# E. “Kika” de la Garza Plant Materials Center

# 2010 Annual Technical Report

**USDA-NRCS**
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## Notices

The E. “Kika” de la Garza Plant Materials Center (PMC) Annual Technical Report is a report to the plant materials discipline and cooperating agencies. This is a preliminary report of results from various studies conducted by the PMC Center staff and cooperators. Conclusions may change with continued investigations or upon further analysis. Written authorization must be obtained from the authors before publishing data from these reports. Contact the PMC Manager for more information at 3409 North FM 1355, Kingsville, Texas 78363, or (361) 595-1313.

Refer to our Web site: http://plant-materials.nrcs.usda.gov/ for additional information about our program.

This report uses currently accepted scientific names as they appear in the PLANTS (Plant List of Accepted Nomenclature, Taxonomy, & Symbols) database where practical. PLANTS is maintained by the National Plant Data Collection Center. See their Web site at http://plants.usda.gov/.

Mention of trade and company names does not imply any guarantee, warranty, or endorsement by the U. S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and does not imply its approval to the exclusion of other products that are also suitable.

**On the cover:** UL – 2010 seed release Webb Germplasm whiplash peppergrass; UR – survey of revegetation project on Bolivar Peninsula, Galveston, Texas; LL – range plants training for teacher group; LR – 2010 seed releases Maverick Germplasm pink pappusgrass. Photography by Shelly D. Maher, PMC Assistant Manager, Forrest Smith, South Texas Natives Coordinator, and Koy Coffer, Texas Wildlife Association.

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# E. "Kika" de la Garza Plant Materials Center

## 2010 Annual Technical Report

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# 2010 Annual Technical Report
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## INTRODUCTION

The Kika de la Garza Plant Materials Center (PMC) located at Kingsville, Texas was established in April 1981. The PMC is operated by the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service, in cooperation with an Advisory Board from Texas A&M University-Kingsville, the Caesar Kleberg Wildlife Research Institute (CKWRI), the South Texas Association of Soil and Water Conservation Districts (STASWCD), and the Gulf Coast Association of Soil and Water Conservation Districts (GCSWCD). The Advisory Board provides overall guidance and direction toward meeting the Plant Material Center's objectives.

The objective of the Plant Materials Program is to provide cost effective vegetative solutions for soil and water conservation problems. This means identifying plants for conservation use, developing techniques for their successful use, providing for their commercial increase, and promoting their use in natural resource conservation and other environmental programs.

## LOCATION AND FACILITIES

The Kika de la Garza PMC is located just outside of Kingsville on 76 acres of land leased from Texas A&M University-Kingsville and 15 acres leased from the King Ranch. The soils at the PMC are primarily Cranell sandy clay loam and Victoria clay. The King Ranch annex has Colmena fine sandy loam soil and Delfina fine sandy loam soil. Topography of the PMC is flat.

Facilities consist of an office, greenhouse, seed cleaning barn, seed storage building, seed lab, shop and equipment storage barn, and a fuel and pesticide storage complex. Limited irrigation water is available from a shallow pond and a low capacity well located at the PMC for furrow irrigation. Specialized hydroponic tanks are located at the PMC for use in production and evaluation of aquatic plants.

## INTERNET

You can access our website on the internet to find information about the Plant Materials Center. Information and publications will be added to our home page periodically. The website address is accessed through

http://www.tx.nrcs.usda.gov or http://plant-materials.nrcs.usda.gov.

## ACKNOWLEDGEMENTS

Our PMC would like to acknowledge the efforts of our many partners and cooperators who have contributed to our projects and accomplishments this year:

- Dr. Allen Rasmussen and the Department of Agriculture & Human Science, Texas A&M-Kingsville
- Dr. Fred Bryant and the Caesar Kleberg Wildlife Research Institute
- Forrest Smith and South Texas Natives
- The King Ranch
- East Texas Plant Materials Center
- James E. “Bud” Smith Plant Materials Center
- Scott Alford, USDA NRCS, Baytown
- Houston Audubon Society
- Dennis Markwardt, Texas Department of Transportation
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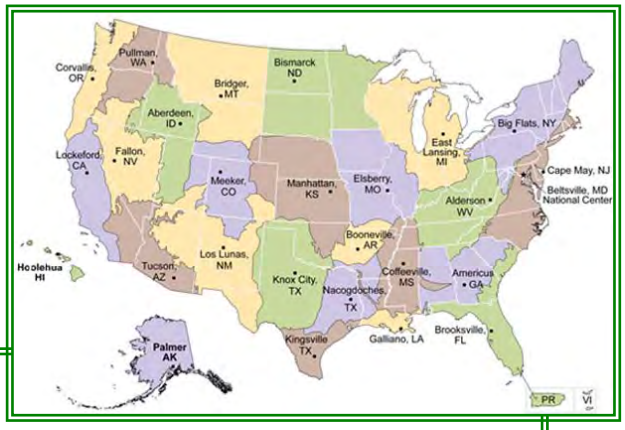
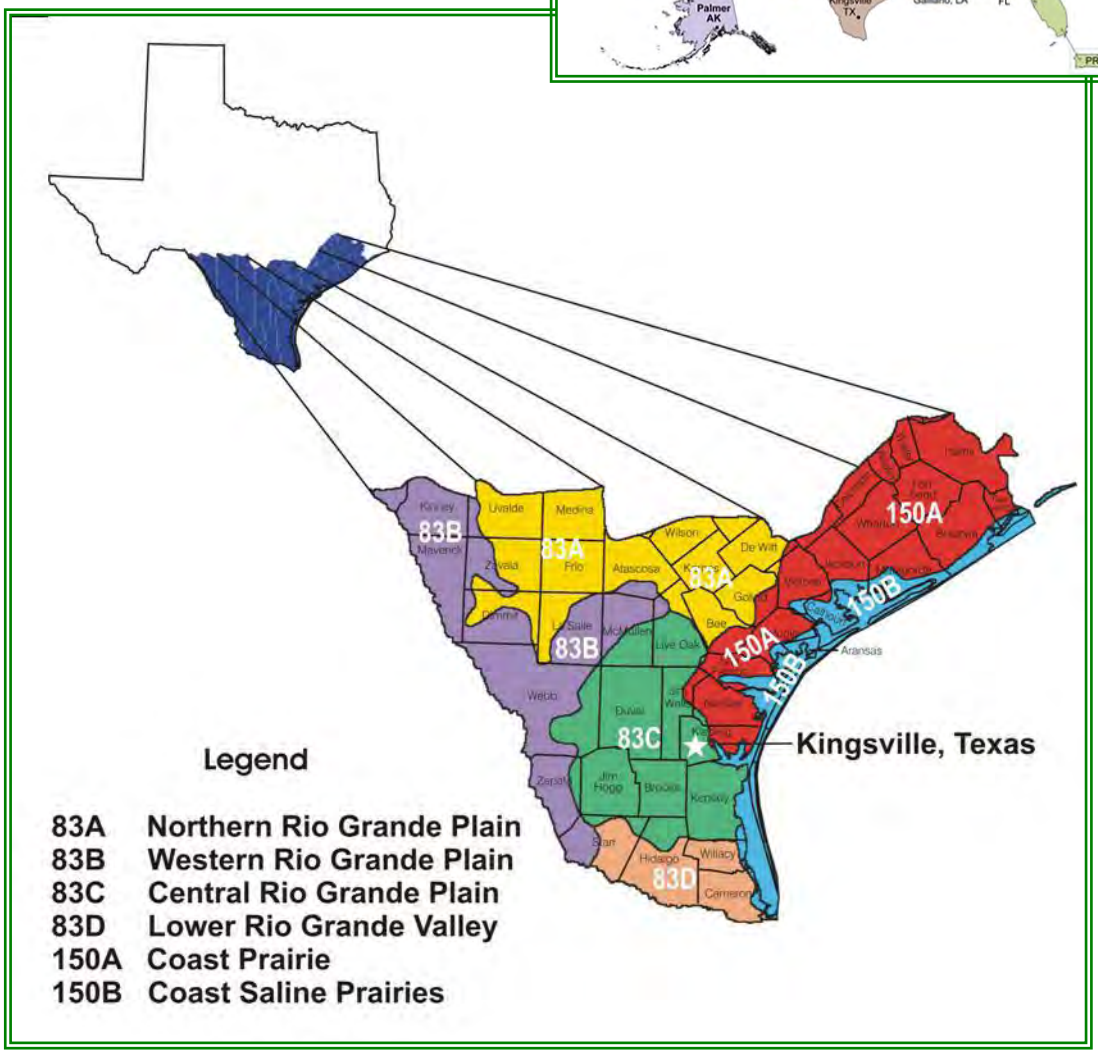
- Dr. Alice Hempel, Texas A&M University-Kingsville
- Dr. Jim Muir, Texas AgriLife Research Stephenville
- Dr. Barry Lambert, Tarleton State University
- Dr. Jim Kiniry, USDA-ARS Grassland, Soil, and Water Research Laboratory
- Dr. Kim Jones, Texas A&M University-Kingsville

Assistance and expertise provided by these individuals and groups has been essential in our success and is greatly appreciated.

## SERVICE AREA

The E. “Kika” de la Garza Plant Materials Center is one of 27 centers located throughout the United States. This PMC serves approximately 27 million acres of the southern portion of Texas.



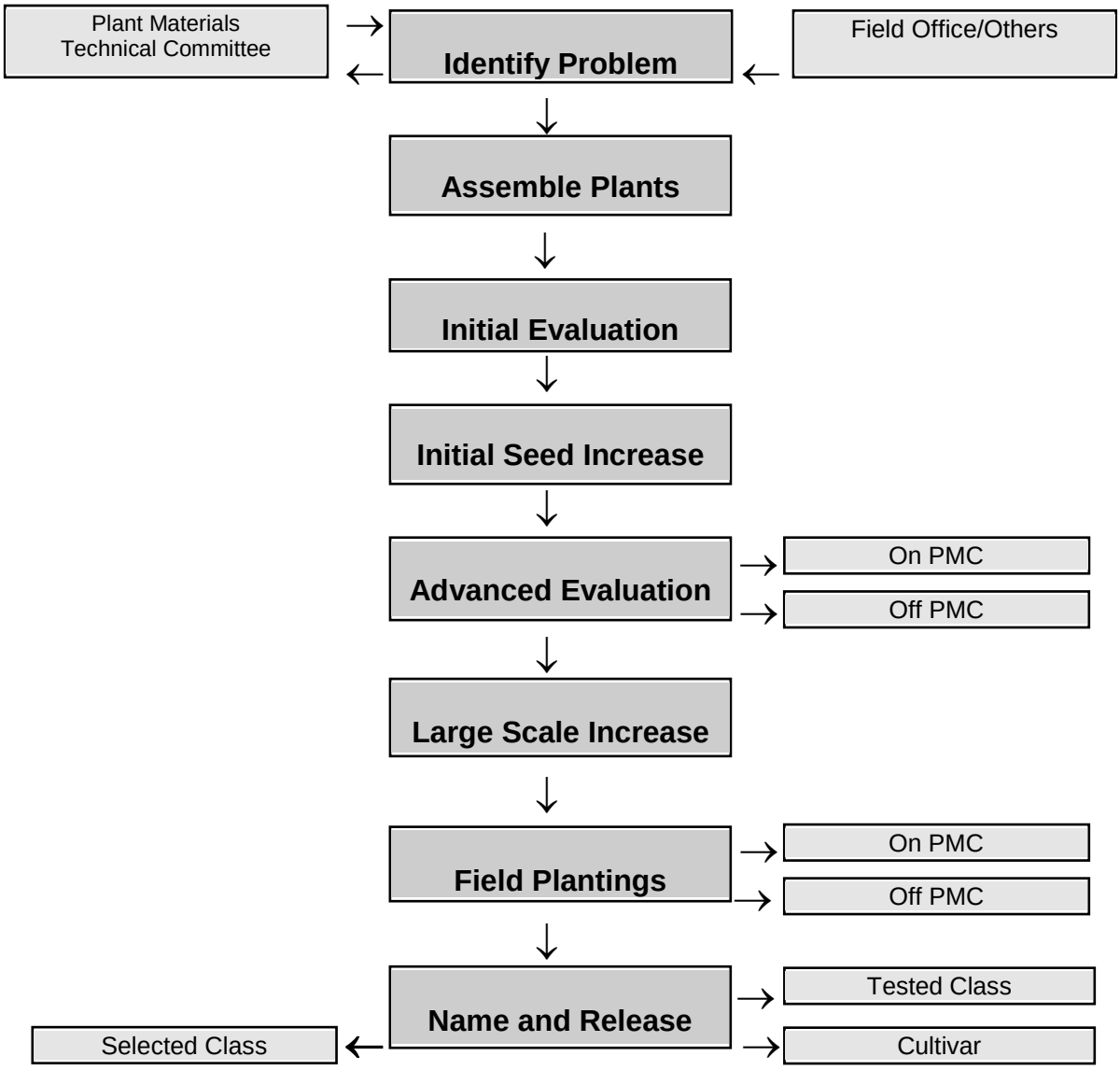
## CLIMATE DATA

| | TEMPERATURE (°F) | | | | RAINFALL (inches) | |
|---|---|---|---|---|---|---|
| **MONTH** | **HISTORICAL AVG.** | **2010 MONTHLY AVG.** | **2010 MAX** | **2010 MIN** | **HISTORICAL AVG.** | **2010 MONTHLY TOTAL** |
| JANUARY | 56.8 | 54.0 | 79 | 24 | 1.71 | 3.65 |
| FEBRUARY | 60.2 | 54.0 | 76 | 35 | 1.62 | 4.19 |
| MARCH | 66.9 | 63.3 | 86 | 35 | 0.86 | 0.85 |
| APRIL | 73.4 | 72.4 | 96 | 50 | 1.50 | 6.80 |
| MAY | 78.4 | 79.5 | 95 | 54 | 2.58 | 6.48 |
| JUNE | 82.9 | 83.4 | 96 | 65 | 3.05 | 4.13 |
| JULY | 84.9 | 84.3 | 96 | 72 | 2.13 | 9.32 |
| AUGUST | 84.9 | 86.2 | 102 | 70 | 2.72 | 0.72 |
| SEPTEMBER | 81.3 | 81.2 | 96 | 60 | 4.47 | 12.59 |
| OCTOBER | 73.8 | 73.3 | 92 | 42 | 3.17 | 0.00 |
| NOVEMBER | 65.0 | 64.9 | 90 | 31 | 1.26 | 0.35 |
| DECEMBER | 58.8 | 59.8 | 84 | 29 | 1.13 | 0.15 |
| | | | | **TOTAL** | **26.20** | **49.23** |

* Temperatures recorded at the National Weather Service Forecast Office in Corpus Christi, Texas
* Rainfall data recorded at the PMC

## PLANT MATERIALS PROGRAM PLANT RELEASE PROCESS

The Plant Materials Program has established a systematic process to evaluate and release plants to address the conservation problems outlined in the long-range program. The intensity and time of evaluation will vary according to the class of release. A cultivar will require many years (10-15) of intense evaluation whereas a selected class plant can be released in 3-4 years with little evaluation. The following flow chart illustrates the steps involved in this process.



# LONG RANGE PROGRAM

## PRIORITIES:

The Kika de la Garza Plant Materials Center's long range program has identified four high priority conservation needs to direct the operations at the PMC. These priorities have been established by the recommendations of the PMC Advisory Board, PMC Plant Technical Committee and Field Office surveys.

-Plant selection and cultural techniques to supply a better diversity of native forage for livestock.

-Plant selection and cultural techniques for addressing shoreline erosion and water quality issues of coastal and inland areas.

-Plant selection and cultural techniques to supply food, cover, and habitat for wildlife and pollinators.

-Plant selection and cultural techniques for ecosystem restoration. Emphasis is on restoration sites with alkaline and saline soil problems, endangered species recovery and sand dune stabilization.

Native Forages
- -Warm-season native grasses
- -Cool-season native grasses
- -Native Legumes

Erosion Control and Water Quality Improvement
- -Evaluation of vegetative barriers for cropland and gully erosion control
- -Plants for coastal shoreline erosion control
- -Plants for coastal water quality improvement

Wildlife Habitat Improvement
- -Plants for wildlife upland habitat
- -Plants for coastal waterfowl habitat
- -Plants for pollinator habitat

Ecosystem Restoration
- -Plant selection and cultural techniques for ecosystem restoration
- -Plants for alkaline and saline soils
- -Techniques for the restoration of endangered plant species

Biofuels
- -Plants for biomass production

# Plant Evaluation Projects

## Status of Active Projects Not Discussed in Detail:

Several active projects are on on hold due to various reasons, including the need for more collections, seed increase, or data processing. A brief update of the plant development projects that did not have extensive information to add for 2009 are included here.

77IO28CL Assembly and Evaluation of Seacoast Bluestem (*Schizachyrium littorale*)
Seed fill has been poor. Four accessions will be sent to Knox City PMC and Baytown in 2011 to observe seed fill in alternate locations.

STPMC-P-0121-RA Pink Pappusgrass (*Pappohporum bicolor*)
Webb Germplasm whiplash pappusgrass and Maverick Germplasm pink pappusgrass were released in 2010. Fact sheets included in this report.

STPMC-P-0126-WEOT Gulf Cordgrass (*Spartina spartinae*)
Two accessions have been selected and are in seed increase. Seed fill in seed increase plots has been low.

STPMC-P-0346- RA Frostweed (*Verbesina microptera*)
Waiting for more seed collections. Not in active evaluation.

STPMC-P-0348-RA Engelmann's Daisy (*Engelmannia peristenia*) [syn. *E. pinnatifida*]
Seed collections were received in 2010. These will be planted in 2011.

STPMC-P-0349-RA Awnless Bush-sunflower (*Simsia calva*)
STN has seven accessions in seed increase.

STPMC-P-0352- RA Florida Paspalum (*Paspalum floridanum*)
On hold due to poor seed fill.

STPMC-P-0355-RA Prairie Acacia (*Acacia angustissima*)
Currently in seed increase. It should be released in 2012.

STPMC-P-0356-RA Golden Dalea (*Dalea aurea*)
Seed increase plots had poor survival on clay soils in 2009. Seed increase tried on sandier soils in 2010 also had poor survival.

STPMC-P-0564-RA Crinkleawn (*Trachypogon secundus*)
STN has it in evaluation.

STPMC-P-0565-RA Slim Tridens (*Tridens muticus*)
STN has it in evaluation.

STPMC-P-0566-RA Indian Blanket [Firewheel] (*Gallardia pulchella*)
Release planned for 2014.

STPMC-P-0567-RA Mexican Hat (*Ratibidia columnaris* or *R. columnifera*)
Release planned for 2014.

STPMC-P-0568-RA Partridge Pea (*Chaemaecrista fasciculate*)
Waiting for more seed collections.

**Study Number: 77IO16H**

**Study Title:** Assembly and Evaluation of Four Flower Trichloris (*Trichloris pluriflora*)

**Introduction:** Four flower trichloris (*Trichloris pluriflora*) is a warm-season perennial bunch grass native to Texas (Hitchcock, 1971). It is of particular interest because USDA-NRCS soil surveys have reported that four flower trichloris is one of two co-dominant climax species on numerous range sites in South Texas. Four flower trichloris is also known as multi-flowered false rhodesgrass (Gould, 1975). Four flower trichloris grows on plains and in dry woods in south Texas, Mexico, and in southern South America (Correll and Johnston, 1996; Hitchcock, 1971). Although the presence of four flower trichloris is considered an indicator of good range condition, there is no known commercial variety of this species.

**Problem:** There is a need for native, adapted seed available at a reasonable price for the restoration and reclamation of habitat in the South Texas Region.

**Objective:** The objective is to assemble, evaluate, select and release, and/or provide information on the propagation of four flower trichloris. Four flower trichloris collections will be evaluated for adaptation in two South Texas Ecoregions, the sandy soil region known as the South Texas Sand Plain and the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** In October of 2008, the PMC selected five accessions of four-flowered trichloris for a commercial seed release. South Texas Natives also selected three accessions. This was narrowed down to six accessions to include the top performing accessions and cover the geographic range of the species. The accessions chosen for release were: 9086184 Jim Wells Co., 9088772 Webb Co., 9089128 Medina Co., 9091809 Jim Hogg Co., 9090315 Wilson Co., and 9091844 Brooks Co.

In June 2009, seed increase plots of each accession were planted by transplants from original seed. Five accessions (9088772 Webb Co., 9089128 Medina Co., 9091809 Jim Hogg Co., 9090315 Wilson Co., and 9091844 Brooks Co.) had enough original seed left to plant in rows by accession side by side in a composite block. Three accessions (9086184 Jim Wells Co., 9090315 Wilson Co., and 9091844 Brooks Co) were planted in isolated blocks of 50 plants. Seed was harvested from the composite seed increase plot, containing five of the six accessions, in October of 2008 and was germination tested in May 2010. This harvest had germination rates ranging from 24-52.8% (Table 1). In July 2009, a cold tolerance plot was planted at the PMC in Nacogdoches, Texas. A survival count was done by the ETPMC on May 6, 2010 (Table 2). Eleven to twenty plants of the original twenty plants per accession survived. The remaining accession (9086184-Jim Wells) will be added to the composite seed increase block in 2011 and this species will be released 2011.

