E. “Kika” de la Garza Plant Materials Center

2009 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 – 2009 seed release Zapata Germplasm Rio Grande clammyweed; UR – seed collection training; LL – the endangered species slender rush pea; LR – 2009 seed releases comprising the Divot Tallowweed blend. Photography by Shelly D. Maher, PMC Assistant Manager & Forrest Smith, South Texas Natives Coordinator.

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E. "Kika" de la Garza Plant Materials Center

2009 Annual Technical Report

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2009 Annual Technical Report
Kika de la Gaza Plant Materials Center, Kingsville, Texas

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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

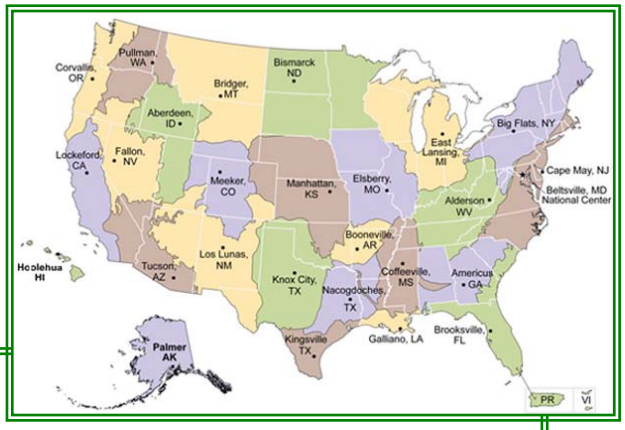
Our PMC would like to acknowledge the efforts of our many partners and cooperators who have contributed to our projects and accomplishments this year:

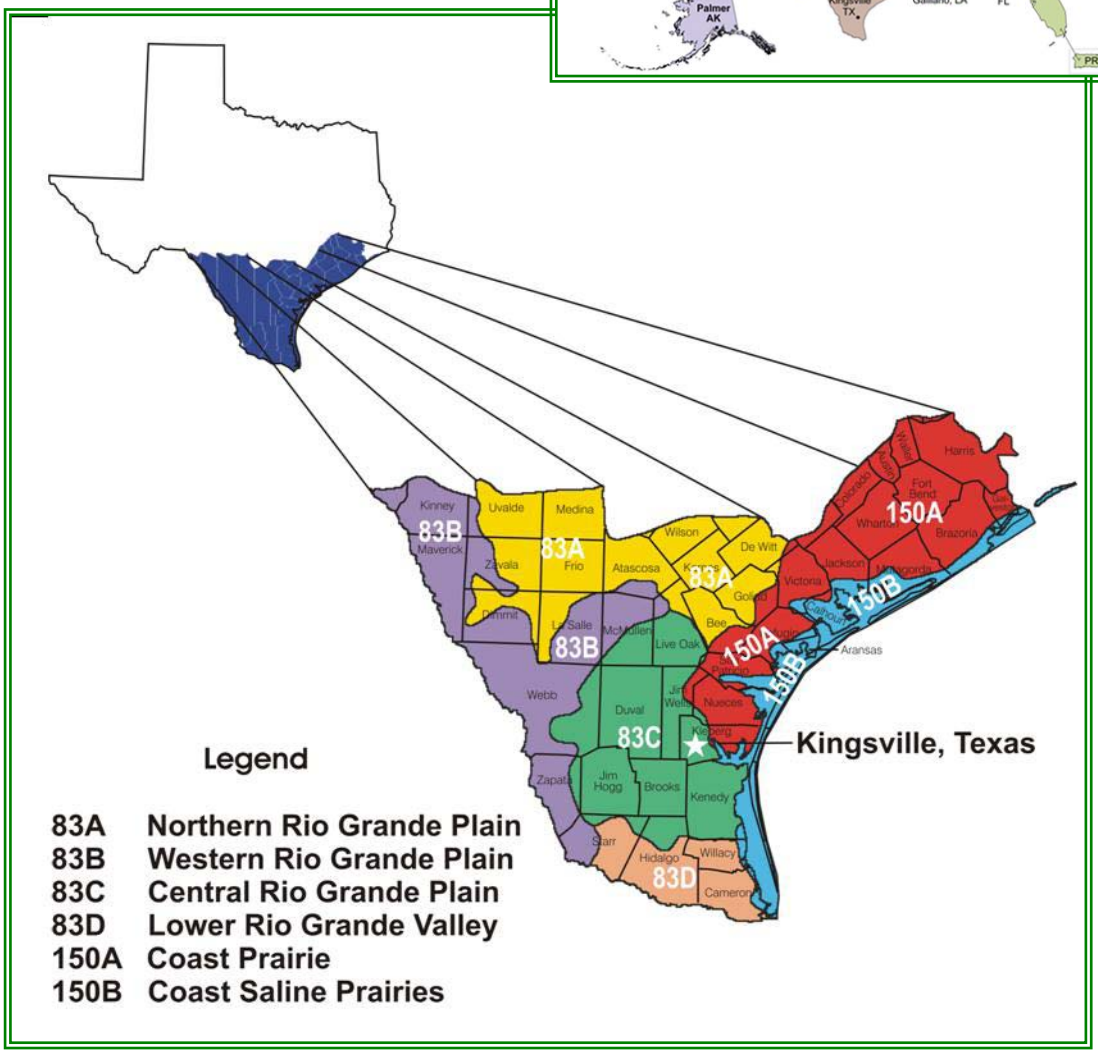
- Dr. Allen Rasmussen and the Department of Agriculture & Human Science, Texas A&M-Kingsville
- Fred Bryant and the Caesar Kleberg Wildlife Research Institute
- Forrest Smith and South Texas Natives
- The King Ranch
- East Texas Plant Materials Center
- James E. “Bud” Smith Plant Materials Center
- Scott Alford, USDA NRCS, Baytown
- Houston Audubon Society
- Dennis Markwardt, Texas Department of Transportation
- Dr. James Grichar and Jeff Rahmes, Texas AgriLife Research Beeville
- Dr. Shad Nelson, Texas A&M University-Kingsville
- Dr. Byron Burson, USDA-ARS
- Dr. Valerie Hipkins, US Forest Service, National Forest Genetics Laboratory
- Dr. Tim Fulbright, Texas A&M University-Kingsville
- Dr. Terry Blankenship and the Welder Wildlife Refuge
- Chad Stinson and the Aransas Wildlife Refuge
- USFWS – Chris Best, Robyn Cobb, and Tim Anderson
- 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.





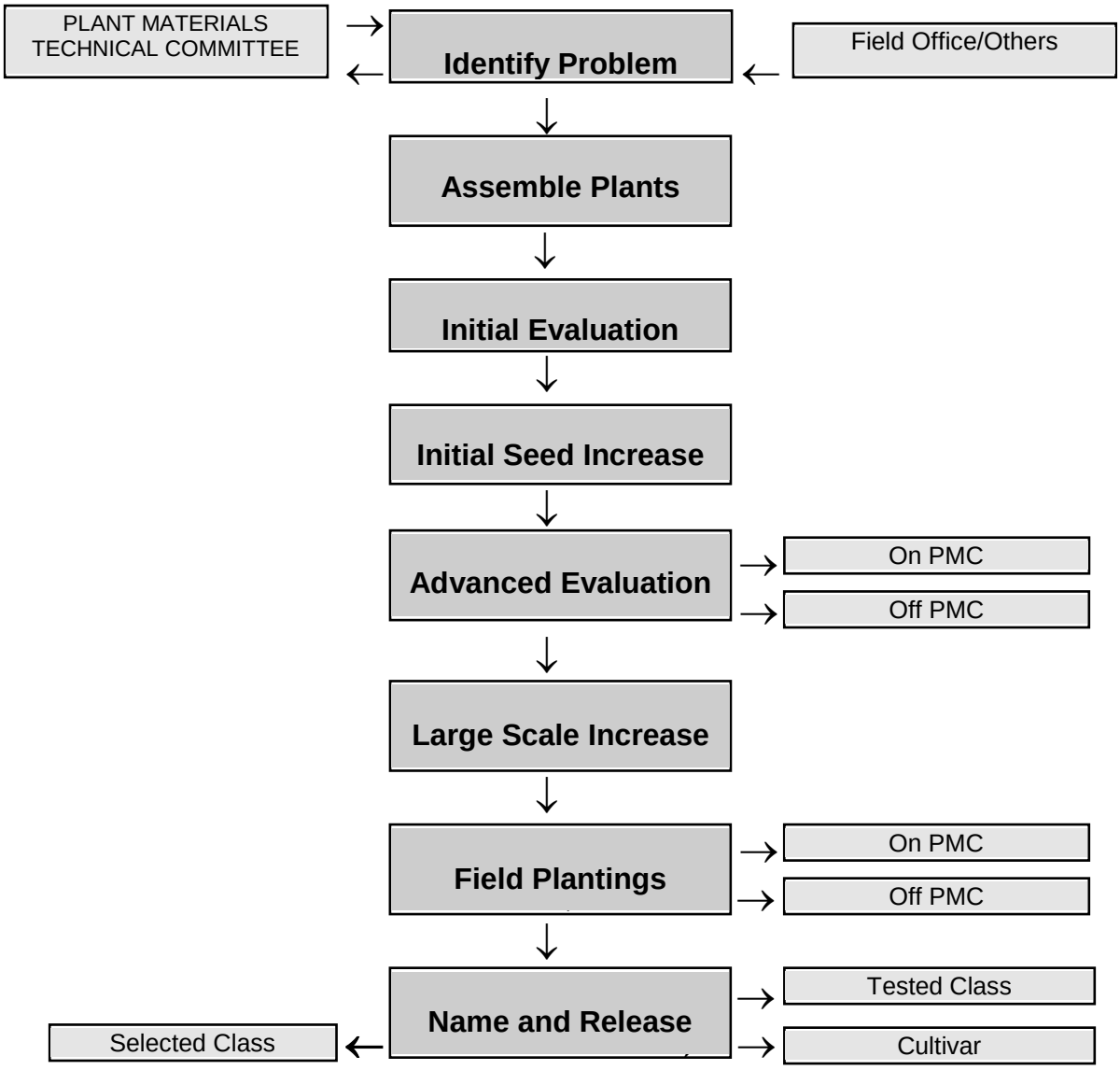
CLIMATE DATA

	TEMPERATURE (°F)				RAINFALL (inches)	
MONTH	**HISTORICAL AVG.**	**2009 MONTHLY AVG.**	**2009 MAX**	**2009 MIN**	**HISTORICAL AVG.**	**2009 MONTHLY TOTAL**
JANUARY	56.8	59.0	83	31	1.71	0.00
FEBRUARY	60.2	65.6	90	30	1.62	0.07
MARCH	66.9	66.8	93	34	0.86	0.43
APRIL	73.4	75.0	96	45	1.50	0.12
MAY	78.4	81.1	99	59	2.58	1.48
JUNE	82.9	85.0	99	66	3.05	0.65
JULY	84.9	87.9	102	73	2.13	0.00
AUGUST	84.9	87.6	101	72	2.72	1.10
SEPTEMBER	81.3	81.3	96	61	4.47	9.82
OCTOBER	73.8	75.5	96	45	3.17	1.25
NOVEMBER	65.0	64.9	84	38	1.26	1.70
DECEMBER	58.8	52.8	80	32	1.13	4.09
				TOTAL	**26.20**	**20.71**

* 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

Initial 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.

STPMC-P-0121-RA Pink Pappusgrass (*Pappohporum bicolor*)
In seed increase for 2009. Should be released in 2010.

STPMC-P-0348-RA Engelmann's Daisy (*Engelmannia peristenia*) [syn. *E. pinnatifida*]
Waiting for more seed collections.

