



Seedhead of whiplash pappusgrass

#### NOTICE OF RELEASE OF

# WEBB GERMPLASM WHIPLASH PAPPUSGRASS

#### SELECTED CLASS OF NATURAL GERMPLASM

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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.

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#### 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.

**W**ebb 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.

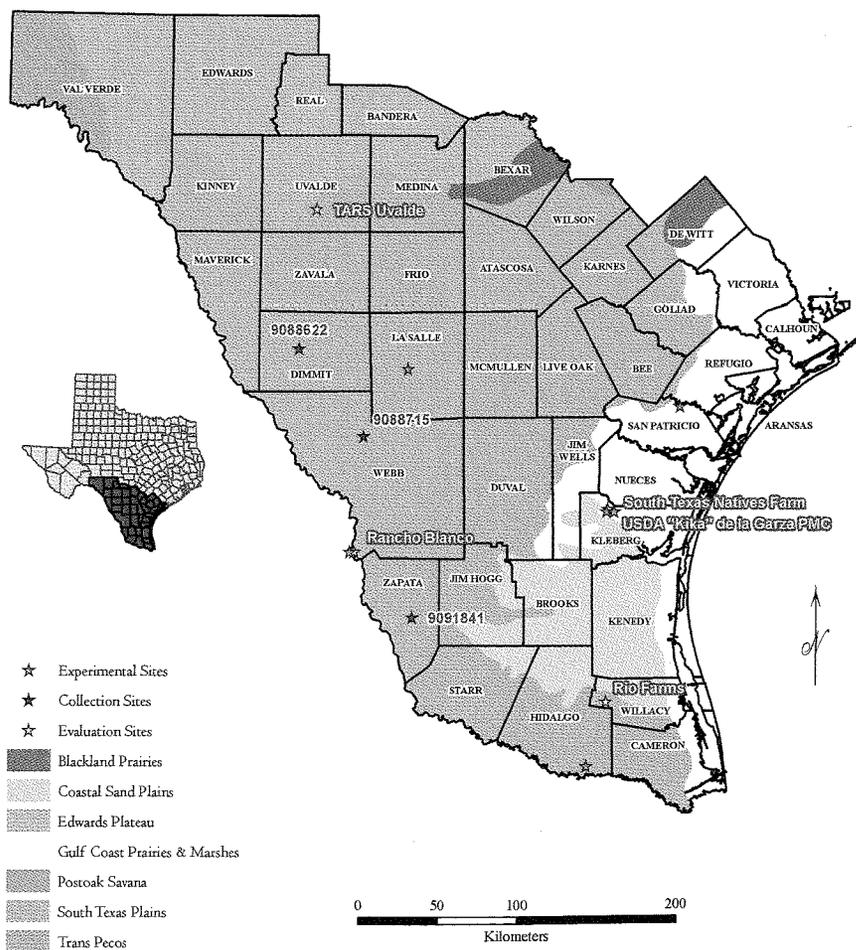
Whiplash pappusgrass is a widespread native grass species found throughout the Gulf Prairies and Marshes, Sand Sheet, and Rio Grande Plain ecoregions of Texas. It can also be found in the southern portions of the Edwards Plateau and eastern Trans-Pecos Mountains and Basins ecoregions and in adjacent 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



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.

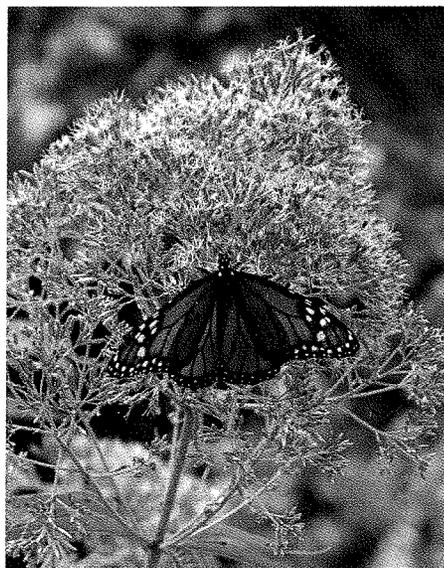
#### DESCRIPTION

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 multi-

ple 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.

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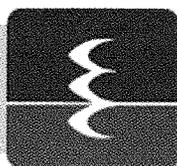


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## METHOD OF SELECTION

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.

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## 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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