**Table 1. Study 77IO16H Four Flower Trichloris October 2009 Harvest Germination**

**Seed Increase Composite**

| Accession Number | Origin (County) | Date Harvested | 3 Days % | 7 Days % | 28 Days % |
|---|---|---|---|---|---|
| 9088772 | Webb | 10-14-09 | 0.0 | 8.0 | 24.0 |
| 9089128 | Medina | 10-14-09 | 0.0 | 23.3 | 30.0 |
| 9090315 | Wilson | 10-14-09 | 2.8 | 40.8 | 52.8 |
| 9091809 | Jim Hogg | 10-14-09 | 21.3 | 42.3 | 47.3 |
| 9091844 | Brooks | 10-14-09 | 5.8 | 34.0 | 38.5 |

*4 reps of 100 seeds each at 12 hours dark 20$^{o}$C (68$^{o}$F) / 12 hours light 30$^{o}$C (86$^{o}$F)

**Table 2. Study 77IO16H Four Flower Trichloris ETPMC Cold Tolerance Evaluation**

**ETPMC on May 6, 2010**

| Accession Number | Origin (County) | Date Evaluated | # Original Plants | # Survived | Vigor* |
|---|---|---|---|---|---|
| 9091809 | Jim Hogg | 5-6-10 | 20 | 14 | 7 |
| 9090315 | Wilson | 5-6-10 | 20 | 20 | 5 |
| 9086184 | Jim Wells | 5-6-10 | 20 | 14 | 5 |
| 9091844 | Brooks | 5-6-10 | 20 | 11 | 7 |
| 9089128 | Medina | 5-6-10 | 20 | 20 | 3 |
| 9088772 | Webb | 5-6-10 | 20 | 19 | 5 |

*Visual observations: 3=good, 5=fair, 7=poor

**Study Number: 77IO23HR**

**Study Title:** Assembly and Evaluation of Virginia Wildrye (*Elymus virginicus*)

**Introduction:** *Elymus virginicus* (Virginia Wildrye) is a native, cool season, perennial bunchgrass that grows two to three feet in height, and reproduces by tillering and seed. The distribution of this species is distributed throughout the United States except for Nevada, California, and Oregon (Hitchcock, 1935). It is commonly found scattered along fencerows, shaded banks, and open woodlands. It prefers moister soil, higher soil fertility, heavier soil textures, and is more shade tolerant than Elymus canadensis (Phillips Petroleum Company, 1963). Phillips Petroleum Company (1963) further reports that it is very palatable, nutritious, and is eaten readily by all classes of livestock in spring and fall when it is green. It is a strongly self-fertilized species (Fryxell, 1957).

**Problem:** There is a need for native, adapted seed available at a reasonable price for the restoration and reclamation o f habitat in the Texas Coastal Prairie.

**Objective:** The objective is to assemble, evaluate, select and release, and/or provide information on the propagation of Virginia wildrye. Virginia wildrye collections will be evaluated for adaptation in the region along the Texas coast known as the Texas Coastal Prairie.

**Discussion:** Eight collections of Virginia wildrye from the Texas Coastal Prairie were seeded in the greenhouse in November of 2009. All eight accessions were transplanted in to the field for initial evaluation in February of 2010. The plot was too weedy to evaluate in the fall of 2010 due to heavy summer rains. This plot will be evaluated and seed will be collected in 2011. No new collections of Virginia wildrye were received in 2010.

**Study Number: 77I049H**

**Study Title:** Assembly and Evaluation of Brownseed Paspalum (*Paspalum plicatulum*)

**Introduction:** Brownseed paspalum (*Paspalum plicatulum*) is a native, warm-season, slightly rhizomatous perennial bunchgrass. It is native to Georgia, Florida, and Texas, south to Argentina, and in the West Indies (Hitchcock, 1971). In Texas, it is common in east and southeast Texas, and in the coastal part of the Rio Grande Plain. It is occasionally found west to North Central Texas, and the northern Rio Grande Plain (Correll & Johnston, 1996). It prefers sandy to sandy loam soils (Gould, 1975), and can be found in open woods and on prairies (Correll and Johnston, 1996). *Paspalum texanu*m, previously recognized as its own species is now included under *Paspalum plicatulum* (Gould, 1975). Gould (1975) notes that although there are some differences between the two, the morphological variability and wide range of adaptability of *Paspalum plicatulum* could easily account for the character differences. Therefore, he does not recognize *Paspalum texanum* as a separate taxon. Hitchcock (1971) includes the Brazilian native, *Paspalum nicorae*, under *Paspalum plicatulum* for similar reasons. *Paspalum plicatulum* flowers throughout most of the year (Gould, 1975). Its fruit turns dark brown at maturity (Correll and Johnston, 1996), thereby earning its common name of brownseed paspalum.

**Problem:** There is a need for native, adapted seed available at a reasonable price for the restoration and reclamation of native habitat in the South Texas region.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of brownseed paspalum. Brownseed paspalum collections will be evaluated for adaptation in three South Texas Ecoregions: the sandy soil region known as the South Texas Sand Plain, the region along the Texas coast known as the Texas Coastal Prairie, and the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** The King Ranch, 9088681-Goliad, and 9088644-Victoria accessions have consistently had the best performance in Kingsville. It was discovered that accessions 9088644, 9088647 and 9088651 are actually the same collection. Accession 9088647 was used in place of 9088644 in East Texas and in the PMC seed increase plot due to a shortage of original seed. The 9088647-Victoria and the King Ranch accessions have consistently had the best performance in East Texas. In 2009, a seed increase plot of the King Ranch, 9088681-Goliad, and 9088647-Victoria accessions were planted at the Annex. Additional plants were added to the King Ranch selection in 2010. A release will be pursued as soon as sufficient seed is obtained.

***Norias Plots:*** The seed collected in May 23, 2007 from the Norias AEP of selected accessions and IEP of new collections was germination tested and TZ tested (for seed viability) in March of 2010 (Tables 1 & 2). In the AEP plot, the King Ranch collection had the best seed fill, followed by accession 9088681. Seed fill was poor in all of the IEP accessions and none had vegetative characteristics superior to accessions already selected.

***East Texas AEP***: The AEP plot at the East Texas PMC in Nacogdoches was planted in July 2005. Accession 9088647-Victoria consistently had the best plant vigor followed by the King Ranch collection. However, 9088681-Goliad had the most consistent seed fill. The seed collected from this plot in 2006 and 2007 was germination tested and TZ tested (for seed viability) in February of 2010 (Tables 3 & 4). Seed fill was much better in the May 2006 harvest,

but low again in the June 2006 and June 2007 harvests. Due to the increase in seed fill seen in the East Texas plot, a small seed increase plot will be planted there in 2011.

**Table 1. Study Number: 77I049H Brownseed Paspalum May 23, 2007 Seed Harvest**

**Norias AEP (sandy soil)**

| Accession Number | Rep | 7 Days % | 28 Days % | TZ Dormant Seed % | % Seed Fill | Adjusted Germ. % |
|---|---|---|---|---|---|---|
| King Ranch | 1 | 15.3 | 16.7 | 0.0 | 18 | 91.0 |
| King Ranch | 2 | 38.0 | 41.3 | 0.0 | 44 | 92.5 |
| King Ranch | 3 | 19.3 | 20.0 | 0.0 | 22 | 94.9 |
| King Ranch | 4 | 19.3 | 20.0 | 0.0 | 22 | 88.9 |
| 9088681 | 1 | 12.7 | 12.7 | 0.6 | 14 | 88.9 |
| 9088681 | 2 | 6.7 | 7.3 | 0.6 | 8 | 83.3 |
| 9088681 | 3 | 5.3 | 7.3 | 0.0 | 8 | 100 |
| 9088681 | 4 | 10.7 | 12.0 | 0.0 | 14 | 91.1 |
| 9064466 | 1 | 3.3 | 3.3 | 0.0 | 6 | 66.7 |
| 9064466 | 2 | 5.3 | 5.3 | 0.0 | 6 | 87.5 |
| 9064466 | 3 | 0.0 | 0.0 | 0.0 | 4 | 0.0 |
| 9064466 | 4 | 0.0 | 0.0 | 0.0 | 1 | 0.0 |
| 9088651 | 1 | 0.7 | 0.7 | 0.0 | 6 | 66.7 |
| 9088651 | 2 | 5.3 | 6.0 | 0.0 | 6 | 87.5 |
| 9088651 | 3 | 0.0 | 0.7 | 0.0 | 4 | 0.0 |
| 9088651 | 4 | 22.0 | 23.3 | 0.0 | 1 | 0.0 |
| 9088644 | 1 | 0.7 | 1.3 | 0.0 | 2 | 100 |
| 9088644 | 2 | 5.3 | 7.3 | 0.0 | 8 | 66.7 |
| 9088644 | 3 | 2.0 | 2.0 | 0.0 | 2 | 100 |
| 9088644 | 4 | 7.3 | 8.0 | 0.0 | 10 | 77.8 |
| 9089219 | 1 | 0.0 | 0.0 | 0.0 | 0 | 0.0 |
| 9089219 | 2 | 2.7 | 2.7 | 0.0 | 4 | 83.3 |
| 9089219 | 3 | - | - | - | - | - |
| 9089219 | 4 | 0.7 | 0.7 | 0.0 | 2 | 50.0 |

*3 reps of 50 seeds each at 12 hours dark 20$^{o}$C (68$^{o}$F) / 12 hours light 30$^{o}$C (86$^{o}$F)

**Table 2. Study Number: 77I049H Brownseed Paspalum May 23, 2007 Seed Harvest**

**Norias IEP (sandy soil)**

| Accession Number | Origin (County) | 7 Days % | 28 Days % | TZ Dormant Seed % | % Seed Fill | Adjusted Germ. % |
|---|---|---|---|---|---|---|
| 9089252 | Victoria | 1.3 | 1.3 | 0.0 | 2 | 100 |
| 9090327 | Goliad | 1.3 | 1.3 | 0.0 | 2 | 100 |
| 9093293 | Ft. Bend | 2.0 | 4.0 | 0.0 | 4 | 100 |
| 9090344 | Victoria | 0.0 | 0.7 | 0.0 | 2 | 50 |
| 9093294 | Ft. Bend | 0.7 | 0.7 | 0.0 | 1 | 100 |
| 9090268 | Goliad | 0.7 | 0.7 | 0.0 | 1 | 100 |

*3 reps of 50 seeds each at 12 hours dark 20$^{o}$C (68$^{o}$F) / 12 hours light 30$^{o}$C (86$^{o}$F)

**Table 3. Study Number: 77I049H Brownseed Paspalum 2006 Seed Harvest**

**ETPMC AEP (sandy soil)**

| Accession Number | Date Collected | 7 Days % | 28 Days % | TZ Dormant Seed % | % Seed Fill | Adjusted Germ. % |
|---|---|---|---|---|---|---|
| King Ranch | 5-22-06 | - | - | - | - | - |
| 9088681 | 5-22-06 | 29.3 | 35.3 | 0.7 | 93.3 | 37.9 |
| 9064466 | 5-22-06 | 0.0 | 0.7 | 0.7 | 60.0 | 1.6 |
| 9088651 | 5-22-06 | 17.3 | 18.0 | 0.0 | 92.0 | 20.4 |
| 9088647 | 5-22-06 | 20.7 | 24.0 | 0.7 | 74.7 | 32.5 |
| 9089219 | 5-22-06 | 43.3 | 46.7 | 0.7 | 86.0 | 54.2 |
| King Ranch | 6-12-06 | 0.7 | 0.7 | 0.0 | 6 | 16.7 |
| 9088681 | 6-12-06 | 14.7 | 21.3 | 0.0 | 26 | 75.2 |
| 9064466 | 6-12-06 | 2.0 | 3.3 | 0.0 | 6 | 35.7 |
| 9088651 | 6-12-06 | 0.7 | 1.3 | 0.0 | 4 | 33.3 |
| 9088647 | 6-12-06 | 1.3 | 1.3 | 0.0 | 8 | 15.0 |
| 9089219 | 6-12-06 | 6.7 | 7.3 | 0.0 | 14 | 57.0 |

*3 reps of 50 seeds each at 12 hours dark 20$^{o}$C (68$^{o}$F) / 12 hours light 30$^{o}$C (86$^{o}$F)

**Table 4. Study Number: 77I049H Brownseed Paspalum 2007 Seed Harvest**

**ETPMC AEP (sandy soil)**

| Accession Number | Date Collected | 7 Days % | 28 Days % | TZ Dormant Seed % | % Seed Fill | Adjusted Germ. % |
|---|---|---|---|---|---|---|
| King Ranch | 6-19-07 | 5.3 | 6.7 | 0.0 | 10 | 75.9 |
| 9088681 | 6-19-07 | 11.3 | 11.3 | 0.0 | 22 | 77.2 |
| 9064466 | 6-19-07 | 0.7 | 1.3 | 0.0 | 4 | 44.4 |
| 9088651 | 6-19-07 | 5.3 | 6.7 | 0.0 | 16 | 36.9 |
| 9088647 | 6-19-07 | 5.3 | 6.7 | 0.0 | 10 | 68.9 |
| 9089219 | 6-19-07 | 4.0 | 4.0 | 0.0 | 12 | 32.5 |

*3 reps of 50 seeds each at 12 hours dark 20$^{o}$C (68$^{o}$F) / 12 hours light 30$^{o}$C (86$^{o}$F)

**Study Number: 77I050JH**

**Study Title:** Assembly and Evaluation of Native Legumes for South Texas

**Introduction:** Native, perennial legumes can add value to many range planting or wildlife food plots. First, most legumes provide a highly nutritious source of forage. Second, legumes help fix nitrogen in the surrounding soil thereby increasing the soil fertility of the planting site. Third, legumes can be used to add biodiversity to a site when planted with grasses and other forbs. Finally, legumes tend to have showy flowers and can add aesthetic value to a site, and be used in a native, perennial garden.

**Problem:** There is a need for native perennial legumes for range restoration, wildlife habitat and xeriscaping in South Texas. Currently, the only native legumes used in South Texas are partridge pea and Illinois bundleflower. Partridge pea is an annual species and Illinois bundleflower is a perennial species that has difficulties with survival and persistence in South Texas.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of native legumes. Native legume collections will be evaluated for adaptation throughout South Texas.

**Discussion:** For information on golden dalea, prairie acacia, desmanthus, and prairie clover see the individual species project reports.

**Low Prairie Clover:** This is a three foot tall, semi-woody, prairie clover species. Foliage production and density have been good over three years and its seed does not easily shatter. Scarifying seed in a sandpaper scarifier for 5 seconds seems adequate to achieve high germination in just 3 days.

Seed was harvested in November 2007 from the one accession under initial evaluation and in November 2008 from the two accessions then under evaluation. These harvests were germination tested in May 2009. Two more collections of this species were made in 2008 from Cameron and Willacy counties. These were seeded in the greenhouse in March 2009 and planted in the field in June 2009. Samples of this species will be sent off for a toxicology evaluation in 2011. The results of this test will determine if this species will be released.

**Species for Initial Observation:** Several legume species were seeded in the greenhouse in March 2009 for observation, but only indigo (*Indigofera suffruticosa*) showed promise. Indigo was planted again in 2010 and will be sent for a toxicology evaluation in 2011. In addition to indigo, poorman's friend (*Stylosanthes viscosa*) was seeded in the greenhouse in January 2010 for observation (Table 1). However, once in the field, poorman's friend did not exhibit characteristics suitable for weed competition.

**Table 1. Study Study 77I050JH - Observation Species**

**Greenhouse Germination Spring 2010**

| Species | Accession Number | Origin | 15 Days % | 30 Days % | 45 Days % |
|---|---|---|---|---|---|
| Indigo | 9093475 | San Patricio | 82 | 84 | 88 |
| Poorman's Friend | PI 352684 | Australia | 0 | 0 | 0 |
| Poorman's Friend | PI 387961 | Mexico | 16 | 20 | 20 |
| Poorman's Friend | PI 387962 | Australia | 8 | 36 | 48 |
| Poorman's Friend | PI 387963 | Australia | 0 | 24 | 24 |
| Poorman's Friend | PI 405093 | Brazil | 0 | 40 | 50 |

***Germination count based number of seeds planted.
All accessions scarified 1 second in a sandpaper drum seed scarifier.

**Study Number: STPMC-P-0134- WLRA**

**Study Title:** Assembly and Evaluation of Desmanthus (*Desmanthus* spp.)

**Introduction:** Native, perennial legumes are a desirable addition to range plantings for two main reasons. First, they can help fix nitrogen in the soil. Second, they are a valuable food source for wildlife. Foliage is eaten by cattle and deer, and the seeds are eaten by quail, doves, and other wild birds. Several species of the genus *Desmanthus* are native to South Texas. 'Sabine' Illinois bundleflower (*D. illinoensis*) has been released by the USDA-NRCS James E. "Bud" Smith Plant Materials Center as a native Texas legume, but it is not well adapted to the South Texas climate. It tends to die off during the hot, dry Texas summers, acting more as an annual than a perennial. *Desmanthus velutinus*, *D. reticulatus*, and *D. virgatus* var. *depressus* are some species of interest. A particular focus will be on accessions adapted to the South Texas climate, with an upright growth form and good seed production that will facilitate large-scale seed harvest. We are currently collecting *Desmanthus* spp. from South Texas sites that have good seed production and an upright growth form, as well as evaluating existing collections of seed at the PMC.

**Problem:** There is a need for perennial native legumes for range restoration, wildlife habitat, and xeriscaping in South Texas.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of *Desmanthus* spp. *Desmanthus* spp. collections will be evaluated for adaptation in the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** Two superior performing accessions of *Desmanthus virgatus*, 9085381-Hidalgo and 9090608-Maverick, were chosen out of seventy-four original accessions of *Desmanthus* spp. These two accessions had more regrowth, higher density, and better seed production than the other accessions. They have been in seed increase since 2007, but have had poor growth and seed production on Victoria clay soils. In 2010, 400 seedlings of each accession were given to South Texas Natives (STN) for a seed increase trial at Rio Farms on sandier soils. A successful seed increase method must be found before a seed release can be made.

***Illinois bundleflower:*** Collections of Illinois bundleflower (*Desmanthus illinoensis*) are being made to find one that will tolerate the South Texas climate. These collections will be evaluated for use as a component in native plant biofuel plots. A nitrogen fixing legume will be necessary in order to avoid the cost of chemical fertilizers.

Eleven accessions of Illinois bundleflower were received in 2009 and were planted in the greenhouse in the spring of 2010 (Table 1). These eleven accessions were planted into an evaluation plot in May of 2010. This plot was evaluated in the fall of 2010. Accession 43914 performed better than the others and had a little seed production, but overall the accessions did not appear adapted to this area. The other accessions had no seed production. As a result of this evaluation, an attempt was made in 2010 to find the southernmost population of Illinois bundleflower. Three accessions were collected and will be planted in 2011.

**Table 1. Study P-0134- WLRA Desmanthus**

**Greenhouse Germination Spring 2010**

| Accession Number | Origin | 15 Days % | 30 Days % | 45 Days % | 60 Days % |
|---|---|---|---|---|---|
| PI 434011 | US-TX - Sabine | 84.0 | 84.0 | 84.0 | 84.0 |
| PI 543896 | United States | 84.0 | 80.0 | 80.0 | 80.0 |
| PI 543897 | United States | 76.0 | 84.0 | 84.0 | 84.0 |
| PI 543898 | United States | 92.0 | 96.0 | 96.0 | 96.0 |
| PI 543901 | United States | 88.0 | 88.0 | 88.0 | 88.0 |
| PI 543902 | United States | 95.8 | 95.8 | 95.8 | 95.8 |
| PI 543903 | United States | 52.0 | 56.0 | 52.0 | 52.0 |
| PI 543908 | United States | 79.2 | 79.2 | 79.2 | 79.2 |
| PI 543914 | United States | 88.0 | 88.0 | 88.0 | 88.0 |
| 9093542 | Travis | 34.3 | 37.1 | 40.0 | 37.1 |
| 9093543 | Travis | 60.0 | 62.5 | 65.0 | 62.5 |

***Germination count based number of seeds planted.

**Study Number: STPMC-P-0137- RA**

**Study Title:** Rio Grande Plain Ecotype Project

**Introduction:** An initiative was developed in August of 2000 and is spearheaded by Caesar Kleberg Wildlife Research Institute to develop and promote native plants for the restoration and reclamation of habitat on private and public lands in South Texas. The goal of the initiative called the South Texas Natives Project is to provide economically viable sources of plants and seeds and to develop effective planting strategies for the restoration of South Texas plant communities.

**Problem:** There is a need for native adapted ecotypic plants for range restoration, wildlife habitat, and xeriscaping in South Texas.

**Objective:** The PMC will establish a seed nursery for South Texas ecotypes of a variety of grasses, forbs, and legumes. Ecotypes will be developed for the Rio Grande Plain ecoregion. The ecotype region was established to be large enough to retain regional integrity and genetic adaptability. The seed nursery will consist of approximately 50 plants per collection of 20 collections of each species. The nursery will consist of transplants that are isolated as necessary to maintain species integrity and diversity. The seed nursery will be hand harvested to ensure a complete spectrum of seed is harvested from each species. The nursery seed will be planted in production fields where it will then be harvested and bulked per species. The ecoregion seed will then be made available to commercial seed growers.

**Discussion:** Throughout the spring and summer of 2009, the seed nursery included 9 species for the Rio Grande Plain ecoregion: green sprangletop, sideoats grama, Engelmann's daisy, frostweed, switchgrass, big bluestem, little bluestem, and Indiangrass. Green sprangletop and frostweed were determined not to be priority species. These two species were discontinued at the end of 2009.

Throughout the spring and summer of 2010, the seed nursery was reduced so that it included six species for the Rio Grande Plain ecoregion: sideoats grama, Engelmann's daisy, switchgrass, big bluestem, little bluestem, and Indiangrass. Germination and evaluation information for these species can be found under the individual species' project. Fifteen new accessions were received in 2010 for the Rio Grande Plain ecoregion.