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

STPMC-P-0351-RA White Prairie Clover (*Dalea candida*)
Waiting for more seed collections.

STPMC-P-0355-RA Prairie Acacia (*Acacia angustissima*)
In seed increase for 2009. Should be released in 2011 or 2012.

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

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. In July 2009, a cold tolerance plot was planted at the PMC in Nacogdoches, Texas. This species will be released 2011.

Seed harvested on July 17, 2008 from an increase plot of acc 8252 was germination tested in June 2009. It had a germination rate of 30%. Seed harvested from the IEP in May and September of 2007 was germination tested in September 2009 (Tables 1&2). The May harvest had germination rates ranging from 48-87.3%. The September harvest ranged from 12-60%. For every accession, the seed harvested in May had a higher germination rate.

Crown Node Elongation Evaluation:
From November 2008 till March 2009, twenty-two accessions were screened in a growth chamber for internode elongation in an effort to select for drought tolerance. All plants of all accessions elongated, thus there is no opportunity for selection. (See technology project for more information.)

Table 1. Study 77IO16H Four Flower Trichloris May 24, 2007 Harvest Germination

Block E (clay soil)

Accession Number	Origin (County)	Date Harvested	Grams Harvested	3 Days %	7 Days %	28 Days %
9038717	Jim Wells	5/24/07	sample	49.3	61.3	62.0
8252	Willacy	5/24/07	sample	52.0	64.0	68.0
9045782	Starr	5/24/07	sample	48.7	66.7	71.3
9064432	Starr	5/24/07	sample	48.0	59.3	66.7
9052756	Duval	5/24/07	sample	46.7	61.3	64.0
9043300	Frio	5/24/07	sample	46.0	51.3	54.7
9043207	La Salle	5/24/07	sample	40.0	60.7	65.3
9043279	Cameron	5/24/07	sample	37.3	50.7	61.3
9045811	Karnes	5/24/07	sample	39.3	56.7	62.0
9089091	Dimmit	5/24/07	sample	50.7	66.7	70.0
9090655	Live Oak	5/24/07	sample	60.0	70.0	76.0
9090721	Wilson	5/24/07	sample	50.0	72.0	74.0
9091844	Hidalgo	5/24/07	sample	55.3	85.3	86.0
9086181	Jim Wells	5/24/07	sample	44.0	58.0	68.0
9086182	Zavala	5/24/07	sample	44.7	56.0	57.3
9086184	Jim Wells	5/24/07	sample	49.3	56.7	57.3
9086185	Jim Wells	5/24/07	sample	56.0	77.3	80.7
9086186	Jim Wells	5/24/07	sample	53.3	64.0	67.3
9091809	Jim Hogg	5/24/07	sample	54.7	70.7	74.0
9090594	Maverick	5/24/07	sample	50.7	55.3	60.0
9090579	La Salle	5/24/07	sample	44.0	60.0	63.3
9088772	Webb	5/24/07	sample	53.3	63.3	64.0
9090364	Willacy	5/24/07	sample	54.7	60.0	66.0
9090413	Medina	5/24/07	sample	27.3	44.0	48.0
9091884	Brooks	5/24/07	sample	40.0	63.3	72.7
9090315	Wilson	5/24/07	sample	42.7	66.7	71.3
9093192	Webb	5/24/07	sample	66.0	72.7	75.3
9090281	Hidalgo	5/24/07	sample	48.0	62.0	68.0
9091883	Kenedy	5/24/07	sample	27.3	80.0	87.3
9088560	Dimmit	5/24/07	sample	48.0	66.0	70.7
9089128	Medina	5/24/07	sample	53.3	75.3	77.3
9090548	Duval	5/24/07	sample	56.0	68.0	77.3
9086211	Kleberg	5/24/07	sample	63.3	76.0	80.0
9086212	Kleberg	5/24/07	sample	54.0	73.3	74.7

***3 reps of 50 seeds each at 12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)
Accessions chosen for seed release.

Table 2. Study 77IO16H Four Flower Trichloris September 27, 2009 Harvest Germination

Block E (clay soil)

Accession Number	Origin (County)	Date Harvested	Grams Harvested	3 Days %	7 Days %	28 Days %
9038717	Jim Wells	9/27/07	sample	19.3	24.0	32.7
8252	Willacy	9/27/07	sample	26.0	38.0	48.0
9045782	Starr	9/27/07	sample	22.7	40.0	51.3
9064432	Starr	9/27/07	sample	33.3	42.7	52.0
9052756	Duval	9/27/07	sample	16.7	38.7	47.3
9043300	Frio	9/27/07	sample	7.3	12.0	25.3
9043207	La Salle	9/27/07	sample	14.7	28.7	34.0
9043279	Cameron	9/27/07	sample	5.3	14.0	38.0
9045811	Karnes	9/27/07	sample	7.3	20.7	30.0
9089091	Dimmit	9/27/07	sample	9.3	13.3	18.7
9090655	Live Oak	9/27/07	sample	14.0	28.0	51.3
9090721	Wilson	9/27/07	sample	16.7	36.0	40.7
9091844	Hidalgo	9/27/07	sample	28.7	46.0	58.7
9086181	Jim Wells	9/27/07	sample	2.7	8.0	12.0
9086182	Zavala	9/27/07	sample	5.3	11.3	25.3
9086184	Jim Wells	9/27/07	sample	16.0	29.3	38.0
9086185	Jim Wells	9/27/07	sample	11.3	31.3	57.3
9086186	Jim Wells	9/27/07	sample	12.0	28.0	33.3
9091809	Jim Hogg	9/27/07	sample	15.3	28.7	43.3
9090594	Maverick	9/27/07	sample	16.7	24.0	28.0
9090579	La Salle	9/27/07	sample	3.3	10.0	14.7
9088772	Webb	9/27/07	sample	6.0	11.3	27.3
9090364	Willacy	9/27/07	sample	8.7	25.3	40.0
9090413	Medina	9/27/07	sample	11.3	15.3	28.7
9091884	Brooks	9/27/07	sample	9.3	20.7	34.7
9090315	Wilson	9/27/07	sample	20.7	30.0	48.7
9093192	Webb	9/27/07	sample	10.0	19.3	32.0
9090281	Hidalgo	9/27/07	sample	14.0	33.3	46.0
9091883	Kenedy	9/27/07	sample	13.3	28.7	60.0
9088560	Dimmit	9/27/07	sample	13.3	18.7	39.3
9089128	Medina	9/27/07	sample	15.3	22.7	35.3
9090548	Duval	9/27/07	sample	8.7	14.7	41.3
9086211	Kleberg	9/27/07	sample	16.7	31.3	42.0
9086212	Kleberg	9/27/07	sample	18.7	32.7	48.0

***3 reps of 50 seeds each at 12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)
Accessions chosen for seed release.

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. Germination ranged from 52-82% (Table 1). These accessions will be planted for initial evaluation in early spring 2010.

Table 1. Study 77IO23HR - Virginia Wildrye

Greenhouse Germination Winter 2009

Accession Number	Origin (County)	15 Days %	30 Days %	60 Days %
9086125	Colorado	76.8	77.0	77.0
9093329	Fort Bend	71.8	73.5	70.0
9093396	Calhoun	81.3	83.0	81.5
9093447	Jim Wells	51.8	52.5	51.8
9093508	Victoria	19.8	47.3	46.5
9093518	DeWitt	81.5	82.3	82.0
9093526	Calhoun	65.0	70.5	69.3
9093545	Matagorda	79.5	79.8	75.3

***Germination count based number of seeds planted.

Study Number: 77IO28CL

Study Title: Assembly and Evaluation of Seacoast Bluestem (*Schizachyrium littorale*)

Introduction: Seacoast bluestem (*Schizachyrium littorale*) is a native, perennial, rhizomatous, warm-season grass. Its previous scientific name, *Schizachyrium scoparium* var. littoralis, described it simply as a variation of little bluestem. It has previously been included under the genus Andropogon as *Andropogon littoralis* Nash (Gould,1975) and *Andropogon scoparium* var. littoralis (Nash) Hitchc. (Correl & Johnston,1996). Although currently treated as its own genus, Schizachyrium is closely related to the genus Andropogon. It has been separated mainly on the basis of a single rachis per inflorescence, as opposed to at least two in the Andropogon. Other close relatives include the genera *Dichanthium* and *Bothriochloa* (Correl & Johnston, 1996). All four genera bear the common name of Bluestem (Gould 1975). This presence of rhizomes is what most easily identifies it from little bluestem. The inflorescence blooms mainly from August to December and consists of numerous racemes 2.5-5 cm long (Gould, 1975).

Seacoast bluestem can be found along sandy shorelines of Lake Ontario in Canada, on sandy shores of Massachusetts and New York, south to North Carolina, along the sand dunes of Lake Michigan in Ohio and Indiana, and along the sandy gulf coast of South East Texas (Hitchcock, 1971). In Texas, it has also been known to grow as far inland as Jim Hogg county, and is common on the sandy shores of the barrier islands of the gulf coast south into Mexico (Correl & Johnston, 1996). It occurs in deep sand in the Gulf Prairies and Marshes and South Texas Plain regions of Texas, and is common on coastal sands near sea level in southern Texas (Gould, 1975).

Seacoast bluestem is usually the dominant forage grass throughout the Texas Coastal Prairie (Hutch, Schuster & Drawe, 1999). It provides good quality forage for livestock, poor forage for wildlife, but provides good cover (Hutch, Schuster & Drawe, 1999).

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 seacoast bluestem. Seacoast bluestem collections will be evaluated for adaptation in two South Texas Ecoregions: the sandy soil region known as the South Texas Sand Plain and the region along the Texas coast known as the Texas Coastal Prairie.

Discussion: At the end of 2007, there were eleven accessions of seacoast bluestem planted in the Texas Coastal Prairie Ecotype field plot, ten accessions in the South Texas Sand Plain Ecotype field plot, and seven accessions in a plot labeled “unknown bluestem”. No new accessions were added in 2008 or 2009. The plots were not evaluated in 2008. On March 10, 2009 the plots were evaluated for early greenup. None of the accessions in any plot were showing greenup. In August 18, 2009 all plots were evaluated for drought tolerance due to low rainfall. All plants in all plots were very short and dry. Seed fill is the main concern with this species.

Seed harvested from the South Texas Sand Plain Ecotype field plot in November of 2007 was germination tested in October of 2009 (Table 1). Many accessions had low germination (most likely due to poor seed fill), but several had germination ranging from 15-37%.

