Availability of Plant Materials: Breeder Seed will be maintained by *South Texas* project or the Caesar Kleberg Wildlife Research Institute. G0 seed will be released to qualified growers under license agreement stipulating production requirements.

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RAMADERO GERMPLASM SPIKE LOVEGRASS

Eragrostis spicata Vasey

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