**Study Number: STPMC-P-0138- RA**

**Study Title:** Texas Coastal Prairie Ecotype Project

**Introduction:** In 2001, an initiative was begun between the USFW Service, CKWRI, the Gulf Coast Association of Soil and Water Conservation Districts, the STN Project, and the Kika de la Garza PMC to produce native, ecotypic plant material to displace invasive species on pastures and agricultural fields, along the Texas Coastal Prairie.

**Problem:** There is a need for native adapted ecotypic plants for range restoration, wildlife habitat, and xeriscaping along the Texas Gulf Coast.

**Objective:** The PMC will establish a seed nursery of Texas Coastal Prairie ecotypes for a variety of grasses, forbs, and legumes. The ecotype region was established to be large enough to retain regional integrity and genetic adaptability. The seed nursery will consist of approximately 20 collections of each species. The nursery will consist of transplants that are isolated as necessary to maintain species integrity and diversity. The seed nursery will be hand harvested to ensure a complete spectrum of seed is harvested from each species. The nursery seed will be planted in production fields where it will then be harvested and bulked per species. The ecoregion seed will then be made available to commercial seed growers.

**Discussion:** In January 2010, 4 accessions of yellow Indiangrass, 6 big bluestem, 1 little bluestem, 4 switchgrass, 5 sideoats grama, 8 Virginia wildrye, 9 white or roundhead prairie clover, and 69 black-eyed Susan were seeded in the greenhouse. Germination and evaluation information for these species can be found under the individual species' project. Those accessions exhibiting good germination were transplanted into the field in the spring of 2009. In 2010, 10 additional collections were received representing five of the selected species and one sunflower.

*Sunflowers:* In addition to the previously selected species, three species of sunflower found in the Texas Coastal Prairie were evaluated starting in 2009. Seventeen new sunflower accessions were received in 2009. Maximilain sunflower, swamp sunflower, and compass plant were evaluatred during the summer of 2009. The compass plants had less biomass, height, and seed production than desired. It was discontinued at the end of 2009. The Maximilain sunflower and swamp sunflower had poor survival in 2009 due to a summer drought and high winds. They were seeded in the greenhouse again in January 2010 (Table 1). Nine Maximilain sunflower and five swamp sunflower were transplanted into the field in May of 2010. This plot was evaluated for field performance in the fall of 2010 (Table 2).

**Table 1. Study STPMC-P-0137- RA Rio Grande Ecotype Project**

**Greenhouse Germination Spring 2010**

| Species | Accession Number | Origin (County) | 15 Days % | 30 Days % | 45 Days % |
|---|---|---|---|---|---|
| Maximilain sunflower | 9093406 | Collingsworth | 20.0 | 26.7 | 26.7 |
| Maximilain sunflower | 9093407 | Hays | 0 | 0 | 0 |
| Maximilain sunflower | 9093445 | Wharton | 8.0 | 35.0 | too thick |
| Maximilain sunflower | 9093465 | Washington | 52.0 | 77.0 | too thick |
| Maximilain sunflower | 9093484 | Comal | 85.0 | 88.0 | too thick |
| Maximilain sunflower | 9093485 | Comal | 67.0 | 84.0 | too thick |
| Maximilain sunflower | 9093486 | Hays | 32.0 | 41.0 | too thick |
| Maximilain sunflower | 9093487 | Kendall | 75.0 | 91.0 | too thick |
| Maximilain sunflower | 9093488 | Blanco | 66.0 | 76.0 | too thick |
| Maximilain sunflower | 9093558 | Austin | 23.0 | 46.0 | too thick |
| Swamp sunflower | 9093496 | Matagorda | 47.0 | 60.0 | 60.0 |
| Swamp sunflower | 9093498 | Matagorda | 27.0 | 42.0 | 42.0 |
| Swamp sunflower | 9093499 | Matagorda | 15.0 | 19.0 | 19.0 |
| Swamp sunflower | 9093500 | Matagorda | 3.0 | 8.0 | 8.0 |
| Swamp sunflower | 9093502 | Brazoria | 34.0 | 47.0 | 47.0 |

***Germination count based number of seeds planted.

**Table 2. Study STPMC-P-0137- RA Rio Grande Ecotype Project**

**Field Evaluation Fall 2010**

| Species | Accession Number | Origin (County) | Notes |
|---|---|---|---|
| Maximilain sunflower | 9093406 | Collingsworth | all dead |
| Maximilain sunflower | 9093445 | Wharton | the most flowers, tall but lodges might be swamp sunflower |
| Maximilain sunflower | 9093465 | Washington | |
| Maximilain sunflower | 9093484 | Comal | |
| Maximilain sunflower | 9093485 | Comal | |
| Maximilain sunflower | 9093486 | Hays | second best accession |
| Maximilain sunflower | 9093487 | Kendall | |
| Maximilain sunflower | 9093488 | Blanco | best accession |
| Maximilain sunflower | 9093558 | Austin | many flowers, but few survived |
| Swamp sunflower | 9093496 | Matagorda | best accession, more leaves |
| Swamp sunflower | 9093498 | Matagorda | second best accession more flowers, but also more lodging |
| Swamp sunflower | 9093499 | Matagorda | |
| Swamp sunflower | 9093500 | Matagorda | |
| Swamp sunflower | 9093502 | Brazoria | |

**Study Number: STPMC-P-0139- RA**

**Study Title:** Assembly and Evaluation of Hall's Panicum (*Panicum hallii*)

**Introduction:** *Panicum hallii* is a warm-season perennial bunchgrass that grows 60-90 cm in height (Gould, 1975). There are two main varieties: *hallii* and *filipes* (USDA, 1994). *Panicum hallii* var. *hallii* (previously known as *Panicum hallii*) can be found from Oklahoma to Colorado to Texas and Arizona and down into Mexico (Hitchcock, 1971). Commonly known as Hall's panicum or panicgrass, it is found mostly in the rocky, dry uplands in the western two-thirds of Texas (Correll and Johnston, 1996), but can also be found on calcareous soils along the Gulf Coast. It is palatable for all livestock, but provides only fair quality forage (Hatch, Schuster, and Drawe, 1999). In addition, it tends to decrease under heavy grazing (Gay, Dwyer, Hatch, and Schickendanz, 1980). *Panicum hallii* var. *filipes* (previously known as *P. filipes*) can be found from Louisiana to Texas, and down into northeastern Mexico (Hitchcock, 1971). It is found along roadsides and in disturbed lowlands from North Central Texas south to the Rio Grande Plain, less frequently in West Texas, and in all but the extreme Northern and Western portions of the Panhandle (Gould, 1975). It is commonly called filly panicum (Hignight, Wipiff, and Hatch, 1988), although the common name, Hall's panicgrass, has been used as well (USDA, 1994). The latter name may come from the high degree of introgression found between the two varieties (Correll and Johnston, 1996). *Panicum hallii* var. *filipes* tends to be more productive than *P. hallii* var. *hallii*, but produces only fair to poor quality livestock forage. The seeds of both varieties can be eaten by birds (Hatch, Schuster, and Drawe, 1999). The two varieties can be distinguished from one another because *P. hallii* var. *filipes* tends to be taller, have longer, more relaxed leaf blades, larger, looser panicles, and smaller spikelets.

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat in the South Texas region.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of Hall's panicum. Hall's panicum collections will be evaluated for adaptation in the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** In July 2010, several 2007-2010 seed increase plot seed harvests were germination tested (Table 1). Both selected accessions are in seed increase and this species will be released in 2011.

**Table 1. STPMC-P-0139- RA Hall's Panicum - Seed Increase Harvest Germination**

| Accession Number | Origin (County) | Date Harvested | 3 Days % | 7 Days % | 28 Days % |
|---|---|---|---|---|---|
| 9089159 | Cameron | 5-18-07 | 12.5 | 34.5 | 36.5 |
| 9089159 | Cameron | 7-15-09 | 2.3 | 4.0 | 4.8 |
| 9089159 | Cameron | 10-19-09 | 26.0 | 52.8 | 63.0 |
| 9089159 | Cameron | 6-9-10 (light) | 0.0 | 0.0 | 0.0 |
| 9089159 | Cameron | 6-9-10 (heavy) | 3.5 | 8.5 | 12.0 |
| 9085421 | Nueces | 5-27-09 | 6.3 | 11.3 | 15.3 |
| 9085421 | Nueces | 8-18-09 | 48.0 | 64.0 | 69.8 |
| 9085421 | Nueces | 10-19-09 | 36.8 | 54.0 | 60.5 |
| 9085421 | Nueces | 5-14-10 | 13.3 | 27.0 | 31.5 |

*4 reps of 100 seeds each at 12 hours dark 20$^{o}$C (68$^{o}$F) / 12 hours light 30$^{o}$C (86$^{o}$F)

**Study Number: STPMC-P-0140- RA**

**Study Title:** South Texas Sand Plain Ecotype Project

**Introduction:** An initiative was developed in August of 2000 and is spearheaded by the Caesar Kleberg Wildlife Research Institute to develop and promote native plants for the restoration and reclamation of habitat on private and public lands in South Texas. The goal of the initiative called the South Texas Natives Project is to provide economically viable sources of plants and seeds, and to develop effective planting strategies for the restoration of South Texas plant communities.

**Problem:** There is a need for native adapted ecotypic plants for range restoration, wildlife habitat and xeriscaping in South Texas.

**Objective:** The PMC will establish a seed nursery of South Texas Sand Plain ecotypes of a variety of grasses, forbs, and legumes. The ecotype region was established to be large enough to retain regional integrity and genetic adaptability. The seed nursery will consist of approximately 20 collections of each species. The nursery will consist of transplants that are isolated as necessary to maintain species integrity and diversity. The seed nursery will be hand harvested to ensure a complete spectrum of seed is harvested from each species. The nursery seed will be planted in production fields where it will then be harvested and bulked per species. The ecoregion seed will then be made available to commercial seed growers.

**Discussion:** In 2010, the seed nursery included five species for the South Texas Sand Plain ecoregion. Information for yellow Indiangrass, big bluestem, little bluestem, switchgrass, and sideoats grama is discussed under the individual species' project. The IEP plot of Hall's panicum was discontinued at the end of 2009 as it was moved into seed increase. Two new collections were seeded for the South Texas Sand Plain ecoregion in 2010. The seed nursery will continue to expand as more collections are received.

**Study Number: STPMC-P-0244- RA**

**Study Title:** Assembly and Evaluation of Silver Bluestem (*Bothriochloa saccharoides*)

**Introduction:** Silver Bluestem (*Bothriochloa saccharoides*) is a native, perennial bunchgrass with a conspicuous basal cluster of leaves (Gould, 1975). The culms are up to 80 cm tall and unbranched (Hutch, Schuster & Drawe, 1999). Silver bluestem occurs in all areas of the state, usually in dry open places (Correll & Johnston, 1979). It prefers sandy soils but can occur on clay soils if well drained, such as embankments (Gould, 1975). It is one of the most common perennial roadside grasses in northern and western Texas (Gould, 1975). It is relatively frequent on sand and sandy loam sites and other well drained, moderately disturbed soils in the Gulf Coast (Hutch, Schuster & Drawe, 1999). However, it is less common in coastal areas and East Texas than longspike silver bluestem (*Bothriochloa longipaniculata*) (Gould, 1975). Its range extends into Alabama, Missouri, southern Colorado, and south to northern Mexico (Gould, 1975). Silver bluestem flowers from May to November (Gould, 1975), and provides good forage (Hutch, Schuster & Drawe, 1999). It is also known by the common name silver beardgrass.

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat in the South Texas region.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of silver bluestem. Silver bluestem collections will be evaluated for adaptation in the sandy soil region known as the South Texas Sand Plain and the broad mixed soil region known as the Rio Grande Plain.

**Discussion:** In 2008, five accessions of longspike silver bluestem (*Bothriochloa longipaniculata*) were chosen for seed increase and eventual release. This species of silver bluestem had the best density and forage production in the initial evaluation plots. Trays of each accession were planted using original seed in March 2009 and used to establish seed increase plots in June 2009. Trays were seeded in January 2010 and plants were added to these plots in 2010.

In May 2010, the 2009 seed increase plot harvests were germination tested (Table 1). Active germination varied greatly, but low germination numbers are likely due to low seed fill.

A cold tolerance test of the five selected accessions was planted at the East Texas PMC in July 2009. Survival and vigor was evaluated by the ETPMC on May 6, 2010 (Table 2). This plot will be monitored for survival and vigor over two winters.

**Table 1 STPMC-P-0244- RA Silver Bluestem - Seed Increase Harvest Germination**

| Accession Number | Origin (County) | Date Harvested | 3 Days % | 7 Days % | 28 Days % |
|---|---|---|---|---|---|
| 9086274 | Atascosa | 8-19-09 | 0.0 | 14.5 | 15.3 |
| 9086274 | Atascosa | 10-15-09 | 14.3 | 34.5 | 39.3 |
| 9086299 | Starr | 10-15-09 | 5.3 | 26.3 | 33.3 |
| 9086217 | Kleberg | 10-15-09 | 0.0 | 12.8 | 16.5 |
| 9086151 | Jim Wells | 9-10-09 | 0.0 | 3.0 | 3.25 |
| 9086151 | Jim Wells | 10-15-09 | 0.3 | 13.8 | 18.8 |
| 9086214 | Kenedy | 10-15-09 | 5.8 | 25.0 | 27.8 |

*4 reps of 100 seeds each at 12 hours dark 20$^{o}$C (68$^{o}$F) / 12 hours light 30$^{o}$C (86$^{o}$F)

**Table 2. STPMC-P-0244- RA Silver Bluestem – ETPMC Cold Tolerance**

| Accession Number | Origin (County) | Survival (20 plants) | Vigor |
|---|---|---|---|
| 9086299 | Starr | 19 | 7 |
| 9086217 | Kleberg | 17 | 5 |
| 9086151 | Jim Wells | 19 | 5 |
| 9086274 | Atascosa | 19 | 5 |
| 9086214 | Kenedy | 19 | 5 |

**Study Number: STPMC-P-0347- RA**

**Study Title:** Assembly and Evaluation of Sideoats Grama (*Bouteloua curtipendula*)

**Introduction:** Sideoats grama is a native, perennial grass with flat, linear leaf blades (Gould, 1975). The inflorescence is usually 30-80 short (1-4 cm long) branches bearing 1-12 sessile spikelets (Gould, 1975). This tufted grass is an important forage species (Correll & Johnston, 1979), but has poor wildlife value (Hutch, Schuster & Drawe, 1999). This species contains two varieties separated by the presence (*Bouteloua curtipendula* var. curtipendula) or absence (*Bouteloua curtipendula* var. *caespitosa*) of creeping rhizomes (Gould, 1975).

*Bouteloua curtipendula* var. curtipendula occurs throughout Texas in open grasslands, woods borders, right-of-ways, and non-disturbed sites with better soils (Gould, 1975). Its range extends from Southeastern Canada to the plains region of Central United States to Colorado, southern Utah, New Mexico, Arizona, and south to northern Mexico (Gould, 1975). The range of *Bouteloua curtipendula* var. caespitosa includes the Cross Timbers and Prairies, Edwards Plateau, South Texas Plains, and Trans Pecos regions of Texas and is most common in western Texas (Gould, 1975). Its range includes Oklahoma, southern Colorado, Utah, New Mexico, Arizona, and southern California through the highlands of northern and central Mexico to Oaxaca, and in Venezuela, Bolivia, Uruguay, Argentina, and Peru (Gould, 1975). Sideoats grama flowers mostly from June to November (Gould, 1975).

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat in the South Texas region.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of sideoats grama. Sideoats grama collections will be evaluated for adaptation in three South Texas Ecoregions: the sandy soil region known as the South Texas Sand Plain, a region along the Texas coast known as the Texas Coastal Prairie, and the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** At the end of 2009, there were 29 accessions in the Rio Grande Ecotype plot, 2 accessions at the Annex in the South Texas Sand Plain Ecotype plot, 1 accession in the Gulf Coast Prairie plot, and 5 commercial varieties in a separate plot for comparison. Until 2009, none of the collections from coastal counties had enough germination to transplant into the field.

In January 2010, three new, one second try, and one replant accession were planted in the greenhouse (Table 1). None of the new accessions produced enough plants to add to the evaluation plots. In February 2010, the September 30, 2008 harvest from the Rio Grande Ecotype plot was germination tested (Table 2). No field evaluations were conducted in 2010 since STN selected accessions for seed increase in 2009.

***Offsite Evaluations*:** STN has also had 18 accessions at an offsite evaluation plot at Rio Farms and 21 accessions and one cultivar at Rancho Blanco under evaluation since 2004. They sent 4 accessions to the Noble Foundation for evaluation in 2006.

***Seed Release:*** In 2009, STN chose ten accessions to move into seed increase: 9089178-Medina & 9089167 Uvalde (from same ranch and very near one another), 9090402-Kinney, 9088961-Atascosa & 9088942-Atascosa (same ranch and collected adjacent to one another), 9089190-Medina, 9088948-Frio (the best characteristics for a horticultural release), 9093236-

Val Verde, 9088634-Frio, and 9090434-Kinney. Based on the success of increasing seed, accessions will be selected out of these ten for release in 2012.

**Table 1. Study STPMC-P-0347- RA Sideoats Grama**

**Greenhouse Germination Spring 2010**

| Accession Number | Origin (County) | Type | 15 Days % | 30 Days % | 45 Days % | 60 Days % |
|---|---|---|---|---|---|---|
| 9093432 | San Patricio | replant | 6.3 | 5.8 | 5.0 | 5.0 |
| 9093446 | Victoria | second try | 0 | 0.3 | 0 | 0.3 |
| 9093548 | Refugio | new | 0 | 0 | 0.3 | 0.3 |
| 9093551 | Austin | new | 0 | 0.5 | 0.5 | 0.8 |
| 9093556 | Austin | new | 0 | 1.3 | 2.0 | 2.5 |

***Germination count based number of seeds planted.

**Table 2. Study STPMC-P-0347- RA Sideoats Grama 2008 Harvest Germination**

**Block E (clay soil)**

| Accession Number | Origin (County) | Date Harvested | Grams Harvested | 7 Days % | 14 Days % | 28 Days % |
|---|---|---|---|---|---|---|
| 9086152 | Karnes | 9-30-08 | sample only | 3.3 | 3.3 | 3.3 |
| 9088634 | Frio | 9-30-08 | sample only | 2.7 | 2.7 | 3.3 |
| 9088730 | Jim Hogg | 9-30-08 | sample only | 4.0 | 5.3 | 5.3 |
| 9088942 | Atascosa | 9-30-08 | sample only | 5.3 | 6.0 | 6.0 |
| 9089065 | Uvalde | 9-30-08 | sample only | 6.7 | 6.7 | 7.3 |
| 9088518 | Duval | 9-30-08 | sample only | 5.3 | 5.3 | 5.3 |
| 9088948 | Frio | 9-30-08 | sample only | 4.7 | 6.0 | 6.7 |
| 9089167 | Uvalde | 9-30-08 | sample only | 2.0 | 2.0 | 2.0 |
| 9089178 | Medina | 9-30-08 | sample only | 0.7 | 0.7 | 0.7 |
| 9088961 | Atascosa | 9-30-08 | sample only | 2.7 | 2.7 | 2.7 |
| 9089156 | Jim Hogg | 9-30-08 | sample only | 14.0 | 14.0 | 14.0 |
| 9086200 | Starr | 9-30-08 | sample only | 1.3 | 1.3 | 1.3 |
| 9088685 | Bee | 9-30-08 | sample only | 2.0 | 2.0 | 2.0 |
| 9090402 | Kinney | 9-30-08 | sample only | 6.0 | 6.7 | 6.7 |
| 9089187 | Medina | 9-30-08 | sample only | 4.0 | 5.3 | 5.3 |
| 9089190 | Medina | 9-30-08 | sample only | 4.7 | 4.7 | 4.7 |
| 9090389 | Kinney | 9-30-08 | sample only | 7.3 | 7.3 | 7.3 |
| 9090404 | Kinney | 9-30-08 | sample only | 3.3 | 3.3 | 3.3 |
| 9090408 | Kinney | 9-30-08 | sample only | 8.0 | 8.0 | 8.0 |
| 9088541 | Medina | 9-30-08 | sample only | 10.0 | 10.0 | 10.0 |
| 9090510 | Frio | 9-30-08 | sample only | 4.7 | 4.7 | 4.7 |
| 9091894 | Maverick | 9-30-08 | sample only | 16.0 | 16.0 | 16.7 |
| 9090392 | Kinney | 9-30-08 | sample only | 4.0 | 4.0 | 4.0 |
| 9090652 | Kinney | 9-30-08 | sample only | 10.7 | 10.7 | 10.7 |
| 9090651 | Kinney | 9-30-08 | sample only | 8.7 | 8.7 | 8.7 |
| 9093162 | Bexar | 9-30-08 | sample only | 3.3 | 3.3 | 3.3 |
| 9090401 | Kinney | 9-30-08 | sample only | 7.3 | 8.0 | 8.0 |
| 9093190 | McMullen | 9-30-08 | sample only | 2.7 | 2.7 | 2.7 |
| 9093167 | Bexar | 9-30-08 | sample only | 6.0 | 6.0 | 6.0 |
| 9093405 | Webb | 9-30-08 | sample only | 12.0 | 12.0 | 12.0 |

***3 reps of 50 seeds at 12 hours dark 20$^{o}$C (68$^{o}$F) / 12 hours light 30$^{o}$C (86$^{o}$F)

**The Study Number: STPMC-P-0350- RA**

**Study Title:** Assembly and Evaluation of Big Bluestem (*Andropogon gerardii*)

**Introduction:** Big bluestem (*Andropogon gerardii*) is a native, perennial grass that forms dense clumps (Gould, 1975). It grows 0.8-2 meters tall, and may or may not form rhizomes (Gould, 1975). The inflorescence blooms mainly from August to November and consists of 2-7 spike-like branches bearing sessile spikelets (Gould, 1975). This species has three varieties, but only one (*Andropogon gerardii* var. *gerardii*) occurs in the South Texas region (Gould, 1975). This variety is found associated with other tall grasses in prairies and wooded areas having sandy or loamy soils throughout the State (Gould, 1975). This variety's range extends from Southern Canada, through the United States from Montana, Colorado, and Arizona, into Mexico where it is infrequent in the northern and central highlands (Gould, 1975).