Table 1. Study 77IO28CL Seacoast Bluestem 2007 Harvest Germination

Texas Coastal Prairie Ecotype - PMC (clay soil)

Accession Number	Species	Origin (County)	Date Harvested	Grams Harvested	3 Days %	7 Days %	28 Days %
9064474	Seacoast	DeWitt	11/09/07	sample	0.0	0.7	0.7
9064461	Seacoast	Zavala	11/09/07	sample	0.0	0.0	2.7
9090280	Seacoast	Brooks	11/09/07	sample	0.0	3.3	24.0
9086171	Seacoast	Kenedy	11/09/07	sample	0.0	21.3	28.7
9090351	Seacoast	Willacy	11/09/07	sample	0.0	5.3	24.0
9086173	Seacoast	Kenedy	11/09/07	sample	0.0	3.3	6.7
9086174	Seacoast	Kenedy	11/09/07	sample	0.7	20.7	37.3
9090349	Seacoast	Willacy	11/09/07	sample	0.0	2.7	30.0
9091805	Unknown	Jim Hogg	11/09/07	sample	0.0	5.3	7.3
9090346	Unknown	Jim Hogg	11/09/07	sample	0.0	0.7	4.7
9091812	Unknown	Jim Hogg	11/09/07	sample	0.0	0.7	2.7
9086180	Unknown	Jim Wells	11/09/07	sample	0.0	4.7	5.3
9090464	Unknown	Jim Wells	11/09/07	sample	0.0	9.3	24.7
9090262	Unknown	Brooks	11/09/07	sample	0.0	0.0	14.7
9090280	Unknown	Brooks	11/09/07	sample	0.0	1.3	15.3

***12 hours dark 20°C (68°F) / 12 hours light 30°C (86°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 (Table 1). Two more collections of this species were made in 2008 from Cameron and Willacy counties. These were seeded in the greenhouse in March 2009 (Table 2) and planted in the field in June 2009. Samples of this species will be sent off for a toxicology evaluation in 2010. 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 including: indigo (*Indigofera suffruticosa*), Lindheimer's senna (*Senna lindheimeriana*), Parry's holdback (*Pomaria melanosticta*), and tall lespedeza (*Lespedeza stuevei*). These were planted into the field in May 2009. Due to a dry summer, survival of some accessions was low. The plot was evaluated in November 2009 (Table 3). Parry's holdback and tall lespedeza were determined to be too small to compete well with weeds and be easy to produce. Lindheimers senna showed promise, but is reported to be unpalatable. Indigo will be planted again in 2010 and sent for a toxicology evaluation.

Table 1. Study 77I050JH Low Prairie Clover November 2008 Harvest Germination

Accession Number	Origin (County)	Date Harvested	Pounds Harvested	Scarifi-cation	3 Days %	7 Days %	28 Days %
9090731	Hidalgo	11-26-08	3.8	0-sec	0.3	8.8	52.3
				5-sec	78.0	80.0	80.5
9093417	Nueces	11-25-08	12.2	0-sec	1.8	9.0	37.0
				5-sec	80.0	84.5	86.0

***12 hours dark 16°C (60°F) / 12 hours light 30°C (86°F)

Table 2. Study Study 77I050JH - Low Prairie Clover

Greenhouse Germination Spring 2009

Accession Number	Origin (County)	15 Days %	30 Days %	45 Days %
9093497	Cameron	31.0	32.5	34.0
9093504	Willacy	57.0	62.5	63.0

***Germination count based number of seeds planted.

Table 3. Study Study 77I050JH - Observation Species

Greenhouse Germination Spring 2009

Species	Accession Number	Origin (County)	15 Days %	30 Days %	45 Days %
Indigo	9093475	San Patricio	92.5	92.5	92.5
Indigo	9093476	Bandera	62.5	62.5	62.5
Lindheimer's Senna	9093478	Brewster	82.5	82.5	82.5
Lindheimer's Senna	9093492	Hays	27.5	37.5	45.0
Parry's Holdback	9093477	Brewster	72.5	72.5	72.5
Tall Lespedeza	9093489	Bastrop	35.0	35.0	35.0
Tall Lespedeza	9093490	Bastrop	0	0	0
Tall Lespedeza	9093491	Bexar	72.5	52.5	52.5

***Germination count based number of seeds planted.
All accessions scarified 1 second in a sandpaper drum seed scarifier, except 9093490.

Table 4. Study Study 77I050JH - Observation Species

Field Evaluation November 2009

Species	Accession Number	Origin (County)	# Planted	# Survived	Notes
Indigo	9093475	San Patricio	20	20	all green
Indigo	9093476	Bandera	20	20	taller, but yellowed
Lindheimer's Senna	9093478	Brewster	20	20	good seed
Lindheimer's Senna	9093492	Hays	16	16	good seed
Parry's Holdback	9093477	Brewster	20	0	all dead
Tall Lespedeza	9093489	Bastrop	14	4	very small
Tall Lespedeza	9093490	Bastrop	0	0	not planted
Tall Lespedeza	9093491	Bexar	20	2	very small

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, South Texas Natives (STN) will try 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.

Seed harvested in 2005 from a small increase plot of 9085381-Hidalgo was germination tested in September of 2009 (Table 1). All harvests exhibited hard seed dormancy and low germination (<10%), but were all increased significantly (80.7-89.3%) with 5 seconds of scarification in a sandpaper drum.

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.

A collection of an unknown *Desmanthus* species was recieved in 2008 and seeded in the greenhouse in March 2009. It had 24% germination in 15 days with scarification. It was planted into an observation plot in May 2009. It had poor survival under drought conditions (2 of 13 alive by November 2009). Eleven accessions of Illinois bundleflower were received in 2009 and will be planted in the greenhouse in the spring of 2010.

Table 1. Study P-0134- WLRA Desmanthus 2005 Seed Increase Harvest Germination

Accession Number	Origin (County)	Date Harvested	Grams Harvested	Scarifi-cation	3 Days %	7 Days %	28 Days %
9085381	Hidalgo	8-9-05	19.4	0-sec	0.0	2.7	4.7
				5-sec	22.0	80.7	80.7
9085381	Hidalgo	8-24-05	44.7	0-sec	0.7	2.0	2.7
				5-sec	82.7	87.3	87.3
9085381	Hidalgo	9-28-05	0.4	0-sec	4.0	8.0	8.0
				5-sec	68.0	88.0	88.0
9085381	Hidalgo	12-13-05 (vac off mat)	40.0	0-sec	5.3	5.3	6.7
				5-sec	60.0	89.3	89.3

***12 hours dark 16°C (60°F) / 12 hours light 30°C (86°F)

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:

Thirty new accessions were received in 2008 for the Rio Grande Plain ecoregion. Throughout the spring and summer of 2008, the seed nursery included 194 collections representing 16 species of the Rio Grande Plain ecoregion. The seed nursery included the following species in 2008: four-flower trichloris, silver bluestem, Hall's panicum, green sprangletop, sideoats grama, Texas wintergrass, Engelmann's daisy, frostweed, switchgrass, big bluestem, little bluestem, Indiangrass, and Apache plume. The IEP plots of four-flower trichloris, silver bluestem, Hall's panicum were discontinued at the end of 2008 due to these species being moved into seed increase.

In March 2009, nine accessions of Maximilain sunflower (*Helianthus maximiliani*), six accessions of swamp sunflower (*Helianthus angustifolius*), and three accessions of compass plant (*Silphium integrifolium*) were seeded in the greenhouse (Table 1). All of these accessions were planted into an observation plot in May of 2009. Due to a summer drought and high winds, survival of many accessions was poor. The plot was evaluated in November 2009 (Table 2). The compass plants had less biomass, height, and seed production than desired. The Maximilain sunflower and swamp sunflower will be planted again in 2010 for evaluation.

Throughout the spring and summer of 2009, the seed nursery included 12 species for the Rio Grande Plain ecoregion: green sprangletop, sideoats grama, Engelmann's daisy, frostweed, switchgrass, big bluestem, little bluestem, Indiangrass, Maximilain sunflower, swamp sunflower, and compass plant. Seventeen new accessions were received in 2009 for the Rio Grande Plain ecoregion.

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

Greenhouse Germination Spring 2009

Species	Accession Number	Origin (County)	15 Days %	30 Days %	45 Days %
Maximilain sunflower	9093406	Collingsworth	17.5	17.5	17.5
Maximilain sunflower	9093407	Hays	2.5	2.5	2.5
Maximilain sunflower	9093445	Wharton	10.0	10.0	10.0
Maximilain sunflower	9093465	Washington	56.3	56.3	56.3
Maximilain sunflower	9093484	Comal	50.0	51.3	51.3
Maximilain sunflower	9093485	Comal	70.0	70.0	70.0
Maximilain sunflower	9093486	Hays	22.5	22.5	22.5
Maximilain sunflower	9093487	Kendall	71.3	72.5	72.5
Maximilain sunflower	9093488	Blanco	51.3	52.5	52.5
Swamp sunflower	9093496	Matagorda	66.3	67.5	67.5
Swamp sunflower	9093498	Matagorda	43.8	51.3	51.3
Swamp sunflower	9093499	Matagorda	20.0	20.0	21.3
Swamp sunflower	9093500	Matagorda	2.5	3.8	3.8
Swamp sunflower	9093501	Brazoria	40.0	46.3	46.3
Swamp sunflower	9093502	Brazoria	36.3	40.0	40.0
Compass plant	9093470	Goliad	12.5	12.5	-
Compass plant	9093471	Goliad	80.0	80.0	-
Compass plant	9093472	San Patricio	22.5	30.0	-

***Germination count based number of seeds planted.

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

Field Evaluation November 2009

Species	Accession Number	Origin (County)	# Planted	# Survived	Notes
Maximilain sunflower	9093406	Collingsworth	5	4	fungi & seed gone
Maximilain sunflower	9093407	Hays	2	2	fungi & seed gone
Maximilain sunflower	9093445	Wharton	8	6	lodging, but more biomass
Maximilain sunflower	9093465	Washington	20	17	lodging
Maximilain sunflower	9093484	Comal	20	18	3 still vertical
Maximilain sunflower	9093485	Comal	20	19	lodging
Maximilain sunflower	9093486	Hays	17	15	1 still vertical
Maximilain sunflower	9093487	Kendall	20	16	lodging
Maximilain sunflower	9093488	Blanco	20	16	lodging
Swamp sunflower	9093496	Matagorda	20	0	-
Swamp sunflower	9093498	Matagorda	20	0	-
Swamp sunflower	9093499	Matagorda	15	10	lodging
Swamp sunflower	9093500	Matagorda	4	3	lodging
Swamp sunflower	9093501	Brazoria	20	0	-
Swamp sunflower	9093502	Brazoria	20	10	lodging
Compass plant	9093470	Goliad	5	2	2 still rosette
Compass plant	9093471	Goliad	20	11	3 flowering, 8 rosette
Compass plant	9093472	San Patricio	13	4	wrong species

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, eco-typic 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 March 2009, 1 new accession of yellow Indiangrass, 2 big bluestem, 2 little bluestem, 1 switchgrass, and 2 sideoats grama 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 2009, 18 additional collections were received representing 6 of the selected species.

In January 2009, the 2006 harvest of 2 accessions of blackeyed Susan was germination tested. Both accessions had active germination despite the harvest being 3 years old. A large scale evaluation of blackeyed Susan is planned for 2010.

Table 1. STPMC-P-0138- RA Texas Coastal Prairie Ecotype Project

Blackeyed Susan Harvest Germination
Block B (clay soil)

Accession Number	Origin (County)	Date Harvested	Grams Harvested	7 Days %	14 Days %	28 Days %
9093299	Fort Bend	11-17-06	15g	30.0	36.0	36.0
9090600	Atascosa	11-17-06	11g	42.0	48.7	50.0

***3 reps of 50 seeds each at 12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

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 March 2009, trays were seeded in the greenhouse to add to the seed increase plots of 9089159-Cameron and 9085421-Nueces. These seed increase plots were expanded in the summer of 2009. This species should be released in 2011 or 2012.

In September 2009, the 2005 IEP seed harvest was germination tested (Table 1). In February 2009, the 2008 harvests of the seed increase plots were germination tested (Table 2). Summer harvests appear to have higher active germination than fall harvests.

Table 1. STPMC-P-0139- RA Hall's Panicum

IEP Harvest Germination
Block C (clay soil)

Accession Number	Origin (County)	Date Harvested	Grams Harvested	7 Days %	14 Days %	28 Days %
9091840	Zapata	8-24-05	1.07g	94	94	94
9091840	Zapata	9-28-05	2.25g	42	45	46
9091840	Zapata	9-28-05 & 12-15-05 mixed	2.00g	91	92	92
9093179	Bexar	12-15-05	0.06g	90	90	90
9085327	Uvalde	12-15-05	0.87g	93	93	93
9090675	Maverick	12-15-05	<1g	12	12	12

***3 reps of 50 seeds each at 12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

Table 2. STPMC-P-0139- RA Hall's Panicum

Seed Increase Harvest Germination

Accession Number	Origin (County)	Date Harvested	Pounds Harvested	3 Days %	7 Days %	28 Days %
9089159	Cameron	05-21-08	1.35	48.0	64.5	67.3
9089159	Cameron	05-30-08	0.11	31.0	47.3	52.0
9089159	Cameron	07-15-08	0.17	16.3	24.3	25.3
9089159	Cameron	09-03-08	1.45	14.8	23.0	24.3
9089159	Cameron	10-22-08	0.85	30.5	46.0	48.8
9085421	Nueces	05-29-08	1.02	44.8	67.3	71.8
9085421	Nueces	07-14-08	0.11	19.8	48.0	51.5
9085421	Nueces	09-03-08	0.77	20.3	39.3	41.0
9085421	Nueces	10-22-08	0.27	16.3	26.0	26.8

***3 reps of 50 seeds each at 12 hours dark 20°C (68°F) / 12 hours light 30°C (86°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 2009, the seed nursery included 5 species for the South Texas Sand Plain ecoregion. The IEP plot of Hall's panicum was discontinued at the end of 2009 as it was moved into seed increase. No new collections were seeded for the South Texas Sand Plain ecoregion in 2009. The seed nursery will continue to expand as more collections are received.

In June 2009, the 2006 harvest of Blackfoot daisy (*Melampodium cinerum*) and the 2007 harvest of wild buckwheat (*Erigonum multiflorum*) were germination tested (Tables 1 & 2). Seeds showed some active germination despite being 3 years old. Information for yellow Indiangrass, big bluestem, little bluestem, switchgrass, and gayfeather is discussed under the individual species' project.

Table 1. STPMC-P-0140- RA South Texas Sand Plain Ecotype Project

Blackfoot Daisy - IEP Harvest Germination

Accession Number	Origin (County)	Date Harvested	Grams Harvested	3 Days %	14 Days %	28 Days %
9090490	Jim Hogg	4-18-06	1.7g Bk.C	0.7	2.0	2.0
9090490	Jim Hogg	11-17-06	0.7g Bk.C	33.7	44.7	44.7
9090490	Jim Hogg	11-27-06	0.4g Annex	7.3	14.0	14.0

***3 reps of 50 seeds each at 12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

Table 2. STPMC-P-0140- RA South Texas Sand Plain Ecotype Project

Wild Buckwheat - IEP Harvest Germination

Accession Number	Origin (County)	Date Harvested	Grams Harvested	7 Days %	14 Days %	28 Days %
9093366	Nueces	11-8-07	24	1.3	6.7	14.0
9093366	Nueces	11-21-07	5	1.3	11.3	20.0

***3 reps of 50 seeds each at 12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

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. In June 2009, the 2008 harvest of the 9086217 seed increase plot was germination tested, but had only 3.5% germination by day 28. This is likely due to low seed fill.

A cold tolerance test of the five selected accessions was also planted at the East Texas PMC in July 2009. This plot will be monitored for survival and vigor over two winters.

Study Number: STPMC-P-0346- RA

Study Title: Assembly and Evaluation of Frostweed (*Verbesina microptera*)

Introduction: Frostweed (*Verbesina microptera*), also known as capitana and crownbeard, is a common, native, cool-season, perennial forb. An attractive member of the sunflower family (Asteraceae), it grows approximately 1.2 m tall blooming from September to November (Jones, 1982). Its bright white flowers, which attract numerous butterflies, and hardiness in dry conditions make it an attractive plant for landscape use. In the field, it is often browsed by deer and cattle (Everitt, Drawe, and Lonard, 1999). It is abundant on loamy soil in parts of Texas and north eastern Mexico. In Texas, it is found along the southern portion of the Edwards Plateau, the Rio Grande Plain, and less frequently in the southern portions of the east and south east regions of Texas (Correll and Johnston, 1996).

Problem: There is a need for perennial forbs 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 frostweed. Frostweed collections will be evaluated for adaptation in the broad mixed soil region known as the Rio Grande Plain.

Discussion: At the end of 2008 there were twelve accessions of frostweed in a Rio Grande Plain ecotype plot. One new accession was received in 2008 and was seeded in the greenhouse in March 2009 (Table 1). It was added to the field plot in June 2009. A drought tolerance evaluation was done in August 2009. All accessions of frostweed in the plot were very small and dry. This project is on hold until collections are recieved from more counties.

Table 1. Study STPMC-P-0346- RA Frostweed

Greenhouse Germination Spring 2009

Accession Number	Origin (County)	15 Days %	30 Days %
9093503	Willacy	9.0	12.0

***Germination count based number of seeds planted.

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 2008, there were 29 accessions in the Rio Grande Ecotype plot, 2 accessions at the Annex in the South Texas Sand Plain Ecotype 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 March 2009, two new and one replant accession were planted in the greenhouse (Table 1). An early greenup evaluation was also conducted in March 2009. All sideoats grama accessions in the Rio Grande Ecotype plot and South Texas Sand Plain Ecotype plot were green, but there were no real notable differences among accessions. In the cultivar plot, Pogue, Premier and Haskell were green, but El Reno and Niner were not. In June 2009, one accession was used to start a Gulf Coast Prairie plot and replants were added to an accession
n in the Rio Grande Ecotype plot. No seed was harvested in 2009. The 2008 seed harvest will be germination tested in 2010. The Rio Grande Ecotype plot and South Texas Sand Plain Ecotype plot were evaluated for drought resistance in August 2009. Most accessions were dry with a little green in the centers of the plants. Three accessions (9086200, 9088685, and 9090651) had poor survival. Ten accessions were producing a small quantity of seed despite the dry conditions (9086152, 9088634, 9089065, 9088948,9089187, 9090389, 9090408, 9088541, 9091894, and 9090392). In the cultivar plot, Pogue and Premier were dry with some green in the centers and producing some seed. El Reno, Haskell, and Niner were very dry with only a few seedheads.

***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 2011 or 2012.

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

Greenhouse Germination Spring 2009

Accession Number	Origin (County)	15 Days %	30 Days %
9093432	San Patricio	6.3	5.3
9093446	Victoria	0	0
9093405	Webb (replants)	6.8	7.5

***Germination count based number of seeds planted.

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 2008 there were 20 accessions in the Texas Coastal Prairie plot, 8 in the Rio Grande Plain plot, and 13 in the South Texas Sand Plain plot. The seed harvested in December 2008 from the Rio Grande Plain and South Texas Sand Plain plots was germination tested in September 2009 (Table 1 & 2). Several accessions had much higher germination than has been seen from this species in the past.

In March 2009, two new accessions were seeded in the greenhouse (Table 3). One accession was added to the Texas Coastal Prairie plot in June 2009. All three plots were evaluated for early greenup in March 2009 and drought resistance in August 2009 (Tables 4-6). No seed was harvested in 2009.

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 - 2008 Harvest Germination

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

Accession Number	Origin (County)	Date Harvested	Grams Harvested	3 Days %	7 Days %	28 Days %
9086226	Goliad	12-9-08	sample	0.0	2.0	2.7
9090265	Goliad	12-9-08	sample	0.0	2.7	2.7
9086169	Kenedy	12-9-08	sample	0.0	1.3	3.3
9086164	Kenedy	12-9-08	sample	0.0	7.3	8.0
9089235	Brooks	12-9-08	sample	0.0	2.0	2.7
9089228	Kenedy	12-9-08	sample	0.0	4.0	6.7
9086165	Kenedy	12-9-08	sample	0.0	4.7	5.3
9093238	Goliad	12-9-08	sample	0.0	2.7	4.7

***12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

Table 2. Study STPMC-P-0350- RA Big Bluestem - 2008 Harvest Germination

South Texas Sand Plain Ecotype – PMC Annex (sandy soil)

Accession Number	Origin (County)	Date Harvested	Grams Harvested	3 Days %	7 Days %	28 Days %
9086164	Kenedy	12-9-08	sample	0.0	10.7	11.3
9086169	Kenedy	12-9-08	sample	0.0	10.7	11.3
9090276	Kleberg	12-9-08	sample	0.0	12.7	13.3
9090263	Kleberg	12-9-08	sample	0.0	3.3	4.0
9089228	Kenedy	12-9-08	sample	0.0	14.7	16.7
9090752	Kleberg	12-9-08	sample	2.0	26.7	28.0
9093239	Kenedy	12-9-08	sample	0.0	34.7	35.3
9093240	Kenedy	12-9-08	sample	0.0	4.0	4.0
9093242	Kenedy	12-9-08	sample	0.7	10.0	10.7
9093237	Kenedy	12-9-08	sample	0.0	4.7	5.3
9093243	Brooks	12-9-08	sample	0.0	0.7	0.7
9093244	Kenedy	12-9-08	sample	0.0	7.3	8.0
9090757	Kleberg	12-9-08	sample	1.3	10.0	10.7

***12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

Table 3. Study STPMC-P-0350- RA Big Bluestem

Greenhouse Germination Spring 2009

Accession Number	Origin (County)	15 Days %	30 Days %
9093469	Washingtion	8.6	14.3
9093494	Victoria	0.2	0.7

***Germination count based number of seeds planted.

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

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

Accession Number	Origin (County)	Early Greenup 3-10-09	Drought Resistance 8-18-09
9086160	San Patricio	no	dry and small
9086167	San Patricio	no	dry and small
9086168	San Patricio	no	dry and small
9088691	Aransas	no	dry and small
9086226	Goliad	no	dry and small
9086170	San Patricio	early greenup	dry and small, slightly better
9086223	Galveston	no	dry and small
408928	Victoria	no	dry and small
9090269	Victoria	no	dry and small
9090333	Refugio	early greenup	dry and small
9090263	Kleberg	early greenup	dry and small
9090276	Kleberg	early greenup	dry and small
9090754	Nueces	early greenup	dry and small, slightly better
9090759	Nueces	early greenup	dry and small
9090752	Kleberg	early greenup	dry and small, slightly better
9090341	Victoria	no	dry and small
9090757	Kleberg	early greenup	dry and small
9090330	San Patricio	early greenup	dry and small
9090267	Victoria	no	dry and small
9089132	San Patricio	no	dry and small
9093469	Washington	no	dry and small

Table 5. Study STPMC-P-0350- RA Big Bluestem Initial Field Evaluations 2009

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

Accession Number	Source (County)	Early Greenup 3-10-09	Drought Resistance 8-18-09
9086226	Goliad	no	dry and small
9090265	Goliad	no	dry and small
9086169	Kenedy	early greenup	dry and small
9086164	Kenedy	early greenup	dry and small
9089235	Brooks	early greenup	dry and small, slightly better
9089228	Kenedy	lots of early greenup	dry and small, slightly better
9086165	Kenedy	early greenup	dry and small
9093238	Goliad	no	dry and small, slightly better

Table 6. Study STPMC-P-0350- RA Big Bluestem Initial Field Evaluations 2009

South Texas Sand Plain Ecotype - ANNEX (sandy soil)

Accession Number	Source (County)	Early Greenup 3-10-09	Drought Resistance 8-18-09
9086164	Kenedy	no	dry and small
9086169	Kenedy	no	dry and small
9090276	Kleberg	no	dry and small
9090263	Kleberg	no	dry and small
9089228	Kenedy	no	dry and small
9090752	Kleberg	no	dry and small
9093239	Kenedy	no	dry and small
9093240	Kenedy	no	dry and small
9093242	Kenedy	no	dry and small
9093237	Kenedy	no	dry and small
9093243	Brooks	no	dry and small
9093244	Kenedy	no	dry and small
9090757	Kleberg	no	dry and small