Big bluestem is one of the four most important forage grasses in the tallgrass prairies region (Gould, 1975). The other three important, widespread grasses are switchgrass, Indiangrass, and little bluestem (Gould, 1975). Big bluestem was once a climax dominant in the Gulf Coast, but it decreases with livestock grazing (Hutch, Schuster & Drawe, 1999). It has good quality for livestock, and fair value to wildlife (Hutch, Schuster & Drawe, 1999).

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat in the South Texas region.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of big bluestem. Big bluestem collections will be evaluated for adaptation in three South Texas Ecoregions: the sandy soil region known as the South Texas Sand Plain, the region along the Texas coast known as the Texas Coastal Prairie, and the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** At the end of 2009, there were 21 accessions in the Texas Coastal Prairie plot, 8 in the Rio Grande Plain plot, and 13 in the South Texas Sand Plain plot. In January 2010, five new accessions and one second try were seeded in the greenhouse (Table 1). Three new accessions were added to the Texas Coastal Prairie plot in 2010. All three plots were evaluated and seed was harvested in December 2010 (Tables 2-4). Accessions 9090754- Nueces and 9090752-Kleberg have consistently been the top two performers in the Gulf Coast Ecotype plot. Accessions 9089228-Kenedy and 9089235-Brooks have been the top two performers in the Rio Grande Plain plot. Accessions 9089228-Kenedy, 9090752-Kleberg, 9093239-Kenedy have been the top performers in the South Texas Sand Plain plot. In previous years, the seed harvests of big bluestem from the PMC plots have had poor seed fill. Accessions will be selected and sent to Baytown and the Knox City PMC for seed fill evaluation in 2011. Until the seed fill issue has been solved, this project will be on hold for selections

***Offsite Evaluations***: South Texas Natives (STN) has 35 accessions and one cultivar "Earl" under evaluation at Rio Farms.

**Table 1. Study STPMC-P-0350- RA Big Bluestem**

**Greenhouse Germination Spring 2010**

| Accession Number | Origin (County) | Type | 15 Days % | 30 Days % | 45 Days % | 60 Days % |
|---|---|---|---|---|---|---|
| 9093360 | Galveston | second try | 0.1 | 1.9 | 2.2 | 2.7 |
| 9093469 | Washington | new | 4.3 | 12.3 | 13.3 | 13.3 |
| 9093494 | Victoria | new | 0.3 | 1.2 | 1.5 | 1.5 |
| 9093555 | Refugio | new | 0.0 | 0.0 | 0.5 | 0.5 |
| PMT-1943 | Victoria | new | 0.1 | 0.4 | 0.3 | 0.3 |
| PMT-2397 | Nueces | new | 0.0 | 0.0 | 0.0 | 0.1 |

***Germination count based number of seeds planted.

**Table 2. Study STPMC-P-0350- RA Big Bluestem Initial Field Evaluations 2010**

**Texas Coastal Prairie Ecotype – PMC Block B (clay soil)**

| Accession Number | Source (County) | % Survival | % Regrowth | Plant Vigor* | Foliage Density* | Resistance * | Uniformity * | Seed Production* | Seed Shatter* |
|---|---|---|---|---|---|---|---|---|---|
| 9086160 | San Patricio | 96 | 100 | 5 | 5 | 5 | 5 | 5 | 4 |
| 9086167 | San Patricio | 78 | 100 | 5 | 5 | 5 | 5 | 5 | 5 |
| 9086168 | San Patricio | 94 | 100 | 5 | 6 | 6 | 5 | 5 | 6 |
| 9088691 | Aransas | 74 | 100 | 6 | 6 | 5 | 5 | 5 | 6 |
| 9086226 | Goliad | 0 | - | - | - | - | - | - | - |
| 9086170 | San Patricio | 96 | 100 | 5 | 5 | 5 | 5 | 5 | 6 |
| 9086223 | Galveston | 78 | 100 | 5 | 5 | 5 | 5 | 3 | 3 |
| 408928 | Victoria | 53 | 100 | 6 | 5 | 5 | 7 | 6 | 6 |
| 9090269 | Victoria | 70 | 100 | 5 | 6 | 5 | 5 | 6 | 6 |
| 9090333 | Refugio | 98 | 100 | 5 | 5 | 5 | 5 | 5 | 5 |
| 9090263 | Kleberg | 94 | 100 | 5 | 5 | 5 | 6 | 5 | 5 |
| 9090276 | Kleberg | 84 | 100 | 5 | 6 | 5 | 5 | 5 | 6 |
| 9090754 | Nueces | 92 | 100 | 5 | 5 | 5 | 5 | 5 | 6 |
| 9090759 | Nueces | 60 | 100 | 5 | 6 | 5 | 5 | 4 | 3 |
| 9090752 | Kleberg | 96 | 100 | 4 | 4 | 5 | 5 | 5 | 6 |
| 9090341 | Victoria | 45 | 100 | 6 | 6 | 5 | 5 | 5 | 4 |
| 9090757 | Kleberg | 80 | 100 | 5 | 5 | 5 | 5 | 5 | 4 |
| 9090330 | San Patricio | 100 | 100 | 5 | 4 | 5 | 5 | 4 | 4 |
| 9090267 | Victoria | 90 | 50 | 7 | 7 | 6 | 5 | 6 | 5 |
| 9089132 | San Patricio | 23 | 50 | 7 | 7 | 5 | 5 | 5 | 5 |
| 9093469 | Washington | 94 | 50 | 5 | 5 | 5 | 5 | 5 | 5 |
| 9093360 | Galveston | 85 | new | 6 | 6 | 5 | 5 | 5 | 5 |
| 9093494 | Victoria | 69 | new | 6 | 6 | 5 | 5 | 6 | 6 |

*Ocular estimate (1= Best)

**Table 3. Study STPMC-P-0350- RA Big Bluestem Initial Field Evaluations 2009**

**Rio Grande Plains Ecotype – PMC Block G (clay soil)**

| Accession Number | Source (County) | % Survival | % Regrowth | Plant Vigor* | Foliage Density* | Resistance * | Uniformity * | Seed Production* | Seed Shatter* |
|---|---|---|---|---|---|---|---|---|---|
| 9086226 | Goliad | 94 | 100 | 5 | 6 | 5 | 5 | 5 | 4 |
| 9090265 | Goliad | 44 | 100 | 7 | 7 | 5 | 5 | 6 | 6 |
| 9086169 | Kenedy | 24 | 100 | 6 | 6 | 6 | 5 | 6 | 6 |
| 9086164 | Kenedy | 36 | 100 | 6 | 6 | 6 | 5 | 6 | 6 |
| 9089235 | Brooks | 93 | 100 | 4 | 4 | 4 | 5 | 5 | 6 |
| 9089228 | Kenedy | 94 | 100 | 4 | 4 | 4 | 5 | 5 | 5 |
| 9086165 | Kenedy | 47 | 100 | 5 | 5 | 5 | 5 | 5 | 5 |
| 9093238 | Goliad | 71 | 100 | 6 | 5 | 6 | 5 | 5 | 5 |

*Ocular estimate (1= Best)

**Table 4. Study STPMC-P-0350- RA Big Bluestem Initial Field Evaluations 2009**

**South Texas Sand Plain Ecotype - ANNEX (sandy soil)**

| Accession Number | Source (County) | % Survival | % Regrowth | Plant Vigor* | Foliage Density* | Resistance * | Uniformity * | Seed Production* | Seed Shatter* |
|---|---|---|---|---|---|---|---|---|---|
| 9086164 | Kenedy | 6 | 90 | 9 | 9 | 9 | 5 | 8 | 7 |
| 9086169 | Kenedy | 20 | 100 | 7 | 6 | 7 | 5 | 6 | 5 |
| 9090276 | Kleberg | 8 | 100 | 6 | 6 | 6 | 5 | 5 | 5 |
| 9090263 | Kleberg | 32 | 100 | 7 | 7 | 7 | 5 | 6 | 5 |
| 9089228 | Kenedy | 36 | 100 | 6 | 5 | 6 | 5 | 5 | 5 |
| 9090752 | Kleberg | 83 | 100 | 5 | 5 | 5 | 5 | 5 | 5 |
| 9093239 | Kenedy | 81 | 100 | 4 | 4 | 5 | 5 | 6 | 6 |
| 9093240 | Kenedy | 88 | 75 | 6 | 7 | 6 | 5 | 7 | 5 |
| 9093242 | Kenedy | 15 | 100 | 5 | 5 | 5 | 5 | 4 | 4 |
| 9093237 | Kenedy | 33 | 100 | 6 | 5 | 5 | 5 | 5 | 4 |
| 9093243 | Brooks | 26 | 100 | 6 | 6 | 6 | 5 | 5 | 5 |
| 9093244 | Kenedy | 22 | 100 | 6 | 6 | 5 | 5 | 5 | 5 |
| 9090757 | Kleberg | 92 | 100 | 5 | 5 | 5 | 5 | 5 | 5 |

*Ocular estimate (1= Best)

**Study Number: STPMC-P-0351- RA**

**Study Title:** Assembly and Evaluation of Prairie Clover (*Dalea spp.*)

**Introduction:** White prairie clover is a perennial member of the Legume family (Correll and Johnston, 1996). Stems three to ten dm. long grow out from a woody base and its white flowered spikes bloom from May to September (Correll and Johnston, 1996). This species occurs in East, South East, and North Central Texas, and rarely occurs in Western Texas (Correll and Johnston, 1996).

**Problem:** There is a need for perennial native legumes for range restoration, wildlife habitat, and xeriscaping in South Texas.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of white prairie clover. White prairie clover collections will be evaluated for adaptation in the region along the Texas coast known as the Texas Coastal Prairie.

**Discussion:** At the end of 2005 there was one accession each of white prairie clover (9088887-Brazoria) and roundhead prairie clover, *Dalea multiflora*, (9086123-Austin) in an evaluation plot. In addition, a seed increase row of accession 9086123-Austin was planted in June of 2004. Seed was harvested from this row in August of 2006. The seed harvests had a germination rate of 61% control and 77% scarified. The seed increase plot was harvested again in 2007, and had a germination rate of 25% control and 54% scarified. These two accessions had excellent performance, but there were no accessions for comparison to justify a seed release. The State NRCS Office requested Field Offices to send in more collections of these two species in 2006.

In January 2010, five accessions of white prairie clover and four accessions of roundhead prairie clover were seeded in the greenhouse (Table 1). In May 2010, five accessions of white prairie clover and two accessions of roundhead prairie clover were transplanted to the field. These accessions were not evaluated in the fall of 2010 due to weeds covering the plants. This plot will be evaluated for field performance in 2011.

**Table 1. Study STPMC-P-0351- RA White & Roundhead Prairie Clover**

**Greenhouse Germination Spring 2010**

| Accession Number | Origin (County) | Species | 15 Days % | 30 Days % | 45 Days % | 60 Days % |
|---|---|---|---|---|---|---|
| 9086129 | Brazoria | White P.C. | 32.5 | 33.5 | 33.5 | 30.5 |
| 9088887 | Brazoria | White P.C. | 18.0 | 20.0 | 20.0 | 19.5 |
| 9093392 | Stonewall | White P.C. | 67.4 | 67.4 | 69.1 | 66.9 |
| 9093393 | Kent | White P.C. | 38.3 | 38.3 | 38.3 | 35.0 |
| 9093513 | Victoria | White P.C. | 61.0 | 61.5 | 63.0 | 63.0 |
| 9076949 | McCulloch | Roundhead P.C. | 6.5 | 7.0 | 7.0 | 6.5 |
| 9086123 | Austin | Roundhead P.C. | 88.0 | 79.0 | 77.0 | 76.0 |
| 9093337 | Aransas | Roundhead P.C. | 13.3 | 13.3 | 13.3 | 10.0 |
| 9093517 | DeWitt | Roundhead P.C. | 74.0 | 80.0 | 80.0 | - |

***Germination count based number of seeds planted.

**Study Number: STPMC-P-0353- RA**

**Study Title:** Assembly and Evaluation of Yellow Indiangrass (*Sorghastrum nutans*)

**Introduction:** Yellow Indiangrass (*Sorghastrum nutans*) is a rhizomatous, native perennial grass (Hutch, Schuster & Drawe, 1999). It grows 0.8 to 2.3 meters tall, and forms short, stout rhizomes (Gould, 1975). Its inflorescence is a loosely contracted panicle covered with 6-8 mm long spikelets (Gould, 1975). It blooms mostly from September to November (Gould, 1975) and is one of the most attractive fall blooming grasses in Texas (Correll & Johnston, 1979). It grows in all regions of the State, but is most common in the tall-grass prairie regions of central and coastal Texas (Gould, 1975). Its range extends from south-central Canada, throughout the U.S. east of the Rocky Mountains, and into Northern Mexico (Gould, 1975).

Yellow Indiangrass is one of the four important forage grasses in the tallgrass prairies regions (Gould, 1975). The other three important grasses are switchgrass, big bluestem, and little bluestem (Gould, 1975). The presence of these four species indicates a range in good condition (Gould, 1975). Yellow Indiangrass provides good quality forage for livestock and good cover for wildlife (Hutch, Schuster & Drawe, 1999).

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat in the South Texas region.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of yellow Indiangrass. Yellow Indiangrass collections will be evaluated for adaptation in three South Texas Ecoregions: the sandy soil region known as the South Texas Sand Plain, the region along the Texas coast known as the Texas Coastal Prairie, and the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** At the end of 2009, there were 12 accessions of yellow Indiangrass planted in the Texas Coastal Prairie ecoregion plot and 8 accessions in a Rio Grande Plain ecoregion plot. All plants in the South Texas Sand Plain plot died in 2009, so the plot was taken out. No seed was harvested in 2009. The seed that was harvested from all plots in 2008 and was germination tested in March 2010, but germination was very low (0-3%).

In January 2010, two new accessions and two second try accessions were seeded in the greenhouse, but they had 0.1-2.5% germination. One new accession, 9093467-Washington, had 26 plants and was added to the Texas Coastal Prairie ecoregion plot, but it was accidentally plowed out before the fall evaluation. The Texas Coastal Prairie ecoregion and Rio Grande Plain ecoregion plots were evaluated for field performance in November 2010 (Tables 1&2). Accession 9090300-Kleberg and 9093273-Aransas have consistently been the top two performers in the Texas Coastal Prairie plot. Accession 9086124-Kleberg has been the worst. Seed was collected from both plots and will be germination tested in 2011. In the Rio Grande Plain ecoregion plot, accession 9086188-Kenedy has consistently been the top performer. In previous years, the seed harvests of yellow Indiangrass from the PMC plots have had poor seed fill. Accessions will be selected and sent to Baytown and the Knox City PMC for seed fill evaluation in 2011. Until the seed fill issue has been solved, this project will be on hold for selections

***Off-Site Evaluations:*** STN has 22 accessions and 2 cultivars in an off-site observation plot at Rio Farms.

**Table 1. Study STPMC-P-0353- RA Yellow Indiangrass – Drought Resistance**

**Texas Coastal Prairie Ecotype – PMC Block B (clay soil)**

| Accession Number | Source (County) | % Survival | % Regrowth | Plant Vigor* | Foliage Density* | Resistance * | Uniformity * | Seed Production* | Seed Shatter* |
|---|---|---|---|---|---|---|---|---|---|
| 9086124 | Kleberg | 14 | 100 | 9 | 9 | 8 | 5 | 7 | 5 |
| 9088693 | Aransas | 94 | 100 | 5 | 5 | 5 | 5 | 6 | 6 |
| 9086221 | Galveston | 92 | 100 | 5 | 5 | 5 | 5 | 6 | 6 |
| 9090335 | Victoria | 100 | 100 | 6 | 6 | 5 | 5 | 7 | 6 |
| 9090287 | Kleberg | 100 | 100 | 5 | 5 | 5 | 5 | 5 | 5 |
| 9090300 | Kleberg | 100 | 100 | 3 | 3 | 5 | 5 | 3 | 4 |
| 9093273 | Aransas | 100 | 100 | 4 | 4 | 5 | 5 | 3 | 4 |
| 9067253 | Matagorda | 67 | 100 | 6 | 6 | 5 | 5 | 6 | 6 |
| 9093318 | Aransas | 100 | 100 | 4 | 4 | 5 | 5 | 4 | 5 |
| 9093304 | Harris | 100 | 100 | 5 | 4 | 5 | 5 | 4 | 6 |
| 9093223 | Fort Bend | 100 | 100 | 4 | 5 | 5 | 6 | 5 | 6 |
| 9093361 | Galveston | 72 | 90 | 5 | 4 | 5 | 5 | 5 | 5 |
| 9093467 | Washington | - | new | - | - | - | - | - | - |

*Ocular estimate (1= Best)

**Table 2. Study STPMC-P-0353- RA Yellow Indiangrass – Drought Resistance**

**Rio Grande Plains Ecotype – PMC Block G (clay soil)**

| Accession Number | Source (County) | % Survival | % Regrowth | Plant Vigor* | Foliage Density* | Resistance * | Uniformity * | Seed Production* | Seed Shatter* |
|---|---|---|---|---|---|---|---|---|---|
| 9090271 | Wilson | 50 | 100 | 7 | 7 | 7 | 5 | 7 | 5 |
| 9090272 | Goliad | 78 | 100 | 7 | 7 | 7 | 5 | 6 | 5 |
| 9089224 | Wilson | 46 | 100 | 7 | 7 | 7 | 5 | 6 | 5 |
| 9090294 | Brooks | 50 | 100 | 5 | 4 | 5 | 5 | 5 | 5 |
| 9068187 | Kenedy | 100 | 100 | 4 | 4 | 4 | 5 | 4 | 5 |
| 9086188 | Kenedy | 94 | 100 | 4 | 4 | 5 | 5 | 4 | 5 |
| 9093164 | Bexar | 92 | 100 | 6 | 6 | 5 | 5 | 5 | 5 |
| 9093170 | Bexar | 86 | 100 | 4 | 5 | 5 | 5 | 5 | 5 |

*Ocular estimate (1= Best)

**Study Number: STPMC-P-0354- RA**

**Study Title:** Assembly and Evaluation of Eastern Gamagrass (*Tripsacum dactyloides*)

**Introduction:** Eastern gamagrass (*Tripsacum dactyloides*) is a rhizomatous, native perennial grass (Hutch, Schuster & Drawe, 1999). It grows 1.5 to 3 meters tall, and forms large clumps (Gould, 1975). Its inflorescence consists of a single spicate raceme 12-25 cm long (or 2-3 erect spikelike racemose branches) with staminate spikelets above and pistillate spikelets below (Gould, 1975). Eastern gamagrass blooms summer thru fall (Correll & Johnston, 1979). It provides good livestock forage and is used as a pasture grass on bottomlands and prairies (Hutch, Schuster & Drawe, 1999). It also provides good wildlife cover and seed (Hutch, Schuster & Drawe, 1999). It grows in all regions of the State, but is most common in the eastern portions in low, moist, little-disturbed grassland sites (Gould, 1975). The range of eastern gamagrass extends throughout the eastern half of the United States, west to Nebraska, Kansas, Oklahoma, and Texas, south to northern Mexico, and in the West Indies (Gould, 1975).

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat along the Texas Coastal Prairie.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of eastern gamagrass. Eastern gamagrass collections will be evaluated for adaptation in the region along the Texas coast known as the Texas Coastal Prairie.

**Discussion: T**here are currently seven accessions in this plot, but all have low seed fill. In 2008, the State NRCS Office requested that Field Offices send in more collections of this species. This project is on hold until more collections are received.

***Inter-Center Observation:***
In April 2008, seed was received from the Florida PMC of their top Eastern gamagrass for observation. Trays were seeded in the greenhouse and ten transplants were planted in an observation plot in June of 2008. In March 2009, this accession was showing signs of early greenup. In August and November, this accession had a plant height of 12” and did not appear to be as drought tolerant as local Texas collections (Table 1). The plants were evaluated again in November 2010. The plants looked much better than the previous year due to a large amount of rain in September, but they still are not as tall or adapted as local accessions.

**Table 1. Study STPMC-P-0354- RA Eastern Gamagrass – Field Evaluation**

**Florida Accession 9059266 – PMC Block L (clay soil)**

| Date | % Stand | Vigor | Drought Tolerance | Insect Problems | Disease Problems | Seed Production | Plant Height | Notes |
|---|---|---|---|---|---|---|---|---|
| 8-18-09 | 10/10 | 7 | 7 | 5 | 5 | 0 | 12” | yellow and burned |
| 11-10-09 | 10/10 | 7 | 7 | 5 | 5 | 0 | 12” | survived but dry leaf tips |
| 11-24-10 | 10/10 | 5 | n/a | 5 | 5 | past | 25” | just starting to brown at tips |

*Ocular Estimates (1 = Best)

**Study Number: STPMC-P-0358- RA**

**Study Title:** Assembly and Evaluation of Little Bluestem (*Schizachyrium scorparium*)

**Introduction:** Little bluestem (*Schizachrium scoparium*) is a native, perennial bunchgrass (Gould, 1975). *Schizachrium scoparium var. scoparium* is the variety commonly known as little bluestem. It grows 0.5-2 meters tall, and does not produce creeping rhizomes (Gould, 1975). The inflorescence blooms mainly from August to December and consists of numerous racemes 2.5-5 cm long (Gould, 1975). It occurs in tallgrass prairies, wood openings, rocky slopes of lightly grazed pastures, and rangeland throughout the State, except in the Pineywoods region (Gould, 1975).