Study Number: STPMC-P-0352- RA

Study Title: Assembly and Evaluation of Florida Paspalum (*Paspalum floridanum*)

Introduction: Florida paspalum (*Paspalum floridanum*) is a native, perennial bunchgrass that grows in grassy areas and open woodlands (Gould, 1975). It grows 2-4 meters tall and forms thick rhizomes (Gould, 1975). Its inflorescence consists of 2-5 branches, each with 4 rows of spikelets on a branched rachis, and blooms mainly from August to November (Gould, 1975). This species has two varieties *Paspalum floridanum* var. *floridanum* (hirsute leaves) and *Paspalum floridanum* var. *glabratum* (glabrous leaves) separated by the presence or absence of coarse hairs on the leaves (Gould, 1975). Both species occur in the Pineywoods, Gulf Prairies and Marshes, and Post Oak Savannah regions of Texas, but var. *glabratum* also occurs in the Blackland Prairies and Cross Timbers and Prairies regions. The range of this species extends from Maryland and Florida, west to Illinois, and in eastern Kansas and eastern Texas (Gould, 1975). Florida paspalum usually occurs on clay or sandy loam soils (Correll & Johnston, 1979). In the eastern portion of the range var. *floridanum* is more common, and in the western portion of the range var. *glabratum* is more common (Gould, 1975). Florida paspalum provides fair to good quality forage for livestock and is a good producer of seed 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 Florida paspalum. Florida paspalum collections will be evaluated for adaptation in the region along the Texas coast known as the Texas Coastal Prairie.

Discussion: There are seven accessions of Florida paspalum in a Texas Coastal Prairie ecoregion plot. An early greenup evaluation was conducted on March 10, 2009. Only accession 9090342 was starting to greenup. A drought resistance evaluation was conducted in August 2009. All accessions were very dry with only a few green leaves. The evaluation plot and the seed increase rows of accession 9088889 did not produce a significant seed harvest in 2009.

In previous years, the seed harvests of Florida paspalum has had poor seed fill. Until the seed fill issue has been solved, this project will be on hold for selections.

East Texas Accession Observation

One accession from East Texas was planted in a separate observation block in 2005. This plot was evaluated in August and November of 2009. The accessions ranked a 9 in vigor and density both months. There was no seed production in August and only 12 seedheads in 50 plants in November. The plants were showing limited signs of survival, but regrowth was very minimal during a year of drought.

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 2008, there were 12 accessions of yellow Indiangrass planted in the Texas Coastal Prairie ecoregion plot, 8 accessions in a Rio Grange Plain ecoregion plot, and 2 in a South Texas Sand Plain ecoregion plot. Seed was harvested from all plots in 2008 and will be germination tested in 2010.

In March 2009, one new accession (9093467-Washington) was seeded in the greenhouse, but it had 0.2% germination resulting in only 2 plants. All plots were evaluated for early greenup in March 2009. In the Texas Coastal Prairie ecoregion plot, all accessions were just starting to greenup. In the Rio Grande Plain and South Texas Sand Plain ecoregion plots none of the accessions were green. In August 2009, all plots were evaluated for drought resistance (Tables 1-3). Most accessions did not respond favorably to the drought. All plants in the South Texas Sand Plain plot died, so the plot was taken out. No seed was harvested in 2009.

Two new accessions were received for Texas Coastal Prairie plot in 2009. They will be planted in the greenhouse in the spring of 2010. Accessions will be added to the plot as received. In previous years, the seed harvests of yellow Indiangrass from the PMC plots have had poor seed fill. 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)	Date	Notes
9086124	Kleberg	8-18-09	plants completely dry
9088693	Aransas	8-18-09	plants completely dry
9086221	Galveston	8-18-09	plants completely dry
9090335	Victoria	8-18-09	plants yellowed and dry
9090287	Kleberg	8-18-09	plants yellowed and dry
9090300	Kleberg	8-18-09	plants yellowed and dry
9093273	Aransas	8-18-09	plants yellowed and dry
9067253	Matagorda	8-18-09	plants yellowed and dry
9093318	Aransas	8-18-09	dry, but greener than other accessions
9093304	Harris	8-18-09	plants yellowed and dry
9093223	Fort Bend	8-18-09	plants yellowed and dry
9093361	Galveston	8-18-09	plants yellowed and dry

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

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

Accession Number	Source (County)	Date	Notes
9090271	Wilson	8-18-09	plants yellowed and dry
9090272	Goliad	8-18-09	plants yellowed and dry
9089224	Wilson	8-18-09	plants yellowed and dry
9090294	Brooks	8-18-09	plants yellowed and dry
9068187	Kenedy	8-18-09	plants yellowed and dry
9086188	Kenedy	8-18-09	slightly better resistance
9093164	Bexar	8-18-09	slightly better resistance
9093170	Bexar	8-18-09	slightly better resistance

Table 3. Study STPMC-P-0353- RA Yellow Indiangrass – Drought Resistance

South Texas Sand Plain Ecotype – PMC Annex (sandy soil)

Accession Number	Source (County)	Date	Notes
9086124	Kleberg	8-18-09	all plants dead
9090300	Kleberg	8-18-09	all plants dead

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: In 2008, there were seven accessions in this plot. The plot was evaluated for drought resistance in August of 2009. All accessions were partially burned and partially green. Performance appeared equal among the accessions. No seed was collected in 2009. In 2008, the State NRCS Office requested that Field Offices send in more collections of this species. This project will be 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. This accession was evaluated again in August and November 2009 (Table 1). This accession does not appear to be as drought tolerant as local Texas collections.

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

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

*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 2008, there were 17 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 March 2009, two new accessions were seeded in the greenhouse (Table 1). One accession was added to the Texas Coastal Prairie Ecotype field plot in June 2009. Additional accessions will be added as received.

All plots were evaluated for early greenup in March 2009 and drought resistance in August 2009 (Tables 2-4). A few accessions had early greenup in March, but by August all accessions had poor vigor as a result of the drought. A few of the older accessions in the Gulf Coast Prairie plot performed worse than the others. No significant seed crop was produced in any of the plots.

The 2007 seed harvests of little bluestem were germination tested in 2009 (Tables 5-8). Some accessions had better germination than in years past, but it is still low (<20%). In previous years, the seed harvests of little bluestem have had poor seed fill. 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.

Inter-Center Observation:
Two cultivars and an accession from Knox City were planted in an observation plot in June of 2008. There was no early greenup by March 10, 2009. An evaluation of this plot was done in November 2009 (Table 9). All accessions had no apparent disease or insect problems, but all had poor drought tolerance.

Table 1. Study STPMC-P-0358- RA Little Bluestem

Greenhouse Germination Spring 2009

Accession Number	Origin (County)	15 Days %	30 Days %
9093468	Washingtion	0.4	1.8
9093483	Brazoria	0.0	0.0

***Germination count based number of seeds planted.

Table 2. Study STPMC-P-0358- RA Little Bluestem PMC Initial Field Evaluation 2009

Texas Coastal Prairie Plot (clay soil)

Accession Number	Source (County)	Early Greenup 3-10-09	Drought Resistance 8-18-09
9086219	Harris	no	worst & driest
9086224	Colorado	no	worst & driest
9089221	San Patricio	early greenup	worst & driest
9089161	Montgomery	no	worst & driest
9090334	Victoria	early greenup	yellowed & burned
9090749	Matagorda	early greenup	yellowed & burned
9089242	Victoria	no	worst & driest
9090748	Matagorda	early greenup	yellowed & burned
9093224	Fort Bend	no	yellowed & burned
9067251	Matagorda	early greenup	yellowed & burned
9067352	Matagorda	early greenup	yellowed & burned
9067252	Matagorda	no	yellowed & burned
9093274	Aransas	early greenup	yellowed & burned
9093301	Fort Bend	no	yellowed & burned
9093373	Washington	no	yellowed & burned
9093351	Harris	early greenup	yellowed & burned
9093358	Galveston	no	yellowed & burned
9093468	Washington	-	yellowed & burned

Table 3. Study STPMC-P-0358- RA Little Bluestem PMC Initial Field Evaluation 2009

Rio Grande Plains Plot (clay soil)

Accession Number	Source (County)	Early Greenup 3-10-09	Drought Resistance 8-18-09
9090266	Goliad	no	dry & burned
9090289	Wilson	no	dry & burned
9086176	Bexar	no	dry & burned
9090371	Medina	early greenup	dry & burned
9086178	Karnes	no	dry & burned
98086225	Goliad	no	dry & burned
9086180	Jim Wells	no	dry & burned
9086179	Atascosa	no	dry & burned
9089226	Wilson	no	dry & burned
9090487	Jim Wells	no	dry & burned
9090424	Kinney	no	dry & burned
9090288	Wilson	no	dry & burned
9086177	Atascosa	no	dry & burned
9089229	Wilson	no	dry & burned
9064474	DeWitt	early greenup	dry & burned
9089245	Wilson	early greenup	dry & burned
9090283	Goliad	no	dry & burned
9089231	Wilson	no	dry & burned
9090295	Wilson	no	dry & burned
9064461	Zavala	early greenup	dry & burned
9089245	Wilson	early greenup	dry & burned
9090751	Bee	early greenup	dry & burned
9091775	Atascosa	no	dry & burned
9089226	Wilson	no	dry & burned
9090371	Medina	no	dry & burned
9091777	Atascosa	early greenup	dry & burned
9091952	Bexar	no	dry & burned
9091954	Bexar	no	dry & burned
9091779	Atascosa	no	dry & burned
9091789	Atascosa	early greenup	dry & burned
9091780	Atascosa	early greenup	dry & burned
9091843	Zapata	no	dry & burned
9089225	Wilson	no	dry & burned

Table 4. Study STPMC-P-0358- RA Little Bluestem PMC Initial Field Evaluation 2009

"Unknown Bluestem" Plot (clay soil)

Accession Number	Source (County)	Early Greenup 3-10-09	Drought Resistance 8-18-09
9091805	Jim Hogg	no	dry & burned
9090346	Jim Hogg	no	dry & burned
9086180	Jim Wells	no	dry & burned
9090280	Brooks	no	dry & burned
9090464	Jim Wells	no	dry & burned
9091812	Jim Hogg	no	dry & burned
9090262	Brooks	no	dry & burned
9089232	Wilson	early greenup	dry & burned
9093227	Dimmit	no	dry & burned

Table 5. Study STPMC-P-0358- RA Little Bluestem - 2007 Harvest Germination

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

Accession Number	Origin (County)	Date Harvested	Grams Harvested	3 Days %	7 Days %	28 Days %
9086219	Harris	10-31-07	sample	0.0	0.0	0.0
9086224	Colorado	10-31-07	sample	0.0	2.0	7.3
9089221	San Patricio	10-31-07	sample	0.0	10.7	12.7
9089161	Montgomery	10-31-07	sample	0.0	0.0	0.7
9090334	Victoria	10-31-07	sample	0.0	2.0	5.3
9090749	Matagorda	10-31-07	sample	0.0	4.7	8.0
9089242	Victoria	10-31-07	sample	0.0	3.3	4.0
9090748	Matagorda	10-31-07	sample	0.0	2.7	4.7
9093224	Fort Bend	10-31-07	sample	0.0	0.0	1.3
9067251	Matagorda	10-31-07	sample	0.0	4.7	10.7
9067352	Matagorda	10-31-07	sample	0.0	9.3	11.3
9067252	Matagorda	10-31-07	sample	0.0	4.0	9.3
9093274	Aransas	10-31-07	sample	0.0	1.3	7.3

***12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

Table 6. Study STPMC-P-0358- RA Little Bluestem - 2007 Harvest Germination

Rio Grande Plain Ecotype – PMC Block G (clay soil)

Accession Number	Origin (County)	Date Harvested	Grams Harvested	3 Days %	7 Days %	28 Days %
9090266	Goliad	11-28-07	sample	0.0	0.0	0.0
9090289	Wilson	11-28-07	sample	0.0	0.7	0.7
9086176	Bexar	11-28-07	sample	1.3	2.7	2.7
9090371	Medina	11-28-07	sample	0.0	0.0	0.0
9086178	Karnes	11-28-07	sample	0.7	0.3	2.0
9086225	Goliad	11-28-07	sample	0.0	2.0	2.0
9086180	Jim Wells	11-28-07	sample	0.0	1.3	2.0
9086179	Atascosa	11-28-07	sample	0.0	2.0	2.7
9089226	Wilson	11-28-07	sample	0.7	0.7	0.7
9090487	Jim Wells	11-28-07	sample	0.0	0.0	0.0
9090424	Kinney	11-28-07	sample	0.0	0.7	0.7
9090288	Wilson	11-28-07	sample	0.0	1.3	1.3
9089229	Wilson	11-28-07	sample	0.7	0.7	0.7
9064474	DeWitt	11-28-07	sample	0.0	0.7	1.3
9089245	Wilson	11-28-07	sample	0.0	0.0	0.0
9090283	Goliad	11-28-07	sample	0.0	0.7	0.7
9089231	Wilson	11-28-07	sample	0.0	0.0	0.0
9090295	Wilson	11-28-07	sample	0.0	3.3	4.7
9064461	Zavala	11-28-07	sample	1.3	3.3	6.7
9089245	Wilson	11-28-07	sample	1.3	3.3	4.0
9090751	Bee	11-28-07	sample	-	2.7	4.0
9091775	Atascosa	11-28-07	sample	-	4.0	4.7
9089226	Wilson	11-28-07	sample	-	0.7	0.7
9090371	Medina	11-28-07	sample	-	1.3	1.3
9091777	Atascosa	11-28-07	sample	-	6.0	7.3
9091952	Bexar	11-28-07	sample	-	0.0	2.7
9091954	Bexar	11-28-07	sample	-	0.7	2.0
9091779	Atascosa	11-28-07	sample	-	2.7	2.7
9091789	Atascosa	11-28-07	sample	-	4.7	4.7
9091780	Atascosa	11-28-07	sample	-	4.7	6.0
9091843	Zapata	11-28-07	sample	-	9.3	16.7
9089225	Wilson	11-28-07	sample	-	2.7	2.7

***12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

Table 7. Study STPMC-P-0358- RA Little Bluestem - 2007 Harvest Germination

Rio Grande Plain Ecotype "Unknown Bluestem" Plot – PMC Block G (clay soil)

Accession Number	Origin (County)	Date Harvested	Grams Harvested	3 Days %	7 Days %	28 Days %
9091805	Jim Hogg	11-28-07	sample	-	8.7	9.3
9090346	Jim Hogg	11-28-07	sample	-	6.0	7.3
9086180	Jim Wells	11-28-07	sample	-	3.3	4.7
9090280	Brooks	11-28-07	sample	-	2.0	5.3
9090464	Jim Wells	11-28-07	sample	-	6.0	7.3
9091812	Jim Hogg	11-28-07	sample	-	8.0	8.7
9090262	Brooks	11-28-07	sample	-	8.0	8.7
9089232	Wilson	11-28-07	sample	-	7.3	7.3
9093227	Dimmit	11-28-07	sample	-	12.0	14.0

***12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

Table 8. Study STPMC-P-0358- RA Little Bluestem - 2007 Harvest Germination

Cultivar Comparison Plot – Wildlife Complex (sandy soil)

Accession Number	Date Harvested	Grams Harvested	3 Days %	7 Days %	28 Days %
Pastura	11-27-07	sample	-	0.0	0.0
Cimarron	11-27-07	sample	-	0.0	0.7

***12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

Table 9. Study STPMC-P-0358- RA Little Bluestem Inter-Center Observation 2009

PMC Block F (clay soil)

Accession Number	Source	% Stand	Vigor	Drought Tolerance	Insect Problems	Disease Problems	Seed Production	Plant Height
9029926	Knox City	16/20	6	7	5	5	6	20"
Pastura	cultivar	9/20	7	7	5	5	9	20"
Cimarron	cultivar	17/20	6	7	5	5	6	18"

*Ocular Estimates (1 = Best)

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 2008 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. One new accession was seeded in the greenhouse in March of 2009, but germination was 0%.

All plots were evaluated for early greenup in March 2009 (Tables 1-3). The Texas Coastal Prairie plot did not exhibit early greenup. Some accessions in the South Texas Sand Plain plot and the Rio Grande Plains plot did. The plots were also evaluated for drought tolerance in August 2009. Overall switchgrass had better vigor than all other species planted at the PMC. All plots were stunted due to the dry conditions, but were still showing green growth. Height did vary among accessions. No seed harvests were made in 2009. New accessions will be added to the plots as received.

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: The King Ranch brought in seed harvested from an observation plot in 2004. This plot was grown from seed collected from multiple populations of switchgrass on the King Ranch. The PMC was asked to assist with improving the germination and selection of this collection. Seed was planted in a flat in the greenhouse and seedlings that

emerged by the seventh day were transferred to another tray. One hundred of these earlier germinating seedlings were planted in an observation plot in June of 2005 at the King Ranch Norias Division. The plot performed well, but plants were highly variable for multiple traits. Seed was collected from this plot in November and December and was germination tested in 2006. After seed was screened with a South Dakota seed blower for heavy seed, the November harvest had 65.9% germination and the December harvest had 95.5%.

In March of 2006, the 100 plants were evaluated for field traits. Only 43 were kept and the rest were removed. Seed was collected from these 43 plants individually in October and again in November 2006. The plot was evaluated again in August of 2007, and 8 plants were selected to keep. The rest were removed before seedheads emerged. Seed was harvested from these eight plants. A new crossing block is planned for 2010. This block will be made up of plants with no crown node elongation from the 43 plant King Ranch 2006 seed harvest and other South Texas collections remaining in storage. See Study Number STPMC-T-0694-RA "Evaluation of Crown Height for Improved Stand Establishment in South Texas Grasses" for more information.

Table 1. Sbtudy STPMC-P-0359- RA Switchgrass - PMC Initial Field Evaluation 2009

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

Accession Number	Source (County)	Early Greenup 3-10-09	Drought Resistance 8-18-09
9086194	Kenedy	no	still green, shorter
9090293	Goliad	no	still green, shorter
9089243	Wilson	no	still green, shorter
9089251	Wilson	no	still green, shorter
9086191	Kenedy	early greenup	still green, medium
9089241	Brooks	early greenup	still green, medium
9093168	Bexar	no	still green, medium
9089249	Wilson	early greenup	still green, medium
9086193	Kenedy	most early greenup	still green, taller
9090383	La Salle	early greenup	still green, taller
9086192	Kenedy	no	still green, medium

Table 2. Study STPMC-P-0359- RA Switchgrass - PMC Initial Field Evaluation 2009

South Texas Sand Plain Ecotype – PMC Annex (sandy soil)

Accession Number	Source (County)	Early Greenup 3-10-09	Drought Resistance 8-18-09
9086194-C1	Kenedy	no	still green, shorter
9086193	Kenedy	no	still green, shorter
9086194-C3	Kenedy	early greenup	still green, medium
9086191	Kenedy	early greenup	still green, taller
9089241	Brooks	no	still green, medium
9086192	Kenedy	no	still green, taller

Table 3. Study STPMC-P-0359- RA Switchgrass - PMC Initial Field Evaluation 2009

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

Accession Number	Source (County)	Early Greenup 3-10-09	Drought Resistance 8-18-09
9088695	Aransas	no	still green
9090297	San Patricio	no	still green

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 also 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 2008, six accessions of plains lovegrass and a cultivar of sand lovegrass “Mason” (*Eragrostis trichodes*) were in initial evaluation plot at the Annex. Seed harvests from 2006 and 2007 were germination tested in January 2009 (Tables 1 & 2). Germination ranged from 31 to 84%. The plains lovegrass accessions were evaluated for early greenup in March 2009 (Table 3). Three accessions had early greenup, one was still dormant, and two appeared dead. This plot was evaluated again in August 2009 for drought tolerance. All accessions appeared dry, but two accessions were taller (Table 3). The sand lovegrass accession appeared to be dead throughout 2009. No seed was harvested in 2009. Accessions will be added to the field plots as received.

Table 1. STPMC-P-0570- RA Plains Lovegrass - 2006 Harvest Germination

Rio Grande Plains Ecotype – PMC Annex (sandy soil)

Accession Number	Origin (County)	Date Harvested	Grams Harvested	7 Days %	14 Days %	28 Days %
9090565	Frio	11-17-06	5.5	60.7	60.7	60.7
9090664	Maverick	11-17-06	9.8	28.7	28.7	30.7
9090593	Atascosa	11-17-06	46.8	36.7	38.0	38.7
9088814	Duval	11-17-06	12.5	75.3	75.3	75.3
9091868	Hidalgo	11-17-06	76.0	54.0	54.7	54.7
9091765	Kleberg	11-17-06	49.5	40.0	40.7	40.7
Mason	Sand lovegrass	11-17-06	not recorded	24.0	27.3	27.3

***12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

Table 2. STPMC-P-0570- RA Plains Lovegrass - 2007 Harvest Germination

Rio Grande Plains Ecotype – PMC Annex (sandy soil)

Accession Number	Origin (County)	Date Harvested	Grams Harvested	7 Days %	14 Days %	28 Days %
9090565	Frio	11-21-07	0.6	53.3	53.3	53.3
9090664	Maverick	11-21-07	0.4	30.7	31.3	31.3
9090593	Atascosa	11-21-07	1.5	63.3	63.3	63.3
9088814	Duval	11-21-07	1.6	79.3	79.3	79.3
9091868	Hidalgo	11-21-07	1.5	84.0	84.0	84.0
9091765	Kleberg	11-21-07	0.9	68.0	68.0	68.0
Mason	Sand lovegrass	11-21-07	not recorded	18.7	19.3	19.3

***12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

Table 3. STPMC-P-0570- RA Plains Lovegrass - PMC Initial Field Evaluation 2009

PMC Annex (sandy soil)

Accession Number	Source (County)	Early Greenup 3-10-09	Drought Resistance 8-18-09
9088814	Duval	dead?	all dry
9090565	Frio	some greenup	all dry, taller
9090593	Atascosa	some greenup	all dry
9090664	Maverick	some greenup	all dry, taller
9091765	Kleberg	dead?	all dry
9091868	Hidalgo	dead?	all dry

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: At the end of 2008, there were seven accessions of gayfeather in Block C to observe the species on a clay soil and three accessions in a plot at the Annex to observe the species on a sandier soil. 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 will be planted for comparison in Kingsville, Nacogdoches, and Baytown, Texas in 2010.

The Annex and Block C plots were evaluated for early greenup in March 2009. None of the accessions were showing early greenup. All accessions except 9086149-Kleberg Co. were then taken out of the Block C plot to produce an isolated harvest. Both plots were evaluated again in August 2009 for drought tolerance. Accession 9086149-Kleberg Co. was still green in the Block C plot and only accession 9093380-Duval Co. was alive and green in the Annex plot.