Little bluestem is one of the four most important forage grasses in the tallgrass prairies regions (Gould, 1975). The other three important, widespread grasses are switchgrass, Indiangrass, and big bluestem (Gould, 1975). Little bluestem provides good quality forage for livestock, has poor value for wildlife forage, but provides good cover (Hutch, Schuster & Drawe, 1999).

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat in the South Texas region.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of little bluestem. Little bluestem collections will be evaluated for adaptation in two South Texas Ecoregions: the sandy soil regions along the Texas coast known as the Texas Coastal Prairie and the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** At the end of 2009, there were 18 accessions of little bluestem planted in the Texas Coastal Prairie Ecotype field plot, 33 accessions in the Rio Grande Plain Ecotype field plot, and 9 accessions in the “unknown bluestem” Rio Grande Plain Ecotype field plot. In January 2010, one new accession, 9093483-Brazoria was seeded in the greenhouse. It had poor germination (0.3%) and was not added to the Texas Coastal Prairie Ecotype field plot. In previous years, the seed harvests of little bluestem have had poor seed fill. Accessions will be selected and sent to Baytown and the Knox City PMC for seed fill evaluation in 2011. Until the seed fill issue has been solved, this project will be on hold for selections.

***Offsite Evaluations:*** STN has 77 accessions of little and seacoast bluestem at Rio Farms in Monte Alto, Texas for offsite evaluation.

**Study Number: STPMC-P-0359- RA**

**Study Title:** Assembly and Evaluation of Switchgrass (*Panicum virgatum*)

**Introduction:** Switchgrass (*Panicum virgatum*) is a native, perennial grass that occurs in clumps (Gould, 1975). It grows 0.6-3 meters tall, and forms scaly, creeping rhizomes (Gould, 1975). The inflorescence blooms mainly from late August to October and consists of open panicles 15-55 cm long bearing spikelets (Gould, 1975). Switchgrass is found in moist lowlands throughout all regions of the State (Gould, 1975). Its range extends from Southeastern Canada, through the United States except on the Pacific coast, into northern Mexico, and Cuba (Gould, 1975).

Switchgrass is one of the four most important forage grasses in the tallgrass prairies regions (Gould, 1975). The other three important, widespread grasses are big bluestem, Indiangrass, and little bluestem (Gould, 1975).

Switchgrass was once a climax dominant on lowlands of coastal prairie (Hutch, Schuster & Drawe, 1999). It provides good quality forage for livestock, is a good seed producer, and provides good cover for ground nesting birds (Hutch, Schuster & Drawe, 1999). It is also good for shoreline stabilization and barriers to control wind and water erosion (Hutch, Schuster & Drawe, 1999).

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat in the South Texas region.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of switchgrass. Switchgrass collections will be evaluated for adaptation in three South Texas Ecoregions: the sandy soil region known as the South Texas Sand Plain, the region along the Texas coast known as the Texas Coastal Prairie, and the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** At the end of 2009, there were two accessions in the Texas Coastal Prairie ecoregion plot, five accessions in the South Texas Sand Plain plot, and eleven accessions in the Rio Grande Plains plot. Four new accessions were seeded in the greenhouse in January of 2010 (Table 1). One accession was added to the Texas Coastal Prairie ecoregion plot in March 2010. Another accession was added to the Rio Grande Plains plot, but once seedheads emerged, it was determined to be Gunieagrass and removed. The Texas Coastal Prairie and Rio Grande Plains plots were evaluated and seed was harvested in November 2010 (Tables 2&3). Lodging was a severe problem in the Rio Grande Plains plot in 2010. In previous years, the seed harvests of switchgrass have had poor seed fill. Until the seed fill issue has been solved, this project will be on hold for selections.

***King Ranch Seed Evaluation:*** See Study Number STPMC-T-0694-RA "Evaluation of Crown Height for Improved Stand Establishment in South Texas Grasses" for more information.

**Table 1. STPMC-P-0359- RA Switchgrass**

**Greenhouse Germination Spring 2010**

| Accession Number | Origin (County) | 15 Days % | 30 Days % | 45 Days % | 60 Days % |
|---|---|---|---|---|---|
| 9093549 | Matagorda | 0.0 | 0.0 | 0.0 | 0.0 |
| 9093553 | Matagorda | 0.0 | 0.0 | 0.0 | 0.2 |
| 9093557 | Washington | 0.0 | 0.2 | 1.1 | 3.3 |
| 9093537 | Karnes | 7.0 | 8.3 | 7.8 | 7.8 |

***Germination count based number of seeds planted.

**Table 2. Study STPMC-P-0359- RA Switchgrass - PMC Initial Field Evaluation 2010**

**Rio Grande Plains Ecotype – PMC Block G (clay soil)**

| Accession Number | Source (County) | % Survival | % Regrowth | Plant Vigor* | Foliage Density* | Resistance * | Uniformity * | Seed Production* | Seed Shatter* | Lodging |
|---|---|---|---|---|---|---|---|---|---|---|
| 9086194 | Kenedy | 98 | 100 | 5 | 5 | 5 | 5 | 5 | 4 | some |
| 9090293 | Goliad | 96 | 100 | 5 | 5 | 5 | 6 | 5 | 6 | |
| 9089243 | Wilson | 100 | 100 | 5 | 6 | 5 | 7 | 5 | 5 | some |
| 9089251 | Wilson | 98 | 100 | 5 | 5 | 5 | 5 | 5 | 6 | |
| 9086191 | Kenedy | 100 | 100 | 4 | 4 | 4 | 5 | 5 | 5 | least |
| 9089241 | Brooks | 100 | 100 | 5 | 6 | 6 | 5 | 5 | 4 | yes |
| 9093168 | Bexar | 100 | 100 | 5 | 5 | 5 | 5 | 5 | 4 | some |
| 9089249 | Wilson | 96 | 100 | 6 | 6 | 5 | 5 | 5 | 5 | yes |
| 9086193 | Kenedy | 98 | 100 | 6 | 6 | 5 | 5 | 5 | 6 | yes |
| 9090383 | La Salle | 100 | 100 | 6 | 5 | 5 | 5 | 5 | 6 | yes |
| 9086192 | Kenedy | 100 | 100 | 6 | 5 | 5 | 5 | 6 | 6 | yes |

*Ocular estimate (1= Best)

**Table 3. Study STPMC-P-0359- RA Switchgrass - PMC Initial Field Evaluation 2010**

**Texas Coastal Prairie Ecotype – PMC Block B (clay soil)**

| Accession Number | Source (County) | % Survival | % Regrowth | Plant Vigor* | Foliage Density* | Resistance * | Uniformity * | Seed Production* | Seed Shatter* |
|---|---|---|---|---|---|---|---|---|---|
| 9088695 | Aransas | 100 | 100 | 5 | 5 | 5 | 5 | 5 | 5 |
| 9090297 | San Patricio | 96 | 100 | 5 | 5 | 6 | 6 | 6 | 5 |
| 9093557 | Washington | 89 | new | 5 | 5 | 5 | 5 | 5 | 5 |

*Ocular estimate (1= Best)

**Study Number: STPMC-P-0570- RA**

**Study Title:** Assembly and Evaluation of Plains Lovegrass (*Eragrostis intermedia*)

**Introduction:** Plains lovegrass (*Eragrostis intermedia*) is a native, perennial grass that occurs in tufts or dense clumps (Gould, 1975). Its culms grow 55-90 centimeters tall (Gould, 1975). The inflorescence blooms mainly from June to November and consists of open panicles 20-40 cm long bearing spikelets (Gould, 1975). It provides good to fair forage and provides bird nesting cover (Hatch, Schuster, and Drawe, 1999). Plains lovegrass is often found on disturbed soil in sand, clay or rocky ground throughout all regions of the State except the Pineywoods, Rolling Plains, and High Plains (Gould, 1975). Its range extends from southern Arizona through southern and eastern Texas, Alabama to southwest Arkansas, and in the mountainous portions of Mexico and Guatemala (Gould, 1975).

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat in the South Texas region.

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of plains lovegrass. Plains lovegrass collections will be evaluated for adaptation in three South Texas Ecoregions: the sandy soil region known as the South Texas Sand Plain, the region along the Texas coast known as the Texas Coastal Prairie, and the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** At the end of 2009, six accessions of plains lovegrass and a cultivar of sand lovegrass “Mason” (*Eragrostis trichodes*) were in initial evaluation plot at the Annex. Plains lovegrass accession 9090664-Maverick was chosen for seed increase in 2011. It will also be planted with AZPMC’s Bonita release for comparison.

**Study Number: STPMC-P-0571- RA**

**Study Title:** Assembly and Evaluation of Gayfeather (*Liatris* spp.)

**Introduction:** Gayfeather (*Liatris* spp.) is a perennial member of the Asteraceae family (Lehman, O'Brien, and White, 2005). There are forty species confined to North America with twelve of these native to Texas and seven native to South Texas (Correll and Johnston, 1996). The plants form underground corms (Correll and Johnston, 1996). The flowers are usually purple and rarely white, with ray flowers absent and disk flowers numerous (Correll and Johnston, 1996). They can be found on sand, clay, caliche, or loam soils depending on the species (Correll and Johnston, 1996 & Lehman, O'Brien, and White, 2005). White-tailed deer eat the leaves of this species (Everitt, Drawe, and Lonard, 1999). The fall transplanted corms of gayfeathers do well under cultivation (Ajilvsgi, 1984). Corms have also been used to treat sore throat and rattlesnake bites resulting in another common name, button-snakeroot (Ajilvsgi, 1984).

**Problem:** There is a need for native, adapted seed of forbs and legumes available at a reasonable price for restoration and reclamation of wildlife habitat in the South Texas region. .

**Objective:** The objective is to assemble, evaluate, select and release and/or provide information on the propagation of gayfeather. Gayfeather collections will be evaluated for adaptation in three South Texas Ecoregions: the sandy soil region known as the South Texas Sand Plain, the region along the Texas coast known as the Texas Coastal Prairie, and the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** From 2006 to 2008, accession 9086149-Kleberg Co. outperformed all other accessions in size, seed production, and seed germination. It was also similar in growth form to the accession chosen by the East Texas PMC for release potential. These two accessions were in seed increase in 2009 and were planted for comparison in Kingsville and Baytown, Texas in 2010. Due to drought none of the plants in Baytown and only a few of the plants in Kingsville survived (Table 1). This evaluation will be planted again in 2011 and accession 9093380-Duval will be added.

**Table 1. STPMC-P-0571- RA Gayfeather – Kingsville Field Evaluation Fall 2010**

**Rio Grande Plains Ecotype – PMC Block L (clay soil)**

| Accession Number | Rep | Survival |
|---|---|---|
| 9067351 | 1 | 5 |
| 9067351 | 2 | 1 |
| 9086149 | 1 | 0 |
| 9086149 | 2 | 2 |

**Study Number: STPMC- P-0672-RAWL**

**Study Title:** Assembly and Evaluation of Southwestern Bristlegrass (*Setaria scheelei*)

**Introduction:** Southwestern bristlegrass [Setaria scheelei (Steud.) A.S. Hitchc.] is a warm-season, perennial bunch grass that is native from Texas and Arizona, south to Northern Mexico (Gould, 1975). In Texas, southwestern bristlegrass is found in the South Texas Plains, Edwards Plateau, Rolling Hills, High Plains, Trans Pecos, and the southern portions of the Blackland Prairies and Gulf Prairies and Marshes regions (Gould, 1975). It is a coarse grass with tall, spreading culms growing to 125 cm (Gould, 1975 & Hatch, Schuster, and Drawe, 1999). It is a shade tolerant species and is often abundant in shaded canyons and open woodlands (Gould, 1975). It is a good forage species and produces a large seed useful to wildlife (Hatch, Schuster, and Drawe, 1999). The objective of this study is to seek out accessions of southwestern bristlegrasss with good germination for further evaluation as a warm-season forage for south Texas. Other factors will be compared, such as plant hardiness, forage production, seed production, and other characteristics that would make southwestern bristlegrass desirable to include in south Texas range and wildlife mixes. Future studies will examine southwestern bristlegrass's ability to compete with shade tolerant exotic species.

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat in the South Texas region.

**Objective**: The objective is to assemble, evaluate, select and release and/or provide information on the propagation of southwestern bristlegrass. Southwestern bristlegrass collections will be evaluated for adaptation in the broad mixed-soil region known as the Rio Grande Plain.

**Discussion:** A seed increase plot of accession 9088950-Atascosa Co. was established from original seed in August of 2006. The 2008 seed harvest was germination tested in 2009 (18 and 32%). The 2008 harvest was seeded in the greenhouse in the spring of 2010 to add to the seed increase plot. About 1,400 plants were added to the seed increase block in May of 2010. Release of this accession is on hold until sufficient seed is obtained.

**Study Number: STPMC- P-1001-RA**

**Study Title:** Assembly and Evaluation of Black eyed Susan (*Rudbeckia hirta*)

**Introduction:** Black eyed Susan (*Rudbeckia hirta*) is found in fields, prairies, and open woods. It is a native forb with rough stems and daisy-like flower heads made up of golden-yellow ray flowers with disk flowers forming a brown central cone. The rough leaves are two to seven inches long. The height varies from 1 to 3 feet tall.

**Problem:** There is a need for native, adapted seed available at a reasonable price for restoration and reclamation of habitat in the South Texas region.

**Objective**: The objective is to assemble, evaluate, select and release and/or provide information on the propagation of black eyed Susan. Seed collections from Texas and Louisiana will be assembled and evaluated at East Texas PMC, Kika de la Garza PMC, and Baytown facility. The accessions will be evaluated by PMC personnel at the three locations for visual characteristics, seed germination, and seedling. The best performing accessions from each location will be used for a composite plant release to be used throughout the service areas for both Plant Materials Centers.

**Discussion:** Accessions were exchanged between the ETPMC and STPMC and grown out for transplanting in spring 2010. The Baytown plot was planted on April 14, 2010. This plot had no irrigation and conditions were at first dry, then a storm caused much of the plot to sit in water. Only some plants in the top portion of the second rep survived. The Kingsville plot was planted on May 4, 2010. This plot was overcome with weeds due to wet field conditions. The Kingsville plot was evaluated on August 26, 2010 (Table 1). ETPMC sent a list on June 2010 of their top 17 accessions (Table 2). These plots will be evaluated for survival and seedling recruitment in the spring of 2011.

**Table 1. STPMC- P-1001-RA Black eyed Susan – Kingsville Field Evaluation Fall 2010**

| Rep | Accession Number | # of Live Plants | Notes |
|---|---|---|---|
| Rep 1 | 9094884 | 5 | |
| Rep 1 | 9093359 | 1 | |
| Rep 1 | 9067364 | 1 | |
| Rep 1 | 9094887 | 1 | |
| Rep 1 | 9094864 | 1 | |
| Rep 1 | 9094885 | 4 | |
| Rep 2 | 9094861 | 1 | |
| Rep 2 | 9093388 | 6 | 2nd best acc in the plot |
| Rep 2 | 9094820 | 1 | |
| Rep 2 | 9067365 | 7 | |
| Rep 2 | 9094876 | 2 | |
| Rep 2 | 9094889 | 0 | wrong species |
| Rep 2 | 9094884 | 5 | 3rd best acc in the plot |
| Rep 2 | 9093229 | 4 | |
| Rep 2 | 9093540 | 5 | |
| Rep 2 | 9094864 | 1 | |
| Rep 2 | 9093359 | 4 | |
| Rep 2 | 9094871 | 8 | best acc in the plot |

**Table 2. STPMC- P-1001-RA Black eyed Susan – ETPMC Top Accessions June 2010**

| Accession Number | Accession Number |
|---|---|
| 9094813 | Robertson |
| 9094873 | Erath |
| 9094890 | Titus |
| 9094841 | Richland,La |
| 9094861 | Polk |
| 9094880 | Upshur |
| 9094820 | Waller |
| 9094882 | Wood |
| 9093338 | Harris |
| 9067361 | Gregg |
| 9067363 | Harrison |
| 9094849 | Richland,La |
| 9094855 | Brazos |
| 9094842 | Richland,La |
| 9094881 | Wood |
| 9094876 | Leon |
| 9094851 | Angelina |

# Technology Development Projects

## Status of Active Projects Not Discussed in Detail:

Several active projects are on hold due to various reasons, including the need for more collections, seed increase, or data processing. A short update of these projects that did not have extensive information to add for 2009 is included here.

STPMC-T-0673-CR Evaluation of construction methods for sand dune establishment
Results were presented in Galveston in 2010 at the Restore America Conference.

STPMC-T-0687-RA Techniques for evaluating seedling vigor
Drought tolerance tests planned for 2011.

STPMC-T-0688-PA Identification and development of inoculants for native legumes
Waiting on lab results.

STPMC-T-0696-RA Evaluation of 4-flower origin for adaptability and improved plant establishment
Release planned for 2011.

**Study Number: STPMC-T-0681-OT**

**Study Title:** Activated-carbon seed treatment to improve plant establishment

**Introduction:** Activated carbon has shown signs that it can deactivate some herbicides. In practical terms this means, a landowner could seed his pasture and over spray the seed row with a carbon band to protect the seeding. He could then follow with an herbicide to control weeds. Spraying at planting time would extend the weed-free period for seedling emergence giving the native species a better chance of establishment.

**Problem:** Reestablishment of native species has been very difficult in South Texas. Aggressive introduced grasses have made it extremely difficult for native plantings to become established because of the highly competitive abilities of these introduced grasses.

**Objective:** The objective of this study is to evaluate the effects of activated carbon and seven herbicides on the seedling emergence of selected native species.

**Discussion:** A greenhouse study was conducted in June and July of 2006 on three legumes with the help of Dr. Bill Ocumpaugh, W. James Grichar and Jeff Rahmes of the Texas Agriculture Experiment Station at Beeville, Texas. Seeds of prairie acacia (*Acacia angustissima*), roundhead prairie clover (*Dalea multiflora*), and BeeWild bundleflower (*Desmanthus bicornutus*) were planted in two rows each in trays of sterilized and sifted Raymondville clay loam. One row of each species was then spayed with a strip of activated carbon. The entire tray was then sprayed with one of seven herbicides at either full or half strength. A control of no herbicide was also included. Each herbicide treatment was replicated with four trays.

None of the BeeWild seeds emerged, but data was taken on the other two species. The number of seedlings that emerged was recorded weekly for six weeks. Average seedling height was taken at three, five, and six weeks. The number of leaf nodes and total aboveground, dry biomass was also taken at six weeks.

*Cadre* at both the full and half rates saw considerably more biomass production for both legumes with the use of activated carbon. The half rate, especially on the prairie acacia, showed dramatic differences between the control and the carbon treatment. The 2,4-D treatment at the full rate showed an appreciable increase of biomass production with the use of activated carbon for both legume species. It was also the only herbicide that showed dramatic differences in the seedling emergence counts between treatments. *Valor* and *First Rate* also showed some effect at the full rate. Overall, there seemed to be an upward trend in biomass production in the activated carbon strips and a downward trend in the unprotected strips.

Greenhouse and field studies were conducted to evaluate the use of a carbon band to provide a ‘safe zone’ for the establishment of three native grass species, KIKA677 germplasm streambed bristlegrass, Alamo switchgrass and Welder germplasm shortspike windmillgrass when used in combination with several PRE and POST herbicides including cloransulam, flumioxazin, imazapic, and 2,4-D. The greenhouse study was conducted in 2007 at the Kika de la Garza Plant Materials Center near Kingsville, TX while field experiments were conducted in 2008 and 2009 at the Texas AgriLife Research Station near Beeville, TX.

In the greenhouse study, switchgrass emergence was improved when a carbon band was used with imazapic or imazethapyr at 0.04 and 0.07 kg/ha or 2,4-D at 2.12 kg/ha. Windmillgrass

emergence was improved when carbon was used in combination with flumioxazin at 0.05 and 0.1 kg/ha, imazapic at 0.04 and 0.07 kg/ha, imazethapyr at 0.07 kg/ha and 2,4-D at 1.06 kg/ha while bristlegrass emergence was improved when carbon was used in combination with flumioxazin at 0.1 kg/ha, imazapic at both rates, and imazethapyr at 0.04 kg/ha. Field studies indicated that flumioxazin at 0.05 and 0.1 kg/ha, imazapic at 0.04 kg/ha, and imazethapyr at 0.04 and 0.07 kg/ha, when used with carbon, were safened for bristlegrass and switchgrass establishment. Windmillgrass establishment was improved when carbon was used in combination flumioxazin at 0.1 kg/ha.

This project was conducted in cooperation with the Texas AgriLife Research Station Beeville, Texas.

**Study Number: STPMC-T-0684-RA**

**Study Title:** Field Experiments to Improve Plant Establishment on Saline Sites

**Introduction:** Over 243,000 hectares of South Texas land is affected by saline soil conditions. Land with sparse vegetation and severe erosion is often found to have accumulated salts within the soil. Weathering of parent material releases soluble salt ions such as Na+, Cl-, Ca2+, Mg2+, SO42+, and HCO3– that contribute to soil salinity. Elevated levels of these soluble salts restrict plant establishment in South Texas and leaves the ground bare and susceptible to soil erosion.

**Problem:** Elevated levels of soluble salts restrict plant establishment in South Texas.

**Objective:** To develop plant recommendations based on salinity levels (EC) and plant performance in the field for the revegetation of saline impacted sites.

**Discussion:** Four field sites in Zapata County were seeded in the fall of 2006. The seed mixture was composed of bristlegrass, windmillgrass, big sacaton, coated Arizona cottontop, and coated false Rhodes grass. The field sites had spotty establishment. Some areas looked very good, likely due to better soil conditions, but overall it could not be called successful.

***Vegetated Barriers:*** Elevated salt levels have been a problem at the Eric Gonzales property in Zapata County. Landshaping was performed in the spring of 2007 to address gully erosion on the ranch. In the fall of 2007, the Plant Materials Center planted five vegetated barriers to evaluate their capability for survival and to protect the site from erosion. Each barrier was spaced on the downhill gradient at a 2 feet height interval. Three barriers were established down the center gully and were 70, 65 and 45 feet in length. The side gullies were addressed with two barriers that were 70 and 45 feet in length. We used a trencher to install the barriers and sprinkled a slow release fertilizer in the trench before installing the plants. We planted one gallon containers of saline tolerant big sacaton (*Sporobolus wrightii*) that were nine months old at a one-foot spacing between plants. We put six and a half feet wide turf reinforcement mat down the centerline of the concentrated flow sites extending 15 feet downslope. Soil conditions were moist at planting and no irrigation was supplied to the planting.

In February of 2008 and 2009, evaluations of the site revealed that there was over 90 % survival of the big sacaton plants. The vegetative barriers were operating as planned and were helping to control sheet and rill erosion on this highly erodible saline site.

***Atascosa Site:*** In August 2009, Ryan Novack with the Atascosa Soil and Water Conservation District (SWCD) contacted the PMC to receive assistance on a severely denuded saline site. Soil samples were taken and the field ranged in salinity from a low EC of 20 and SAR of 12 to a high EC of 81 and SAR of 17. In December 2009, barley was planted on the site. On March 15, 2010, the site was also planted with alkali grass (*Puccinellia nuttalliana*), strawberry clover (*Trifolium fragiferum*), millet and milo. About a day after the seeding, the area received 0.5” of rain. This was followed by another inch of rain the next week. Nothing germinated and survived. This brings home the point that a soil test needs to be taken on any saline site that requires revegetation. A site must have a salinity less than an EC of 20 if perennial plants are being considered and probably less than an EC of 30 for an annual like sorghum. The Atascosa site had salinity that ranged from an EC of 20 to 81. The only thing that can be done when no

plants survive is to consider hauling anything to the site that will increase organic matter and help leach out the salts, such as cotton gin trash, landfill yard compost, and hay mulch.

This project was conducted in cooperation with the Zapata and Atascosa County Soil and Water Conservation Districts.

**Study Number: STPMC-T-0694-RA**

**Study Title:** Evaluation of Crown Height for Improved Stand Establishment in South Texas Grasses

**Introduction:** In Panicoid grasses, the subcoleoptile internode of the developing seedling elongates to elevate the coleoptile to the soil surface (Hyder et al. 1971). Elongation of the subcoleoptile internode stops after the tip of the coleoptile perceives red light. Van Overbeck (1936) indicated that illumination of the coleoptile stopped auxin production, which caused tissues below the coleoptile tip to stop elongating. The perception of the light stimulus, the interruption of the auxin supply, and the termination of growth ideally occurs before the crown node is elevated above the soil surface.

The crown node in Panicoid grasses, such as switchgrass, is the point of origin for adventitious roots. Grass seedling establishment is dependent on the development of adventitious roots. Adventitious roots are generally prevented from developing when the crown node is elevated above the soil surface (Olmsted, 1941; Hyder, 1971; and Tischler et al., 1987.)

Several factors may be responsible for excessive crown node elevation in the field. Overcast conditions or emergence of the seedling at night would reduce the amount of red light and delay the cessation of the subcoleoptile internode elongation.

**Problem:** Excessive crown node elevation of warm-season grass seedlings has been implicated as a major limitation to successful establishment. Crown node placement at or above the soil surface hinders development of adventitious roots at the crown node. Tischler and Voigt (1993) were the first to propose a selection method to overcome the crown node problem. They grew various grasses in low, continuous light for 7 days and observed that for many grasses there was considerable variation in crown node placement above the soil surface.

**Objective**: To evaluate native warm season grasses for crown node placement.

**Discussion:** The E. “Kika” de la Garza Plant Materials Center screened multiflowered false Rhodesgrass in the winter of 2008 and sideoats grama during the spring of 2009 for low crown node elevation using the protocol of low, continuous light described by Tischler and Voigt (1993). We used “plant books” (5 cells per book and 10 books per tray) filled with Redi-earth and soaked overnight in water to saturate. Cells were seeded, covered, and then placed in a growth chamber for 4 weeks. Conditions in the chamber were a constant 30oC with light at 1.5 µ mol/m2/sec. Plants were evaluated weekly for 4 weeks.

Twelve accessions of sideoats grama and twenty-two accessions of multiflowered false Rhodesgrass were observed in October 2009, and all of them revealed 100% crown node elongation. These results indicate there is little chance of selecting or breeding for improved crown node placement amongst these sideoats grama and multiflowered false Rhodesgrass accessions.

Two accessions of Hall’s panicum, five accessions of little bluestem, three accessions of big bluestem and two accessions of Indiangrass were observed in February 2010. It appears that there is no selection potential for improved crown node placement in Hall’s panicum or little bluestem as all of them revealed 100% crown node elongation. Big bluestem may have potential, but there were too few seedlings (5) to make a judgment. Indiangrass showed some potential. Lometa Indiangrass had 9 seedlings out of 37 that had no crown node elongation.

***Switchgrass Breeder Block:*** Switchgrass seedlings were screened for low crown node placement using the above described protocol. A population of seedlings with low crown node placement were planted in a 5x5 randomized complete block breeder block replicated 6 times at the King Ranch. This population consists of seedlings from the 1998 Low Crown Alamo switchgrass produced by Dr. Ocumpaugh at the Texas AgriLife Experiment Station in Beeville, seedlings from a King Ranch crossing block, and seven other wild collections from across South Texas.

In 2010, plants from the switchgrass breeder block were evaluated for uniformity in stature and timing of seed development. Based on this evaluation, the non-uniform plants were rouged out leaving 70 plants from 8 maternal lines. Seed was harvested from these plants in October and November of 2010. Seed-fill and germination will be conducted on this seed in 2011.

**Study Number: STPMC-T-0703-WLTE**

**Study Title**: South Texas Ambrosia Restoration Project

**Introduction:** South Texas ambrosia (*Ambrosia cheiranthifolia*) is a member of the aster family. South Texas ambrosia is an erect, silvery to grayish-green, perennial, herbaceous plant, 4 to 12 inches in height. It has simple leaves, about 3 inches long and 1.5 inches wide, are usually opposite on the lower portion of the plant and alternate above. Male and female flowers are separate but occur on the same plant. Male flowers are in heads arranged along a terminal, elongated stem. Flower stalks contain 10-20 small, yellowish, bud-like flowers, about 1/4 inch across and shaped like hanging bowls. Female flowers are in small clusters at the leaf bases below the male flowering stalks.

South Texas ambrosia blooms in late summer and fall, but its flowers are not showy and may be missed by the casual observer. It spreads through rhizomes (underground stems), and a single individual plant may be represented by hundreds of stems forming close-spaced colonies. It may occur in association with slender rush-pea, which is also federally-listed as endangered.

Associated native grasses found at the existing sites include Texas grama, buffalograss, Texas wintergrass, and tobosa. Native woody species found scattered throughout the existing sites include mesquite, huisache, huisachillo, brasil, granjeno, and lotebush. While south Texas ambrosia does not appear to survive continual plowing, sporadic disturbance may enhance its growth and spread. Studies are currently addressing the effect of mowing on the species.

South Texas ambrosia occurs in open grasslands or savannas on soils varying from clay loams to sandy loams. Historically, South Texas ambrosia was known from Cameron, Jim Wells, Kleberg, and Nueces counties in South Texas, and the state of Tamaulipas in Mexico. Today, the species occurs at six locations in Nueces and Kleberg counties. The current status of any populations in Mexico is unknown.

**Problem:** South Texas ambrosia was listed as endangered by the U.S. Fish and Wildlife Service in August 1994. Loss of habitat has led to the decline of this species. Conversion of habitat to agricultural fields and urban areas has limited the amount of habitat available for colonization. In addition, introduced species such as buffelgrass and King Ranch bluestem compete with this and other natives of the coastal prairie. Invasion of grasslands by shrub and tree species also contributes to loss of available habitat, although the species does occur among scattered woody plants. Disturbance associated with activities occurring along road right-of-ways where the species is found may also be detrimental.

**Objective:** The objective of this project is to attempt to reintroduce South Texas ambrosia at the North Nueces County Park in Robstown, Texas.

**Discussion:** Two hundred transplants of south Texas ambrosia were planted in September of 2006 at the North Nueces County Park. Transplants ranged in size from 1 gallon to 5 gallon. They were planted into a clay soil and then weed matting was placed around each plant.

In September of 2007, it was noticed that the weed mat while helping the plants survive the first year now seemed to be interfering with their ability to spread. South Texas ambrosia being a rhizomatous species could not get its tillers through the weed mat. Therefore, the weed mat was removed in October of 2007.

When evaluated in October 2010, there were over 2,040 plants of south Texas ambrosia. The rhizomatous nature of this plant allowed it to spread as much as 16' from the original planting site. It was noticed that most of the plants that survived were located on the sloping hillside of the planting area. There were large expanses of dead plants on the flat, top of the hill. During the course of this study, it was also noticed that south Texas ambrosia can grow much taller than its typical botanical description of 4 to 12 inches. We found it growing as tall as 3 to 3 1/2' tall when having to compete with Kleberg bluestem.

This project was conducted in cooperation with Dr. Alice Hempel at Texas A&M University-Kingsville and the United States Fish and Wildlife Service.

**Study Number: STPMC-T-0704-RA**

**Study Title:** Evaluation of Three Endemic Plants of the Refugio-Goliad Prairies

**Introduction:** The Coastal Prairie Conservation Initiative (CPCI) is a partnership between the Grazing Lands Conservation Initiative (GLCI), the U.S. Fish and Wildlife Service (USFWS), Texas Parks and Wildlife Department (TPWD), the Natural Resources Conservation Service (NRCS), and private landowners formed to restore habitat in the Refugio-Goliad prairies. A measure of success for this initiative is the establishment or expansion of existing populations of three focal species. Initial efforts have centered around improving habitat for the release of Attwater's prairie chicken. Additional effort is now being focused on two endemic forbs of the Texas coastal prairie; plains gumweed (*Grindelia oolepis*) and threeflower broomweed (*Thurovia triflora*), and one endemic shrub; Texas peach bush (*Prunus texana*).

Two variants of the Texas Gulf Coast Prairie support plant species absent from other sites. Claypan prairie sites, particularly those on soils mapped as somewhat saline and/or sodic fine sandy loams of the Orelia series, are common on the Beaumont surface of the southern part of the project area. These soils tend to pond water in wetter seasons but become hard as concrete in hotter, drier months. As a result, the vegetation is generally sparser and somewhat more stunted than elsewhere, and it is often dominated by species that are absent from or scarce in other sites. Common components of claypan flats include goldenweed (*Isocoma drummondii*), whorled dropseed (*Sporobolus pyramidatus*), threeflower broomweed (*Thurovia triflora*), Texas willkommia (*Willkommia texana*), narrowleaf sumpweed (*Iva angustifolia*), and horse-crippler cactus (*Echinocactus texensis*). Gulf cordgrass (*Spartina spartinae*) is often present in the surrounding matrix, further evidence of the interesting soil chemistry in these areas.

The second variant is the slightly saline or sodic soils that occur in small patches within a nonsaline soil matrix. It has been reported from about 30 places in the following counties: Aransas, Brazoria, Calhoun, Galveston, Harris, Jackson, Matagorda, Refugio, San Patricio, and Waller counties.

Threeflower broomweed (*Thurovia triflora*) is a small annual that bears little resemblance to other broomweeds of the region, neither in stature nor flower color. It is tiny, seldom more than 4 or 5 inches tall, and has small white flower-heads. The other local broomweed species (*Gutierrezia texana* and *Amphiachyris dracunculoides*) are generally at least a foot tall and bear larger yellow flower heads.

Plains gumweed is a rhizomatous perennial forming small clumps. Its stems are no more than one foot tall, with alternate leaves that are narrowly oblanceolate and sparingly toothed. The flower heads are solitary at the tips of the stems and are ¾ inch wide or less. The flower heads are not as resinous as those of other gumweeds. It seems to occur mostly in ephemeral wet spots in coastal prairies on clayey soils. It is endemic to the Texas Gulf Coastal Plain in Bee Cameron, Jim Wells, Nueces, Refugio, and San Patricio counties.

Texas peachbush is endemic to the Rio Grande Plains and Edwards Plateau where it may grow in poor or disturbed soil. It is a dwarf, bushy shrub having very irregular branches and grayish bark. It grows to a height of three feet and a width of two to four feet. Young branches are light grey and conspicuously covered with short, stiff hairs. Texas peachbush opens its white or pink blossoms just before unfolding its leaves in spring. Its edible, peach-like fruits ripen in June and are reported to make excellent preserves.

**Problem**: Plains gumweed is on the Texas watch list for rare and endangered species. Three flowered broomweed and Texas peach bush are endemic species that have limited populations (21-100) and thus make the species vulnerable to depletion and loss.

**Objective**: The purpose of this study is to collect data pertaining to the taxonomy, morphology, habitat and reproductive biology of these three plant species in order to aid in the restoration, stabilization and maintenance of their populations.

**Discussion:** In cooperation with Dr. Tim Fulbright and James E. Pittman III of the Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville we initiated a study in 2007 on two endemic forbs of the Texas coastal prairie; plains gumweed (*Grindelia oolepis*) and threeflower broomweed (*Thurovia triflora*), and one endemic shrub; Texas peach bush (*Prunus texana*).

Plains gumweed was harvested from one site on the Vidaurri Ranch from October 26 through December 13, 2007. The total harvest for the year was 133 seeds weighing 0.2623 grams. Calculations estimate that plains gumweed produces 230,202 seeds per pound.

Fifty seeds of plains gumweed were planted at the PMC in January of 2008 and 18 successfully germinated. The plants were then planted in 14 x 14 inch containers with most containers getting four plants. They began flowering in June, six months after they germinated, with the peak of flowering occurring in September. They continued to produce seed from August through November. At the field sites, plains gumweed flowered from September through November. The sites which had populations of plains gumweed either had naturally occurring short vegetation or grass that was being kept mowed. Due to the rhizomatous nature of this species, there are now several hundred plants that are capable of being transplanted at a reintroduction site. At the field sites, plains gumweed flowered from September through November. The sites which had populations of plains gumweed either had naturally occurring short vegetation or grass that was being kept mowed.

Threeflower broomweed was harvested from one site on the Vidaurri Ranch from November 15 through December 13, 2007. The total harvest for the year was 543 seeds weighing 0.3338 grams. Calculations estimate that threeflower broomweed produces 738,532 seeds per pound. One hundred seeds were planted at the PMC in January of 2008 and 72 successfully germinated. The threeflower broomweed began flowering in September, peaked in October and finished in mid November. At the field sites, the first plants were seen in September and continued to produce seed through November. The sites that threeflower broomweed are growing in at the Refugio location are small patches of short grass relative to the surrounding area and rock hard, possibly saline, soil that has been compacted by livestock. Many if not most plants were growing within the livestock trails rather than just along the edges.

Shanna Dunn, NRCS soil scientist for the Corpus Christi region, visited the project site on November 29, 2007. She used an EM-38, electro-magnetic device, to determine the soil salinity from our plant harvest sites. The plains gumweed sites ranged from 0.4 to 1.2 EC levels at the surface and 0.5 to 1.4 EC levels at around 6 inches below the surface. In general, these sites are only slightly saline. This may be partly due to the high rainfall that occurred at this site temporarily leaching the salts. At the threeflower broomweed harvest site, the surface reading indicated an EC of just 2.0. However, the subsurface had a reading of 7.3 with a SAR of 64, which indicates a high level of salinity. For reference, bermudagrass is considered a salt tolerant species. Its threshold for 50% survival is at an EC level of 6.9.

A case-controlled logistic regression was used to determine which variables most affected the odds of one of the study species occurring at a point (Powell and Steidl 2002, Thomas and Taylor 2006). A correlation matrices was constructed to eliminate vegetation variables from logistic regression models if they were highly correlated (≥0.70). The logistic procedure was then used to calculate odds ratios and Wald's 95% confidence intervals (CI). Variables were removed from models if they were not significant ($P > 0.05$). T-tests were used to compare plant survival with and without tilling. Variances were equal in all t-tests ($P > 0.05$).

Plains gumweed occurred on clays (47% of individuals measured, $n = 8$), sandy clays (47% of individuals measured, $n = 8$), and sandy clay loams (6%, $n = 1$). Percent visual obstruction and percent clay were significant predictors of presence of plains gumweed (Table 1). After accounting for percent clay, for every 1% increase in visual obstruction ($F_{1,15}$ df = 7.8, P = 0.013) the odds of plains gumweed occurring decreased 26% (95% CI, 7-41%). After accounting for percent visual obstruction, for every 1% increase in percent clay ($F_{1,32}$ df = 8.4, P = 0.011) the odds of plains gumweed occurring increased 5% (95% CI, 5-35%).

Threeflower broomweed occurred on clays (3% of individuals measured, $n = 1$), clay loams (3%, $n = 1$), loams (11%, $n = 4$), loamy sands (5%, $n = 2$), sandy loam (41%, $n = 15$), sandy clay (3%, $n = 1$), sandy clay loams (32%, $n = 12$), and silt loams (3%, $n = 1$. Variables that were significant predictors of occurrence of threeflower broomweed were percent visual obstruction, percent forb canopy cover, and soil electrical conductivity. After accounting for percent forb canopy cover and electrical conductivity, for every 1% increase in percent visual obstruction ($F_{1,32}$ df = 15.6, P < 0.001) the odds of a threeflower broomweed being present declined 27% (95% CI, 14-37%). After accounting for other significant variables in the model, for every 1% increase in forb canopy cover ($F_{1,32}$ df = 16.8, P < 0.001) the odds of a threeflower broomweed being present increased 11% (95% CI, 6 - 18%). The odds of a threeflower broomweed being present decreased 0.05% (95% CI, 0.02 - 0.08 %) for every 1 µmol/cm increase in soil electrical conductivity ($F_{1,32}$ df = 14.9, P < 0.001) after accounting for other significant variables in the model.

Texas peach bush occurred on sands (45% of individuals measured, $n = 10$) and loamy sands (55%, $n = 12$). For every 1 µg/ml increase in soil nitrogen ($F_{1,21}$ df = 9.5, P = 0.006), the odds of a Texas peach bush being present increased 1.8 fold (95% CI, 0.60 - 3.09 fold).

Neither threeflower broomweed nor plains gumweed appear to be rare based on recruitment limitations of seed-fill or seed germination. Therefore, we designed an experiment to evaluate whether microsite or habitat requirements were the cause for their rarity. If transplants or seeds established and persisted at the experimental sites this would indicate no microsite or habitat limitations to the species.

Nine 6.1 x 1.7 m plots were established in August of 2009 of plains gumweed at 2 locations on the Welder Wildlife Refuge (N 28.06.369 W 97.24.411) near Sinton, Texas. Five of these plots were on a characterized site and four plots were on a non-characterized site. A characterized site was a site that exhibited characteristics that we observed from existing populations. A characterized site had a Victoria clay soil with a claypan B horizon underlain with a Beaumont formation. Plants were located along the upper edge of a road-side ditch adjacent to a smaller, existing population of plains gumweed. Plants in association with plains gumweed are beaked panicum (*Panicum hians*), pink fluffgrass (*Tridens congestus*), and whorled dropseed (*Sporobolus pyramidatus*). The non-characterized site was a site 6.1 m from the ditch on a level site. Plants on this site were predominantly Kleberg's bluestem *(Dichanthium annulatum*). Each plot was divided in half with one side tilled (treated) and the other side left undisturbed

(untreated); the experiment was replicated 5 times at the characterized site and 4 times at the uncharacterized site. Forty plants of plains gumweed were planted in each plot. The side of the plot receiving the treatment was randomly determined by coin toss. Percent survival of plains gumweed transplants was similar (P = 0.427) with tilling (80%, 95% CI 62 – 98%) and no tilling (70%, 95% CI 42 – 98%) on the characterized site. Percent survival was also similar (P = 0.059) between tilling (86%, 95% CI 56 – 116%) and no tilling (50%, 95% CI 10 – 89%) on the uncharacterized site. At the field sites, plains gumweed began flowering in September 2009 and completely finished their reproductive cycle by December 2009. At the "characterized" site, plains gumweed produced 91 seed-heads and at the "non-characterized" site they produced 106 seed-heads.

Distribution of plains gumweed was not microsite limited in our study. However, in the wild it is limited to sites with short vegetation that are high in clay. This appears to be due to its uncompetitive stature compared to surrounding weeds. The species can be successfully reestablished, at least in the short term, by transplanting greenhouse-grown seedlings. Tilling does not appear necessary to facilitate establishment.

At the Aransas Wildlife Refuge threeflower broomweed was planted in August of 2009 by seed near where a formerly existing population once occurred (characterized site) and an adjacent site deemed unsuitable. There were enough seeds for 6 total plots with each plot receiving 100 seeds each. Each plot had the same size and configuration as those used for plains gumweed. No emerging plants of threeflower broomweed were present in any plot in May 2010. Based on the seed germination and field studies, threeflower broomweed appears to be rare or endemic based on both a microsite limitation and dispersal limitation. None of the seed that we planted on either the "characterized" site or "non-characterized" site became established. Furthermore based on its short growth form, it probably is uncompetitive with surrounding vegetation limiting it to isolated short-grass communities and sites that are constantly mowed or grazed.