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 (Table 1). These harvests will be seeded in the greenhouse in the spring of 2010 to add to the seed increase plot. Release of this accession is on hold until sufficient seed is obtained.

Table 1. STPMC- P-0672-RAWL Sowthwest Bristlegrass - 2008 Harvest Germination

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

Accession Number	Origin (County)	Date Harvested	Grams Harvested	3 Days %	14 Days %	28 Days %
9088950	Atascosa	6-26-08	18.2	0.0	16.5	18.0
9088950	Atascosa	10-23-08	27.2	0.0	26.0	31.8

***12 hours dark 20°C (68°F) / 12 hours light 30°C (86°F)

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 will be presented in Galveston in 2010 at the Restore America Conference.

STPMC-T-0681-OT Activated-carbon seed treatment to improve plant establishment
Data in analysis and journal article will follow.

STPMC-T-0684-RA Field experiments to improve plant establishment on saline sites
Planting done in 2009 will be evaluated in 2010.

STPMC-T-0687-RA Techniques for evaluating seedling vigor
Drought tolerance tests planned for 2010.

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

STPMC-T-0692-OT Evaluation of seed storage on seed germination
Heat treatment will be retested on 2010 bristlegrass harvest.

STPMC-T-0696-RA Evaluation of 4-flower origin for adaptability and improved plant establishment
Waiting on clarification of results from lab. Release pending in 2012.

STPMC-T-0703-WLTE South Texas Ambrosia Restoration Project
Waiting for harvested seed to continue seed fill analysis.

STPMC-T-0704-TE Evaluation of Three Endemic Plants of the Refugio-Goliad Prairies
Plots will be evaluated in 2010.

STPMC-T-0705-RANU Forage Quality Study of Selected South Texas Plants
Journal article in progress.

STPMC-P-0801- RAWL Multi-site Native Legume Evaluation
Hogs eliminated Beeville plot. Waiting on data analysis of other sites.

Study Number: STPMC-T-0678-RA

Study Title: Herbicide treatments to improve native grass establishment into introduced grass pastures

Introduction: 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. Furthermore, there are very few native species that are available on the commercial market for replanting. However, the E. "Kika" de la Garza Plant Materials Center has been working on evaluation and producing several native species for reseeding in the South Texas Area.

What are the aggressive, introduced species that make it challenging to establish native species in South Texas? They can be broken down into 3 categories: 1) short, sod-like exotics such as bermudagrass, KR bluestem, and crabgrass, 2) mid/tall exotics such as buffelgrass, Kleberg bluestem, Johnsongrass, and bahiagrass, and 3) shady habitat species such as guineagrass and ryegrass.

The planting strategies are the same except that the species selected are different for the sod-like grasses versus the tall grasses. One first starts out with a heavy grazing, burning, or mowing-bailing to remove the existing vegetation. Then any regrowth is killed by spraying with a selective herbicide. Then the site is either tilled in preparation for planting or a no-till planting is used. Depending on how bad the infestation of introduced species is, the landowner may decide to go with a legume cover-crop prior to planting the native grasses. Following the cover-crop, the site will either get plowed or it will get sprayed and planted with a no-till drill. The selected native grasses must be quick germinating and growing in order to get established and be capable of competing with any introduced species that have survived the employed treatments or are blown in from surrounding property.

Problem: Restoring native grasses in areas dominated by introduced species is often difficult due to the lack of available native vegetative material and the difficulty of removing the introduced species.

Objective: The objective of this study is to develop planting strategies for establishing native species in introduced grass pastures.

Discussion:

TAMUK Study: Following the research and 2005 study (Tjelmeland, A., T.E. Fulbright, and J. Lloyd-Reilley, 2008. Evaluation of herbicides for restoring native grasses in buffelgrass dominated grasslands. Restoration Ecology 16:263-269), Texas A&M University-Kingsville initiated an evaluation of herbicides for control of buffelgrass and Kleberg bluestem. Verdict 520® and Clincher SF® herbicides containing the active ingredients Haloxyfop and Cyhalofob will be applied in experimental trials at 4 rates to buffelgrass and Kleberg bluestem monocultures. The Daubenmire method will be used to estimate percent canopy cover of both species before and at several intervals following treatment. Five plants will be randomly selected and monitored per plot. Tillers of those plants will be counted to determine individual plant mortality or injury caused by the herbicide applications. Experimental plots will be shredded before spraying to encourage similar growth stage among all plants.

STN Study: In 2006, South Texas Natives (STN) established plots from a seed mix of 12 native grasses into a previous buffelgrass pasture near Larado, Texas. Plots were established at three seeding dates in 2006 (spring, summer and fall) and were seeded at low, standard, and high seeding rates. After two years of evaluation, Dilley Germplasm slender grama and Welder Germplasm shortspike windmillgrass have shown the best overall competitive ability with buffelgrass. Seeding rates have had no significant effect on canopy cover of native species at one or two years after seeding. Late summer plantings resulted in the greatest canopy cover of native species one year after seeding. However, two years after planting, seeding date had no effect on native canopy cover. Canopy cover of all planted native grasses decreased one to two years after seeding.

Results from this study indicate that no single native grass resists the reinvasion of buffelgrass despite the ability of many species to establish in these areas. Slender grama and shortspike windmillgrass show good competitive ability in the early stages of plantings in areas dominated by buffelgrass. Hooded windmillgrass, multiflowered false Rhodesgrass, Arizona cottontop, and pappusgrasses are seasonally competitive. Seed mixtures comprised of these competitive grasses may be useful to diversify homogenous stands of buffelgrass. However, the results of this study underscore the need for additional research to devise management practices to prevent or retard the reinvasion of exotic grasses following native grass seeding.

Study Number: STPMC-T-0679-RA

Study Title: Herbicide treatments to improve forb and legume establishment into introduced grass pastures

Introduction: 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. Furthermore, there are very few native species that are available on the commercial market for replanting. However, the E. "Kika" de la Garza Plant Materials Center has been working on evaluation and producing several native species for reseeding in the South Texas Area.

We have three strategies for dealing with these categories. There is a forb planting strategy, a sod-grass strategy, and tall grass planting strategy. The establishment of forbs or legumes starts with a heavy grazing, burning, or mowing-baling to remove as much of the existing vegetation as possible. Then any regrowth is killed by spraying with a selective herbicide. Then the site is either tilled in preparation for planting or a no-till planting is used. The site is then planted with selected forbs and legumes. Selective grass-specific herbicides are then used to help the forbs become established.

Problem: Restoring native grasses in areas dominated by introduced species is often difficult due to the lack of available native vegetative material and the difficulty of removing the introduced species.

Objective: The objective of this study is to develop planting strategies for establishing native species in introduced grass pastures.

Discussion: In 2008 and 2009, South Texas Natives (STN) planted a native seed mix composed of five native grasses and five native forbs on one-acre plots at seven ranches across South Texas. The seed mix consisted of species developed by STN and the E. "Kika" de la Garza PMC, all of which should be commercially available to consumers within the next 2-3 years.

At all sites, two species have performed very well at date, Dilley Germplasm slender grama and Zapata Germplasm Rio Grande clammyweed, confirming the importance of early successional species in rangeland plantings. One site had greater than 60% native plant cover just eight months after planting. Two perennial forbs, orange zexmenia and prairie acacia, have also established quickly and performed well at several sites.

Future data collection will focus on monitoring these seeded native plant communities with particular emphasis on the susceptibility or resistance of the plantings to exotic grass invasion.

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 30°C with light at 1.5 µ mol/m^2/sec.

Plants were evaluated weekly for 4 weeks. Twelve accessions of sideoats grama and twenty-two accessions of multiflowered false Rhodesgrass were observed, 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.

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. Once seed is harvested from this breeder block it will be tested against a commercial source of Alamo switchgrass for seedling establishment.

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 (Table 1). 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.

Table 1. STPMC-T-0906-TE Adaptability of 'Tropic Sun' Sunn Hemp - 2009

Plot#	Rep	Harvest date	Plt ht (in)	0.5 m^2 Plot wt Sample 1 (g)	0.5 m^2 Plot wt Sample 2 (g)	0.5 m^2 Plot wt Sample 3 (g)	0.5 m^2 Avg. plot wt (g)	grab sample Wet wt (g)	grab sample Dry wt (g)	Pct dry weight of sample (decimal %)	Avg. 0.5m^2 plot dry weight (g)	Yield (lb/acre)
STx30	**1**	6/26/09	3.0	-	-	-	-	-	-	-	-	-
STx30	**2**	6/26/09	4.0	-	-	-	-	-	-	-	-	-
STx30	**3**	6/26/09	3.0	-	-	-	-	-	-	-	-	-
STx30	**4**	6/26/09	3.5	-	-	-	-	-	-	-	-	-
STx60	**1**	7/27/09	26.0	902	1056	1126	1028.0	253	43	0.16996	174.72	3117
STx60	**2**	7/27/09	38.0	534	712	1021	755.67	251	42	0.16733	126.45	2256
STx60	**3**	7/27/09	27.8	1219	1351	1304	1291.3	252	45	0.17857	230.60	4114
STx60	**4**	7/27/09	22.5	960	680	891	843.67	251	41	0.16335	137.81	2459
STx90	**1**	8/26/09	43.0	956	857	1081	964.67	253	71	0.28063	270.72	4830
STx90	**2**	8/26/09	43.5	1166	1380	1487	1344.3	250	69	0.27600	371.04	6619
STx90	**3**	8/26/09	56.5	1501	1292	1231	1341.3	252	73	0.28968	388.56	6932
STx90	**4**	8/26/09	39.3	1578	1208	1530	1438.7	251	75	0.29880	429.88	7669
STxAF	**1**	12/10/09	88.0	1090	1090	1362	1180.7	265	155	0.58491	690.58	12320
STxAF	**2**	12/10/09	92.0	2088	1816	1634	1846.0	251	140	0.55777	1029.60	18369
STxAF	**3**	12/10/09	85.0	1090	1362	2134	1528.7	251	149	0.59363	907.46	16189
STxAF	**4**	12/10/09	98.0	1725	2179	1453	1785.7	252	152	0.60317	1077.10	19215

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, Montana 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 need to be described.

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 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 Montana. Plots were maintained through 2009.

At the end of 2009, measurements were taken of plant height and stand density. In 2010, recordings of greenup and 50% seedhead emergence will be taken along with light interception data to estimate plant cover and biomass at maturity. 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.

New Releases

Plant Fact Sheet

RIO GRANDE CLAMMYWEED

Polanisia dodecandra (L.) DC. ssp. *riograndensis* Iltis

Plant Symbol = PODOR

Contributed by: E. "Kika" de la Garza Plant Materials Center, Kingsville, Texas & South Texas Natives, Kingsville, Texas

Forrest Smith, South Texas Natives

Uses

Wildlife: Rio Grande clammyweed is recommended for upland wildlife plantings and in range seeding mixes. Clammyweed seed is eaten by game birds such as bobwhite quail, scaled quail, mourning doves, white-wing doves, and Rio Grande wild turkeys, as well as many non-game species of birds and mammals. Rio Grande clammyweed is also an important nectar plant for many species of butterflies and provides habitat to many other insects. Clammyweed has no grazing value for livestock or wildlife. Clammyweed is often found in dense stands of non-native grasses, and may be useful in efforts to diversify these stands for wildlife.

Beautification: Rio Grande clammyweed is an attractive nectar plant for butterfly gardens. However, its leaves release a strong, unpleasant odor when crushed, so plants should be located away from foot traffic areas.