What appears to limit distribution of Texas peach bush in the Refugio-Goliad Prairie region is that they need a very well drained sandy soil and protection from predation. All colonies of peach bush that we have encountered were growing at or near the top of loosely packed sandy hills.

This project was conducted in cooperation with Texas A&M University-Kingsville, NRCS, the Victoria Soil and Water Conservation District, the Nature Conservancy, the United States Fish and Wildlife Service, the Vidaurri Ranch, the Welder Wildlife Refuge, and the Aransas Wildlife Refuge.

**Study Number: STPMC-T-0705-RANU**

**Study Title:** Forage Quality Study of Selected South Texas Plants

**Introduction:** There is little forage yield and nutritive information available for native South Texas warm season grasses. This information is needed to strengthen the USDA/NRCS efforts to document these grasses and promote their use as native forage sources for Texas ranchers. This information is needed for NRCS programs such as: Forage Suitability Group Descriptions, National Soil Information System, Ecological Site Information System, Prescribed Grazing Plans, Pasture and Hay Planting, Range Seeding, Web Soil Survey, Grazingland Spatial Analyses, and Nutritional Balance Analyzer. Many of the grass species currently used by ranchers are introduced species. Helpful information is needed so that ranchers can make informed decisions about native forages.

**Problem:** Forage yield and nutritive information is needed for native South Texas warm season grasses. This information would strengthen USDA/NRCS efforts to promote their use as native forage sources for Texas ranchers.

**Objective**: The objective of this study is to establish growth curve plots for South Texas grasses and document the monthly phenological state for these grasses as well as assess the plot biomass and crude protein and digestibility.

**Discussion:** In the spring of 2007 five native grasses were chosen for analysis; shortspike windmillgrass, plains bristlegrass, multiflowered false Rhodesgrass, silver bluestem, and pink pappusgrass. Seed of these species was collected from South Texas and then sown in pots in the greenhouse at the Kika de la Garza Plant Materials Center. These plants were then transplanted into 4 replicated plots at the Texas Agricultural Experiment Station at Stephenville. Each plot is subdivided into eight quadrants. Monthly clippings were randomly assigned to each quadrant from April through November of 2007 and 2008. The clippings will be analyzed in 2008 and 2009. Plots were set-up to evaluate no fertilizer and a 60 lb N/acre fertilizer treatment and its effect on forage biomass and forage nutritive value.

In 2007 (establishment year), fertilizer increased yields for multiflowered false Rhodesgrass and pink pappusgrass. Within the fertilized treatment, multiflowered false Rhodesgrass had the greatest yield (5,038 lbs/acre) and plains bristlegrass the least (1,742 lbs/acre), while shortspike windmillgrass and plains bristlegrass were intermediate in yield. In 2008, fertilizer again increased yields for multiflowered false Rhodesgrass and pink pappusgrass. Within the fertilized treatment, pink pappusgrass had the greatest yield (2,448 lbs/acre) and plains bristlegrass had the least (843 lbs/acre). Due to pest and fungal infection, 2008 yield data could not be estimated for shortspike windmillgrass. In 2007, fertilizer had no effect on neutral detergent fiber (NDF). Fiber values were high because grasses were allowed to establish fully before clipping: plains bristlegrass 79%, pink pappusgrass 78.6%, multiflowered false Rhodesgrass 76.9%, and shortspike windmillgrass 75.4% NDF. In 2007, fertilizer decreased the percentage of acid detergent fiber (ADF) in multiflowered false Rhodesgrass, with no effect on the other species. Plains bristlegrass had the highest ADF value (46.3%), pink pappusgrass (45.2%), multiflowered false Rhodesgrass (41.6%), and shortspike windmillgrass the smallest (38.1%). In 2008, fertilizer had no effect on acid detergent fiber. Shortspike windmillgrass had the highest percentage invitro organic matter digestibility in 2007, at 39.5%. Pink pappusgrass was the least digestible at 35.2%, while multiflowered false Rhodesgrass and plains bristlegrass

were intermediate.  Pink pappusgrass had the highest percentage of crude protein in 2007 at 8, but the other three species did not differ from one another with an average crude protein of 7.

In 2010, an article titled “Herbage Nitrogen, Fiber, and in Vitro Disappearance of Three Great Plains Grasses During Establishment” was submitted by Angela E. Lee, J.P. Muir, B.D. Lambert, J.L. Reilley, and T.R. Whitney for publication in the journal Crop Science.  A second article was also prepared titled, “Matter, Carbon, and Nitrogen Yields of Three Great Plains Grasses with Forage and Biodiversity Potential” by J.P. Muir, A.E. Lee, B.D. Lambert, J.L. Reilley, and J.R. Bow to be submitted to the journal Bioresourse Technology.

Cooperative funding provided by the Texas AgriLife Research at Stephenville, the USDA – Natural Resources Conservation Service,  E. “Kika” de la Garza Plant Materials Center, and Tarleton State University.

**Study Number: STPMC-P-0801-RAWL**

**Study Title:** Multi-site Native Legume Evaluation

**Introduction:** Warm season forage legumes can contribute nutrient value to pasture and rangeland systems because of digestible crude protein (CP) derived from plant/Rhizobia symbiosis (White and Wight, 1984; Clark and Ulyatt, 1985). Native perennial legumes were an important component of the native grasslands in the southern Great Plains of the USA (Weaver, 1954) and could once again contribute considerable nutritive value to both natural and cultivated grazing systems (Posler et al., 1993; McGraw et al., 2004; Muir et al., 2005). However, most have been eliminated or radically reduced through overgrazing from most pasture and rangeland systems in the southern Great Plains (Weaver, 1954), and few introduced or native cultivated perennial, warm-season forage legumes have proven productive and persistent in this region. The rising cost of industrial nitrogen fertilizers contributes to a growing need for agronomic evaluation of native legumes (Sprent, 1999) that might improve CP content of native and improved grasslands of the southern Great Plains.

**Problem:** There is a need for a greater array of native perennial herbaceous legumes for inclusion in forage, rangeland and wildlife seed mixes in the southern Great Plains. End-uses include rangeland restoration, native prairie reconstruction, CRP plantings, and wildlife habitat restoration.

**Objective:** Three sources of prairie acacia seed along with one source each of panicled tickclover and herbaceous mimosa are presently available for evaluation of seed and herbage yield, forage nutritive value, and effect of forage harvest on seed yield. The prairie acacia seed sources are a composite developed at the Kika de la Garza PMC, Plains Germplasm from the James E. 'Bud' Smith PMC, and STPA05 from Texas AgriLife Research in Stephenville. The panicled tickclover seed source is STPTC01 from Texas AgriLife Research in Stephenville and the Crockett herbaceous mimosa is from the East Texas PMC. Data from the evaluation will be used to support seed releases in the Select and Cultivar categories, establish adaptation limits, response to varying soils & climates, and productivity/persistence in a wide range of environments.

**Discussion:** The question often arises when collecting and evaluating native forage ecotypes: how much genetic variability exists within species? This study examined three prairie acacia (*Acacia angustissima* var. *hirta*) accessions from Texas for genetic overlap, adaptation to a wide range of latitudes, as well as seed and herbage yield, nutritive values, and effect of forage harvest on seed production at Stephenville, TX. Accessions were an ecotype collected near Stephenville (32°13' N, 98°12' W, elevation 395 m), the composite 'Plains Germplasm' collected at 17 sites from 29 to 32° N, 95 to 101° W, and 121 to 778 m) and an ecotype from Frio County (28° 37' N, 99° 15' W, elevation 176 m) selected at Kingsville, TX by the E. "Kika" de la Garza PMC. The accession from the E. "Kika" de la Garza PMC (KPA) yielded over 400% more ($P \leq 0.05$) herbage (3,483 kg DM $ha^{-1}$ $yr^{-1}$) at Stephenville than the other entries the third year after establishment. Herbage removal negatively ($P \leq 0.05$) affected seed yield, which was as much as 2,590 kg $ha^{-1}$ $yr^{-1}$ for previously unharvested Plains Germplasm prairie acacia the second year after establishment. Differences ($P \leq 0.05$) in leaf:stem ratios, some nutritive values and crude protein yields were measured among accessions with the accession from the E. "Kika" de la Garza PMC showing the most promise where there were differences. Polymerase chain reaction genetic analysis indicated the least difference between Stephenville prairie acacia (91% within accession similarity) and Plains Germplasm prairie acacia (92% within accession similarity) and the most difference between these two and the E. "Kika" de la Garza

PMC prairie acacia (79% within accession similarity), which also presented a taller, woodier growth habit. Percent plot cover differed ($P \leq 0.05$) among locations (Knox City, TX 50%, Stephenville, TX 100%, Nacogdoches, TX 99% and Homer, LA 61%) but not among accessions 3 yr after seeding. Our results found that genetic variation within prairie acacia germplasm collected in Texas does exist, and that variation is expressed primarily in herbage production differences independently of edapho-climatic differences along a longitudinal gradient.

This project was conducted in cooperation with the Texas AgriLife Research Station Stephenville, Texas.

**Study Number: STPMC-T-0906-TE**
**National Project Number: PM-T-0901**

**Study Title:** ICST - Adaptability of 'Tropic Sun' Sunn Hemp

**Participating PMCs:** AZPMC, ARPMC, CAPMC, UCEPC, FLPMC, GAPMC, IDPMC, KSPMC, LAPMC, MDPMC, MIPMC, MSPMC, MOPMC, MTPMC, NVPMC, NJPMC, NMPMC, NYPMC, NDPMC, ORPMC, STXPMC, NTXPMC, ETXPMC, WAPMC, WVPMC

**Introduction:** Sunn Hemp (*Crotalaria juncea*) has been touted as a great green manure and cover crop since the 1930s, when it was reported to be an excellent soil-improving crop. Sunn hemp produces high organic matter yields while fixing large amounts of nitrogen. However, the difficulty in acquiring seed and cheap fertilizer prices caused many farmers to abandon the use of this crop. Energy costs have brought leguminous cover crops back to the forefront for sustainable agriculture production and have led to efforts to increase production of sunn hemp seed.

Sunn hemp is a tropical or sub-tropical plant that acts like a summer annual when grown in the continental United States. Sunn hemp's adaptation to a wide range of soils and superior performance on poor sandy soils has attracted attention. As a cover crop, sunn hemp can produce 5,000-6,000 pounds of biomass per acre in southern climates in 60-90 days. It also can produce 120-140 pounds of nitrogen in the same amount of time.

**Problem**: The regions of adaptation and potential use of Sunn Hemp need better definition.

**Objective**: This study attempts to determine the areas of the country with the potential to use sunn hemp for green manure and cover crops. The anticipated use of sunn hemp is as a 30-45 day green manure crop. Sunn hemp does not produce seed above 28 degrees N latitude (southern tip or Florida or Texas). Since it does not produce seed through most of the US and is sensitive to frost, it has little potential to be weedy. Technology Transfer Products will be produced, including a national tech note, state tech notes, and a referred journal article.

**Experimental Plan**: The STPMC planted 13 rows 87' long on 3 foot centers. The seed bed was well prepared and weed free. The seed was inoculated with a cow pea type Bradyrhizobium sp. that was sent with the seed. Irrigation and natural precipitation was recorded.

Date of planting, emergence, and complete stand was recorded. Height of plants at time of clipping was recorded. Clipping dates were 30 days, 60 days and 90 days after planting date. Three 5' samples per clipping date per rep were clipped just above the soil surface (12 per harvest). Fresh clipped material was weighed for each harvest and reported in the "Data Collection Form". A grab sample was collected from each of the three clippings from each replication and bulked to achieve a sample size of ~250 grams. Grab sample wet weights were reported in the Data Collection Form. After the grab sample was dry, the dry weight was reported in the Data Collection Form. The date the first flowers appeared was recorded. The date of first frost was recorded as well as the height of the material when it was killed by frost. Samples were then repeated from borders within the plot.

**Discussion:** The plot was planted then flood irrigated (about 15,000 gal) on May 27, 2009 at the STPMC. At 2 weeks there was still spotty (<50%) emergence perhaps due to seed flow problems with the seed drill. On June 19, 2009 the skips were hand planted at 1 inch apart and

the plot was flood irrigated again (about 15,000 gal). On June 22nd there was 99% emergence. The fist sample date was June 26th, but there was very little growth due to drought. Thus, height was recorded, but biomass was not sampled at 30 days. The plot was flood irrigated on June 30th (about 15,000 gal) and again for a final time on July 15th (about 8,000 gal). Sixty-day data was taken on July 27th and ninety-day date was taken on August 26, 2009. The date of first flower was September 21, 2009. The first frost was December 5th and the final data was taken on December 10, 2009. Seed was beginning to form, but was still green when killed by the frost.

The data was sent to Ramona Garner, East Plant Materials Specialist and Joel Douglas, Central Plant Materials Specialist for comparison and analysis.

Since all the plants died at the STPMC before seed was produced, an attempt was made in 2010 to find a collection of sunn hemp that was more adapted to South Texas. Accession were requested from GRIN and 16 accessions were seeded in the greenhouse in August 2010. In October 2010, there was not much difference in field performance between accessions. The plot was evaluated after the first frost on December 10, 2010. Only two accession had and plants still alive, PI 219717 – 2 plants and PI 250485 – two plants. None of the plants were alive by the end of the year and seed was not produced.

**Table 1. STPMC-T-0906-TE Adaptability of 'Tropic Sun' Sunn Hemp**

**Greenhouse Germination Spring 2010**

| Accession Number | Origin (County) | 15 Days % |
|---|---|---|
| PI 207657 | Sri Lanka | 80.0% |
| PI 219717 | Myanmar, Shan | 84.0% |
| PI 234771 | Nigeria | 48.0% |
| PI 250485 | India | 68.0% |
| PI 250486 | India | 84.0% |
| PI 250487 | India | 60.0% |
| PI 295851 | Brazil, San Paulo | 24.0% |
| PI 314239 | Former Soviet Union | 76.0% |
| PI 322377 | Brazil, San Paulo | 88.0% |
| PI 337080 | Brazil | 68.0% |
| PI 346297 | India, New Delhi | 84.0% |
| PI 391567 | South Africa | 88.0% |
| PI 426626 | Pakistan | 92.0% |
| PI 468956 | United States | 76.0% |
| PI 561720 | Brazil, San Paulo | 8.0% |
| PI 652939 | United States, Texas | 56.0% |

***Germination count based number of seeds planted.

**Study Number: STPMC-T-0907-TE**

**Study Title:** Panicum Adaptation

**Introduction:** Most grasses, including Reed canarygrass, perennial ryegrass, and northern and southern cultivars of switchgrass are reported to have optimal areas of adaptation. Likewise, results with Miscanthus have shown that plants at the Elsberry, Missouri PMC are much more robust than at the Temple, Texas site. Such specificity of adaptation has been attributed to high temperature tolerance, photoperiod, and winter kill.

**Problem**: The regions of adaptation of some potential biofuel grass species/ cultivars need better definition. The primary mechanisms affecting their adaptation also need to be described.

**Objective**: In this study, we intend to better define these limits of adaptation for some important biofuel candidate grasses and begin to determine environmental factors controlling it.

**Discussion:** In 2009, the ARS from Temple Texas established a small plot of 10 different species/ cultivars of switchgrass, Miscanthus, big sacaton, perennial ryegrass, and Hall's panicum replicated four times at the PMC and eight other locations extending from Texas to Missouri. Plots were maintained through 2009. At the end of 2009, measurements were taken of plant height and stand density.

In 2010, dry weights were recorded throughout the year on all the species at all the locations. Table 1 shows the total yearly dry weight of each species for 2010 at the Plant Materials Center in Kingsville, Texas.

**Table 1. Dry weights in tons per hectare for the various grass species in Kingsville, TX.**

**Year 2010**

| Species | tons/hectar |
|---|---|
| Switchgrass 'Alamo' | 19.0 |
| Switchgrass 'Blackwell' | 3.9 |
| Switchgrass 'Cave-in-Rock' | 4.9 |
| Switchgrass 'Cimarron' | 3.8 |
| Switchgrass 'Kanlow' | 11.3 |
| Miscanthus | 5.7 |
| Big Sac | 8.2 |

In 2011, plants will be harvested three times from each location. Data collection will include plant height, fresh and dry weights, FI-PAR measurements, and leaf area. FI-PAR measurements will be taken using an AccuPAR LP-80 Ceptometer (Decagon Devices, Pullman, WA) two hours before or after solar noon. Destructive leaf area will be calculated using the LI-3000C Portable Leaf Area Meter (LI-COR Biosciences, Lincoln, NE.

This data should be beneficial for simulating development and yield of these grasses across latitudes and for predicting how areas of adaptation could change with various possible climate change scenarios.

This project was conducted in cooperation with the Texas AgriLife Research Station Temple, Texas.

**Study Number: STPMC-T-1002-CR**

**Study Title:** Bolivar Revegetation

**Introduction:** The Bolivar peninsula was under seawater for 24-48 hours following Hurricane Ike. This resulted in massive die-off of the existing vegetative cover of the island. The Audubon society manages approximately 4 acres of land adjacent to the historic Fort Travis on the Bolivar peninsula. The native plant community for this site is dominated by marshhay cordgrass with lesser amounts of gulfdune paspalum, seashore paspalum, gulf cordgrass, Florida paspalum and brownseed paspalum. Native woody species that exist in the county are yaupon, waxmyrtle, Texas ebony, liveoak, redbay and Barbados cherry.

**Problem:** Houston Audubon contacted the USDA NRCS for assistance because of their concerns about reestablishing the native vegetation that would maintain native plant diversity and the need to provide suitable nesting habitat especially for visiting neotropical birds.

**Objective:** The objective of this project was to assess three different approaches to revegetating the Audubon site on Bolivar peninsula.

**Discussion**: The soil at the site was a Galveston fine sand with a pH of 7.5 and an Ec of 2.1 ppt with a high sodium level of 1.6 ppt. The nitrogen and phosphorus levels were low. There were two sites on the property, each approximately 1.6 acre in size. Each site received a tree planting, vegetative grass transplants and a seeding trial that consisted of 8 single species and three multiple species mix. The sites were sprayed with glyphosate twice to kill existing weeds prior to the October 2009 planting. Forty-seven trees of 5 different species were provided by the Louisiana PMC. The five species were mulberry, hackberry, liveoak, Texas persimmon and yaupon. The trees were planted on 20' centers.

Audubon planted 3,448 grass transplants representing six species that were provided by both the Louisiana PMC and the Kika de la Garza PMC. The six species were marshhay cordgrass, seashore paspalum, gulf cordgrass, brownseed paspalum, gulf bluestem and seashore dropseed. The grass transplants were planted on 3' centers.

The seeding trials were planted by the Kika de la Garza PMC with a modified range drill. The seedings consisted of 8 single species and 3 multiple species mix. The 8 species were eastern gamagrass, longspike tridens, roundheaded prairie clover, Illinois bundleflower, Canada wildrye, partridge pea, shortspike windmillgrass and Florida paspalum. The seed mixes included all of the single species as well as seacoast bluestem, Indian blanket, gayfeather, Mexican hat, white prairie clover and black eyed Susan. Seed was provided by the LAPMC, Native American Seed, Pierce Ranch Seed and the E. "Kika" de la Garza PMC. The single species seeding rate was at 30 pls/ft2., The seed mixes were seeded at 20#/acre. The seeded plots were replicated 2 times at the 2 sites.

The site was evaluated on September 2, 2010. Tree survival was 92% for the mulberry, 80% for the yaupon, 67% for both the liveoak and hackberry and 25% for the Texas persimmon. Survival rates for the grass transplants were 98% for the seashore dropseed, 43% for the seashore paspalum, 35% for the marshhay cordgrass, 15% for the gulf cordgrass and 0% for both the gulf bluestem and the brownseed paspalum. The percent cover of the seeded plots were 23% for the Canada wildrye, 7% for the partridge pea and 4% for the Illinois bundleflower. The other 5 species had 0% coverage. The Native American Seed mix had at least 4 different

species come up representing Canada wildrye, partridge pea, Indian blanket and Illinois bundleflower. The Pierce Ranch Seed mix had 3 species represented with Canada wildrye, Illinois bundleflower and seacoast bluestem. The Louisiana PMC seed mix also had 3 species represented with Canada wildrye, Illinois bundleflower and partridge pea. The conclusions from this study were that both tree and grass transplants were the most effective approach on this site. Only the Canada wildrye seeding was successful. Minor success was attained from the Illinois bundleflower and partridge pea seedings.

This project was conducted in cooperation with the Audubon Society, the Louisiana PMC and Texas NRCS.

**Study Number: STPMC-T-1003-CR**

**Study Title:** Pollinator Projects

**Introduction:** Pollinators, such as insects, birds, bats, and other animals, are essential to our environment. The ecological service they provide accounts for the reproduction of nearly 70 percent of the world's flowering plants, including more than two-thirds of the world's crop species. Pollination by bees and other species contributes an estimated $3 billion dollars worth in fruits and vegetables production, and $1.6 billion to $8.3 billion for agricultural crops. Crops grown throughout Texas that benefit from pollinators include: tomatoes, berries, alfalfa, sunflowers, fruit orchards, and vegetables. Outside of agriculture, pollinators play a vital role in most terrestrial ecosystems. Fruits and seeds derived from insect pollination make up a major part of the diet for many species of wildlife.

**Problem:** There is evidence that many pollinator species are on the decline due to disease, habitat loss, fragmentation, and deterioration.

**Objective:** NRCS can help develop and enhance pollinator habitat through technical and financial assistance. Habitat development and enhancement can be planned and implemented adjacent to cropland fields and within pastureland, and rangeland. Habitat requirements of pollinators should include food, shelter and water, space, a place to reproduce, and materials for nesting in order to survive and flourish. Native plant materials can provide these needs. The STPMC will likely have various projects in the coming years in relation to pollinators.

**Discussion**:

*Pollinator Game*: A Jeopardy style PowerPoint game will be produced by the E. "Kika" de la Garza PMC based on the Range Game and the Plant Materials Game that were already available. This design was begun in 2010 and will be completed in 2011. This game will then be made available for school and conservation minded groups.

*Pollinator Plants Handout*: The E. "Kika" de la Garza PMC and *South Texas Natives* will team up to produce a Pollinator Plants Handout based on the one done by the East Texas PMC. A draft list of potential plant species to include in the handout has been developed and discussed.

*PMC Office Landscaping*: The area around the office and seed lab will be landscaped to support pollinators. This project is on hold due to drought conditions.

*Pollinator Mix Demo Plot*: A demonstration planting of commercially available pollinator seed mixes was planted in November 2010. The following mixes were included in a 40' by 80' block each: Native American Seed Butterfly Retreat Mix, Bamert Seed Bird and Butterfly Blend, Bamert Seed American Magic Wildflower Mix, Turner Seed Starburst Spring, Turner Seed Texas Native Spring Mix, Turner Seed Texas Native Fall Mix, Douglas King Co King's wildflower mix, and Applewood Seed Co Texas/Oklahoma Wildflower Mix. These plots will be evaluated in 2011.

**Study Number: STPMC-T-1004- TE**

**Study Title:** Evaluation of Soil Treatments for Establishing and Maintaining Endangered Plant Species Within a Shortgrass Prairie Community.

**Introduction:** Less than 1% of the original Texas Gulf Coast Prairie remains in a relatively pristine state. And no one knows the amount of shortgrass prairie inclusions present and lost from within the greater Texas Gulf Coast Prairie. Many of the threatened and endangered plants species of south Texas are associated with this rare plant community type. Plants such as the endangered slender rushpea and sout Texas ambrosia as well as such rare plants endemics as threeflower broomweed, Texas willkommia, coastal gayfeather, Texas windmill-grass and south Texas rushpea.

**Problem:** There are a limited number (3-4) of natural populations of the endangered plant species slender rushpea (*Hoffmannseggia tenella*). All are under intense competition from invasive, exotic grasses making them extremely vulnerable to extinction.

**Objective:** NRCS can help develop shortgrass prairie replicas planted with slender rushpea and other rare plants to provide a refugium for individual population genetics. Discovering what soil characteristics allow these small shortgrass prairie communities to persist will aid in establishment and long-term maintenance of these replicas.

**Discussion:** The design of this experiment was a randomized complete block with 4 replications. Construction consisted of overlaying a weed mat over the existing soil to prevent roots from penetrating but allowing air, water and nutrients to pass through it. This weed mat thus restricted the soil profile to 18 inches. Twelve inches of clay soil was placed on top of the mat. Then one of 4 soil treatments were applied to each plot. These consisted of 1) 6” of clay soil with no slope, 2) 6” of clay soil with a 1-2% slope 3) 6” of sandy loam soil with no slope and 4) 6” of sandy loam with a 1-2% slope. Each plot was 10’ by 10’ and constructed with 2” by 10” by 10 ‘ boards. The entire project area was 40’ by 40’ with 5’ sloping sides at a 3:1 gradient. After construction it was irrigated and solarized with black plastic for 2 weeks prior to planting to kill any residual weed seed. Each plot was planted with 100 transplants at a one-foot spacing. Plant species were slender rushpea, hooded windmillgrass, Hall’s panicum, prostrate bundleflower, curly mesquite, buffalograss and Texas grama. 1600 transplants were planted with 320 of them being slender rushpea. Following planting Prowl herbicide was applied to help control weeds. Survival counts for the slender rushpea will be conducted in 2011.

# New Releases

United States Department of Agriculture
Natural Resources Conservation Service

# Plant Guide

# WHIPLASH PAPPUSGRASS

## *Pappophorum vaginatum* Buckley

Plant Symbol = PAVA2

Contributed by: USDA NRCS Kika de la Garza Plant Materials Center

*Forrest Smith, South Texas Natives*

**Alternate Names**
*Pappophorum mucronulatum*

***Uses***
Whiplash pappusgrass is useful for upland wildlife plantings, highway right-of-ways and ecosystem restoration. It provides fair forage for livestock.

**Status**
Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status and wetland indicator values).

**Description**
*General:* Whiplash pappusgrass is a native, warm-season, perennial bunch grass with a height of 2 to 3 1/2 feet. The leaf blade is flat, narrow up to 10 inches long with edges that may roll inward. The seedhead is 4 to 8 inches long, narrow, tightly contracted, with a whitish or tawny appearance only rarely with a slight purple tinge (Gould, 1975).

*Distribution*: For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site. It is found in Texas, New Mexico and Arizona.

*Habitat*: Whiplash pappusgrass is found in dry rangelands of Texas to Arizona with annual rainfall of 10 to 20 inches. In the west it occurs at elevations of 2,500 to 4,000 feet. It is located on a wide variety of range sites including gray sandy loam, claypan prairie, and saline clay. It is associated with Arizona cottontop, false Rhodes grass, alkali sacaton, plains bristlegrass, and vine mesquite.

**Adaptation**
Whiplash pappusgrass grows well on most soil types, including sandy loam, clay, clay loam and saline clay soils

**Establishment**
Seedbed preparation should begin well in advance of planting. Planting can be scheduled for early spring or where there are few cool-season weeds, whiplash pappusgrass can be planted in the late summer. In Arizona and New Mexico planting should be timed to catch the summer monsoons. Establish a clean, weed-free seedbed by either tillage or herbicides. Prior to planting, the site should be firm and have accumulated soil moisture.

Whiplash pappusgrass is best seeded using a native-grass drill with picker wheels to ensure a good planting of the fluffy seed. Broadcast seeding may be used in areas not easily planted with a drill, but some type of additional coverage such as culti-packing or light dragging will be beneficial to ensure good seed to soil contact. Seed coatings (talc based) can also be used to increase the flowability of the fluffy seed through standard seed drills.

Seed should be planted 1/8 to 1/4 inch deep. It is better to plant too shallow than too deep. For calibration purposes, Webb Germplasm whiplash pappusgrass contains approximately 436,250 uncoated seeds per bulk pound. A seeding rate of 3 pounds of pure live seed (PLS) per acre is recommended. In planting mixtures reduce the rate according to the percent of whiplash pappusgrass in the mixture.

Soil analysis should be performed prior to planting to determine the necessary levels of nitrogen, phosphorus and potassium. Nitrogen should not be applied until the stand is established. If 1 to 2 plants per square foot have become established, the planting has been successful.

**Management**
Arizona cottontop should not be grazed the first year. After a stand is established, either continuous or rotational grazing can be used. Contact your local NRCS field office for assistance in developing a prescribed grazing plan. Plants should be allowed to produce seed occasionally to insure stand health. Whiplash pappusgrass is a long-lived perennial that is extremely drought and fire tolerant once established.

**Pests and Potential Problems**
Common pests of whiplash pappusgrass seed include fall armyworms (*Spodoptera* spp.), thrips (*Thrips* spp.), and rice stink bugs (*Oebalus pugnax*). Control of pests may be necessary in order to produce seed crops in dry years under irrigation

**Seeds and Plant Production**
Seed increase plots have been planted on 36" bedded rows, however flat plantings may be possible with frequent weeding. Whiplash pappusgrass can also be established with vegetative transplants. Rapid spread and growth has been observed in transplant established stands providing seed harvests within the first year. Furthermore transplants stands facilitate better weed control in the seed production fields.
Deep soil tillage or frequent close cultivation is recommended to promote seed production. Commercial herbicides are available for weed control once plants are beyond the seedling growth stage. Consult your local extension weed specialist for recommended herbicides.

Whiplash pappusgrass produces seed throughout the year. Seed is harvested with a Flail Vac or similar brush-type harvester. The use of slow travel and RPM speeds while harvesting results in relatively clean seed, needing little cleaning or processing. Debearding of the seed has been accomplished through the use of a Westrup brush machine. However, do not aggressively debeard the seed such that it removes the caryopsis from the glumes as seed damage or reductions in seed life have been observed. To clean stems and chaff from harvests, a clipper seed cleaner has been used following the debearding treatment.

On average one should expect to produce 50 bulk pounds per harvest of clean seed per acre. Purity of the seed is usually around 54% and germination rates are about 47%. Adequately stored seed in humidity and temperature controlled facilities can be expected to stay viable for 5 to 10 years.

**Cultivars, Improved, and Selected Materials (and area of origin)**
Webb Germplasm whiplash pappusgrass is a blend of 3 collections from the Rio Grande Plains of Texas and was released by Texas A&M-Kingsville *South Texas Native*, the USDA-NRCS E."Kika" de la Garza Plant Materials Center and Texas AgriLife Research Station in Beeville, Texas in 2010. It was selected for its good seed germination and seedling vigor, as well as excellent soil, seed viability. It is predominantly adapted to sandy loam, claypan prairie, and saline clay range sites in south Texas. Breeder seed is maintained by *South Texas Natives* in conjunction with Texas Foundation Seed Service.

Pima Germplasm whiplash pappusgrass is a blend of 16 collections from Arizona and was released in 2006 by the USDA-NRCS Tucson Plant Materials Center. It was selected for release for ecosystem restoration, erosion control, wildlife cover and restoration of disturbed areas in southern Arizona. Breeder seed is maintained by USDA-NRCS Tucson Plant Materials Center (Garner, Hershdorfer, and Munda, 2006).

**References**
Garner, E.R., M.E. Hershdorfer, and B. Munda. 2006. Notice of Release of Pima Pappusgrass Selected Class of Germplasm. USDA-NRCS Tucson Plant Materials Center. Tucson, AZ.
Gould, F.W. 1975. The Grasses of Texas. Texas A&M University Press. College Station, TX.

**Prepared By**
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USDA-NRCS, E. " Kika" de la Garza Plant Materials Center, Kingsville, Texas

**Citation**
Lloyd-Reilley, J. 2010. Plant guide for whiplash pappusgrass (*Pappophorum vaginatum)*. USDA-Natural Resources Conservation Service, Kika de la Garza Plant Materials Center. Kingsville, TX.

Published October, 2010

Edited: [14Sep2010 sdm]

For more information about this and other plants, please contact your local NRCS field office or Conservation District at http://www.nrcs.usda.gov/ and visit the PLANTS Web site at http://plants.usda.gov/ or the Plant Materials Program Web site http://plant-materials.nrcs.usda.gov.

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United States Department of Agriculture
Natural Resources Conservation Service

# Plant Guide

# PINK PAPPUSGRASS

## *Pappophorum bicolor*
## E. Fourn.

Plant Symbol = PABI2

Contributed by: USDA NRCS, E. "Kika" de la Garza Plant Materials Center

*Forrest Smith, South Texas Natives*

**Alternate Names**
*Pappophorum mucronulatum*

***Uses***
Pink pappusgrass is useful for upland wildlife plantings, highway right-of-ways and ecosystem restoration. It provides fair forage for livestock. It also may have uses in urban landscaping and ornamental plantings. The foliage is a deep green color and seedheads are an attractive pink coloration.

**Status**
Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status and wetland indicator values).

**Description**
*General:* Pink pappusgrass is a native, warm-season, perennial bunch grass with a height of 2 to 5 feet tall. The leaf blade is flat, narrow up to 10 inches long with edges that may roll inward. The seedhead is 4 to 8 inches long, narrow, tightly contracted but sometimes with erect spreading branches. Pink pappusgrass, as its name implies, has a pink or purplish tinge at maturity (Gould, 1975).

*Distribution*: For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site. It is found in Texas, New Mexico, and Arizona.

*Habitat*: Pink pappusgrass is found in the dry rangelands of Texas to Arizona with annual rainfall of 10 to 20 inches. It is located on a wide variety of range sites including gray sandy loam, clayloam, and saline clay. It is associated with Arizona cottontop, false Rhodes grass, alkali sacaton, plains bristlegrass, and curly-mesquite. Pink and whiplash pappusgrass have considerable overlap in range and habit, and often grow together (Reeder, 2008).

**Adaptation**
Pink pappusgrass grows well on most soil types, including sandy loam, clay, clay loam and saline clay soils

**Establishment**
Seedbed preparation should begin well in advance of planting. Planting can be scheduled for early spring or where there are few cool-season weeds, pink pappusgrass can be planted in the late summer. In Arizona and New Mexico planting should be timed to catch the summer monsoons. Establish a clean, weed-free seedbed by either tillage or herbicides. Prior to planting, the site should be firm and have accumulated soil moisture.

Pink pappusgrass is best seeded using a native-grass drill with picker wheels to ensure a good planting of the fluffy seed. Broadcast seeding may be used in areas not easily planted with a drill, but some type of additional coverage such as culti-packing or light dragging will be beneficial to ensure good seed to soil contact. Seed coatings (talc based) can also be used to increase the flowability of the fluffy seed through standard seed drills.

Seed should be planted 1/8 to 1/4 inch deep. It is better to plant too shallow than too deep. For calibration purposes, Maverick Germplasm pink pappusgrass contains approximately 322,000 uncoated seeds per bulk pound. A seeding rate of 3 pounds of pure live seed (PLS) per acre

is recommended. In planting mixtures, reduce the rate according to the percent of pink pappusgrass in the mixture.

Soil analysis should be performed prior to planting to determine the necessary levels of nitrogen, phosphorus and potassium. Nitrogen should not be applied until the stand is established. If 1 to 2 plants per square foot have become established, than the planting has been successful.

**Management**

Pink pappusgrass should not be grazed the first year. After a stand is established, either continuous or rotational grazing can be used. Contact your local NRCS field office for assistance in developing a prescribed grazing plan.

Plants should be allowed to produce seed occasionally to insure stand health. Pink pappusgrass is a long-lived perennial that is extremely drought and fire tolerant once established.

**Pests and Potential Problems**

Common pests of pink pappusgrass seed include fall armyworms (*Spodoptera* spp.), thrips (*Thrips* spp.), and rice stink bugs (*Oebalus pugnax*). Control of pests may be necessary in order to produce seed crops in dry years under irrigation

**Seeds and Plant Production**

Seed increase plots have been planted on 36" bedded rows, however flat plantings may be possible with frequent weeding. Pink pappusgrass can also be established with vegetative transplants. Rapid spread and growth has been observed in transplant established stands providing seed harvests within the first year. Furthermore transplants stands facilitate better weed control in the seed production fields.

Deep soil tillage or frequent close cultivation is recommended to promote seed production. Commercial herbicides are available for weed control once plants are beyond the seedling growth stage. Consult your local extension weed specialist for recommended herbicides.

Pink pappusgrass produces seed throughout the year. Seed is harvested with a Flail Vac or similar brush-type harvester. The use of slow travel and RPM speeds while harvesting results in relatively clean seed, needing little cleaning or processing. Debearding of the seed has been accomplished through the use of a Westrup brush machine. However, do not aggressively debeard the seed such that it removes the caryopsis from the glumes as seed damage or reductions in seed life have been observed. To clean stems and chaff from harvests, a clipper seed cleaner has been used following the debearding treatment.

On average one should expect to produce 150 bulk pounds per harvest of clean seed per acre. Purity of the seed is usually around 55% and germination rates are about 40%. Adequately stored seed in humidity and temperature controlled facilities can be expected to stay viable for 5 to 10 years.

**Cultivars, Improved, and Selected Materials (and area of origin)**

Maverick Germplasm pink pappusgrass is a blend of 7 collections from the Rio Grande Plains of Texas and was released by Texas A&M-Kingsville *South Texas Native*, the USDA-NRCS E."Kika" de la Garza Plant Materials Center and Texas AgriLife Research Station in Beeville, Texas in 2010. It was selected for its good seed germination and seedling vigor, as well as excellent soil, seed viability. It is predominantly adapted to sandy loam, clayloam, and saline clay range sites in south Texas. Breeder seed is maintained by *South Texas Natives* in conjunction with Texas Foundation Seed Service.

**References**

Gould, F.W. 1975. The Grasses of Texas. Texas A&M University Press. College Station, TX.

Reeder, J.R. 2008. 18.01 PAPPOPHORUM Schreb *in* Manual of Grasses for North America. Utah State University, Logan, UT.

**Prepared By**

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**Citation**

Lloyd-Reilley, J. 2010. Plant guide for whiplash pappusgrass (*Pappophorum vaginatum)*. USDA-Natural Resources Conservation Service, E. "Kika" de la Garza Plant Materials Center. Kingsville, TX.

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## Presentations for STPMC in FY 2010

| Date | Title | Presenter(s) |
|---|---|---|
| Fall 2009 | PMC Direction & Delivery | J. Lloyd-Reilley |
| 11/18/2009 | PMC Seed Release/Commercial Availability | J. Lloyd-Reilley |
| 02/09/2010 | Development and Seed Release of Three Native Annual Forbs for Restoration in South Texas | F. Smith & J. Lloyd-Reilley |
| 02/09/2010 | PMC In-Review | J. Lloyd-Reilley |
| 02/23/2010 | The Kika de la Garza PMC Operational Approach | J. Lloyd-Reilley |
| 04/28/2010 | The Logistics in Seed Production for South Texas Ecotypic Releases | J. Lloyd-Reilley |
| 05/26/2010 | Calibrating Seed Drills | J. Lloyd-Reilley |
| 06/08/2010 | NRCS Calibrating Seed Drill Workshop | J. Lloyd-Reilley |
| 06/09/2010 | Range Plant Identification | S. Maher & V. Garcia |
| 07/22/2010 | Native Pollinators | S. Maher |
| 08/03/2010 | Range Plant Id for Teachers | J. Lloyd-Reilley & S. Maher |
| 08/04/2010 | Native Ornamental Wetland Plants | J. Lloyd-Reilley |
| 08/28/2010 | South Texas Cooperative Project Opportunities | J. Lloyd-Reilley |
| 09/14/2010 | Seed Collecting for TxDOT | S. Maher |
| 09/23/2010 | Seed Collection Workshop | J. Lloyd-Reilley & S. Maher |

## Publications for STPMC in FY 2010

| Title | Author(s) |
|---|---|
| Plant Profile: Plantagos | S. Maher |
| Plant Profile: Scarlet Rose Mallow | S. Maher |
| Plant Profile: Shortspike Windmillgrass | S. Maher |
| Plant Profile: Water Lilies | S. Maher |
| E. "Kika" de la Garza PMC Borchure | J. Lloyd-Reilley, S. Maher, J. Moeller |
| 2009 Progress Report of Activities | J. Lloyd-Reilley & S. Maher |
| Pink Pappusgrass Plant Fact Sheet | J. Lloyd-Reilley & S. Maher |
| Whiplash Pappusgrass Plant Fact Sheet | J. Lloyd-Reilley & S. Maher |
| 2009 Technical Report | J. Lloyd-Reilley & S. Maher |
| Calibrating a Seed Drill for Conservation Planting | J. Lloyd-Reilley |
| Canada Wildrye Plant Guide | J. Lloyd-Reilley |
| Native Legumes for Advanced Biofuel Production | J. Lloyd-Reilley |
| Native Ornamental Wetland Plants for the Coastal Bend | J. Lloyd-Reilley |
| Pink Pappusgrass Plant Guide | J. Lloyd-Reilley |
| Plains Bristlegrass Plant Guide | J. Lloyd-Reilley |
| Seedbed Preparation | J. Lloyd-Reilley |
| Streambed Bristlegrass Plant Guide | J. Lloyd-Reilley |
| What Are Plant Ecotypes | J. Lloyd-Reilley |
| Whiplash Pappusgrass Plant Guide | J. Lloyd-Reilley |
| Why Natives? | J. Lloyd-Reilley |
| Guiding Plant Matierial Development for Exotic Grass Dominated Landscapes with Native Plant Functional Groups | F. Smith, J. Lloyd-Reilley, & W. Ocumpaugh |
| Maverick Germplasm Release Notice | F. Smith & J. Lloyd-Reilley |
| Webb Germplasm Whiplash Pappusgrass Release Notice | F. Smith & J. Lloyd-Reilley |
| Maverick Germplasm Release Brochure | F. Smith |
| Webb Germplasm Release Brochure | F. Smith |
| Notice of Release of Dilley Germplasm slender grama | F. Smith, W. Ocumpaugh, P. Maywald, J. Lloyd-Reilley, S. Maher, and K. Pawelek |

**New Release for STPMC in FY 2010**
Webb Germplasm whiplash pappusgrass
Maverick Germplasm pink pappusgrass

**Other Active Releases for STPMC**
Zapata Germplasm Rio Grande clammyweed
STN-561 Germplasm Hookers plantain
STN-496 Germplasm redseed plantain
Goliad Germplasm orange zexmenia
Chaparral Germplasm hariy grama
Atascosa Germplasm Texas grama
Dilley Germplasm slender grama
La Salle Germplasm Arizona cottontop
Mariah Germplasm hooded windmillgrass
Welder Germplasm shortspike windmillgrass
PMC-648 Germplasm plains bristlegrass
PMC-677 Germplasm streambed bristlegrass
PMC-819 Germplasm streambed bristlegrass
PMC-820 Germplasm streambed bristlegrass
Lavaca Germplasm Canada wildrye
Kinney Germplasm two-flower trichloris
Falfurrias Germplasm big sacaton