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 and Adaptation

Rio Grande clammyweed is a native annual forb, endemic to southern Texas. It is found in sandy, gravelly (sometimes limestone) or alluvial silty soil. The plants are 2-6 dm. tall and sparsely branched or unbranched. The leaflets are in groups of 3 with leaves 2-4 cm long, 5-20 mm wide. The flowers are pink to rose with petals 5-16 mm long. The fruit is a narrow capsule producing numerous rounded seeds. Rio Grande clammyweed has an average of 154,500 seeds per pound.

Distribution: Please consult the Plant Profile page for this species on the PLANTS Web site.

Establishment

Rio Grande clammyweed is an early successional plant. It is quick to establish on disturbed soils, grows quickly, and provides a favorable environment for other slow to germinate native species. In mixed species native plantings in south Texas, clammyweed is often the first planted species to emerge and flower. Rio Grande clammyweed readily re-seeds itself with moderate soil disturbance.

Forrest Smith, South Texas Natives

Seeding trials at Kingsville, Texas have shown good establishment from seed in fall (October) and spring (April) plantings. Fall plantings should be made at least 2 months prior to danger of frost so that seed is produced before freezing as clammyweed typically requires 45-60 days from emergence to seed maturity.

For direct seeding, broadcast or drill seed during March through May or in September and October into a clean, weed free seedbed. Seeds should be

covered from ¼ to ½" depth to ensure good soil to seed contact. Plant at a seeding rate of 8 PLS (pure live seed) pounds per acre for a pure stand. When planting this as a component of a seed mixture, the seeding rate should be adjusted to the desired percent of the mix.

Javier Hernandez, South Texas Natives

Management

Rio Grande clammyweed requires little management. Seed production plots will require occasional weeding. It can survive in both droughty and moist conditions. For seed production purposes, occasional irrigation during extremely droughty periods may help seed fertility.

Rio Grande clammyweed can be harvested with a combine. When harvesting clammyweed, run the combine's cylinder speed at 1100 RPM, the concave at 8 mm, the sieve open 3/8", and the fan at 200 RPM. To clean the seed, simply run combined product through a clipper style seed cleaner. It is recommended that after cleaning, the seed should be stored at 45°F and less than 50% humidity.

Spring seed harvests near Monte Alto, Texas have had an average of 67% PLS, with 15% seed dormancy. Seed yields from June hand harvests (first crop produced) were 168 lbs. PLS/acre. Seed increase harvests in June 2008 at Kingsville, Texas (first crop produced) showed hand harvest seed yields averaging 144 lbs. PLS/acre under irrigated conditions. PLS of these harvests averaged 83%.

Pests and Potential Problems

Green bugs can cause extensive damage to the plants foliage, and weevils have been observed in the seed pods. Both pests are fairly easy to control with organophosphate (e.g.Malathion) and carbamate (e.g. Sevin) insecticides. Please contact your local agricultural extension specialist or county pest specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

Commercial seed production of Rio Grande clammyweed should focus on production of the first seed crop following planting. Plants commonly flower and produce seed beyond the first seed crop, and will set seed until frost; however subsequent seed crops have poor seed fill, lower active germination, and significantly lower seed yields.

Cultivars, Improved, and Selected Materials

Zapata Germplasm is a selected class release developed from seed originating from Dimmit and Zapata County, Texas. It was released cooperatively between the South Texas Natives Project and the E. Kika de la Garza Plant Materials Center in 2009. Zapata Germplasm was selected for active seed germination and superior field performance in comparison to other South Texas collected accessions. It is intended to provide food for wildlife. Certified seed is available and Breeder Seed will be maintained by South Texas Natives, Kingsville, Texas.

Prepared By and Species Coordinator:

John Lloyd-Reilley & Shelly D. Maher, USDA NRCS, E. "Kika" de la Garza Plant Materials Center, Kingsville, Texas

Forrest S. Smith, South Texas Natives, Caesar Kleberg Wildlife Research Institute,
Texas A&M University-Kingsville, Kingsville, Texas

Edited:

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Plant Fact Sheet

HOOKERS PLANTAIN

Plantago hookeriana

Fisch. & C.A. Mey.

Plant Symbol = PLHO

Contributed by: E. "Kika" de la Garza Plant Materials Center, Kingsville, Texas & South Texas Natives, Kingsville, Texas

Forrest Smith, South Texas Natives

Alternate Names
Tallow weed, California plantain

Uses
Wildlife: Hookers plantain is a cool season forage recommended for cool season upland wildlife plantings and in range seeding mixes. Hookers plantain seed is consumed by game birds such as bobwhite quail and mourning doves, and the foliage is eaten by bobwhite quail, Rio Grande wild turkeys, white-tailed deer, and cattle.

Erosion: Hookers plantain also can be used in many types of conservation plantings, such as stream-side buffers and filter strips.

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 and Adaptation
Hookers plantain is a short-stemmed, cool season annual with a slender taproot. The leaves are linear to narrowly oblanceolate, with margins that are entire or with small scattered denticulations. The leaves are up to 3 dm. long and 2 cm. wide, but usually much smaller and are glabrous to lanate.

The scapes (inflorescences) are erect or ascending, and may be shorter than or exceed the leaves in height. The scapes are glabrate to pubescent with spikes to 12 cm. long and 8 mm. thick, rarely reduced to only 2 flowers. The bracts are broad at the base. The corolla lobes are up to 4 mm. long and whitish with a brown spot at base of each or brown stripes the entire length of each. Each flower produces two seeds, dull-brown, finely pitted, and about 3 mm. long and 1.3 mm wide. STN-561 Germplasm contains 197,816 seeds per pound.

Distribution: Please consult the Plant Profile page for this species on the PLANTS Web site.

Establishment
Plantains are established from seed. Seeds should be sown directly into the seedbed. Germination tests conducted by the South Texas Natives Project (2006) found germination rates ranging from a low of 28% to a high of 94% and rapid initiation of germination following the onset of favorable conditions (germination < 36 hours). Seed dormancy can be as high as 90% but appears to be easily broken by field conditions. Plantains typically take 180 days from planting to seed maturity.

Forrest Smith, South Texas Natives

For direct seeding, broadcast or drill seed during September through December into a clean, weed free seedbed. Seeds should be covered from ¼ to ½" depth to ensure good soil to seed contact. The full

seeding rate for Hookers plantain is 10 PLS pounds per acre for a pure stand. When planting this as a component of a seed mixture, the seeding rate should be adjusted to the desired percent of the mix.

Forrest Smith, South Texas Natives

Management

Hookers plantain requires little management. Seed production plots will require occasional weeding. It can survive in both droughty and moist conditions. For seed production purposes, occasional irrigation during extremely droughty periods may help seed fertility.

Hookers plantain can be harvested with a combine. When harvesting Hookers plantain, run the combine's cylinder speed at 1100 RPM, the concave at 6 mm, the sieve open 3/8", and the fan at 600 rpm. To clean the seed, it should first be run through a Westrup brush machine and can then be cleaned further using a clipper style seed cleaner. It is recommended that after cleaning, the seed should be stored at 45°F and less than 50% humidity.

Seed increase plots in 2007 at TAES Beeville yielded seed with 93 % viability, 90 % seed dormancy, and 79 % pure live seed. Seed yield was estimated at 288 pounds of bulk seed per acre. Seed harvested from seed increase plots of STN-561 Germplasm at Kingsville in June 2008 had 92% viability, 0% dormancy, 94% active germination, and 93.49% pure live seed. Seed yield from Kingsville plantings was 322 lbs. pure live seed per acre.

Pests and Potential Problems

Thrips have been observed in the seed heads, however they are fairly easy to control with organophosphate (e.g..Malathion) and carbamate (e.g. Sevin) insecticides. Please contact your local agricultural extension specialist or county pest specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

Cultivars, Improved, and Selected Materials

STN-561 Germplasm Hookers plantain is a selected class release developed from seed originating from Median County, Texas. It was released cooperatively between the South Texas Natives Project, Texas AgriLife Research-Beeville, and the E. Kika de la Garza Plant Materials Center in 2009. STN-561 Germplasm will be marketed as part of a blend of 2 accessions of *Plantago* called Divot Tallow Weed Blend. STN-561 Germplasm superior vigor, seed production, and characteristics making mechanical harvest possible. STN-561 Germplasm was selected because of excellent seed establishment characteristics, suitability for mechanical harvest and agronomic production, and high seed yields in comparison to other South Texas collected accessions. It is intended to provide food for wildlife. Certified seed is available and Breeder Seed will be maintained by South Texas Natives, Kingsville, Texas.

Prepared By and Species Coordinator:

John Lloyd-Reilley & Shelly D. Maher, USDA NRCS, E. "Kika" de la Garza Plant Materials Center, Kingsville, Texas

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Edited:

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Plant Fact Sheet

REDSEED PLANTAIN

Plantago rhodosperma

Decne.

Plant Symbol = PLRH

Contributed by: E. "Kika" de la Garza Plant Materials Center, Kingsville, Texas & South Texas Natives, Kingsville, Texas

Forrest Smith, South Texas Natives

Alternate Names
Tallow weed, Redseed Indianwheat

Uses
Wildlife: Redseed plantain is a cool season forage recommended for upland wildlife plantings and in range seeding mixes. The seed is known to be consumed by game birds such as bobwhite quail and mourning doves, and the foliage is eaten by bobwhite quail, Rio Grande wild turkeys, white-tailed deer, and cattle. Redseed plantain has been shown to be an important component in the diets of both scaled and bobwhite quail in southwest Texas.

Erosion: Redseed plantain also can be used in many types of conservation plantings, such as stream-side buffers and filter strips.

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 and Adaptation
Redseed plantain is a cool season, annual with a slender taproot. Leaves are oblanceolate to 35 cm. long and 5 cm. wide, but usually much smaller. The leaves are grayish-green in color, pubescent, with margins that are entire to coarsely pectinate or salient-dentate.

The scapes (inflorescences) are one to several, hirsute, and shorter than to exceeding the leaves in height. The spikes are up to 2 dm. long and 1 cm. thick. Each flower produces two seeds that are bright red to reddish black in color. The seeds are 2-3 mm. long, more than half as wide, nearly flat on both sides, and have a thin pale margin. STN-496 Germplasm contains 322,000 seeds per pound.

Distribution: Please consult the Plant Profile page for this species on the PLANTS Web site.

Forrest Smith, South Texas Natives

Establishment
Plantains are established from seed. Germination tests conducted by the South Texas Natives Project (2006) found germination rates ranging from a low of 40% to a high of 80% and rapid initiation of germination following the onset of favorable conditions (germination < 36 hours). Plantains typically take 180 days from planting to seed maturity.

For direct seeding, broadcast or drill seed during September through December into a clean, weed free seedbed. Seeds should be covered from ¼ to ½" depth to ensure good soil to seed contact. The full

seeding rate for redseed plantain is 10 PLS pounds per acre for a pure stand. When planting this as a component of a seed mixture, the seeding rate should be adjusted to the desired percent of the mix.

Forrest Smith, South Texas Natives

Management

Redseed plantain requires little management. Seed production plots will require occasional weeding. It can survive in both droughty and moist conditions. For seed production purposes, occasional irrigation during extremely droughty periods may help seed fertility.

Redseed plantain can be harvested with a combine. When harvesting redseed plantain, run the combine's cylinder speed at 1100 RPM, the concave at 6 mm, the sieve open 3/8", and the fan at 600 rpm. To clean the seed, it should first be run through a Westrup brush machine and can then be cleaned further using a clipper style seed cleaner. It is recommended that after cleaning, the seed should be stored at 45°F and less than 50% humidity.

Seed harvested from seed increase plots of STN-496 Germplasm at Kingsville in June 2008 had 88% viability, 12% dormancy, 79% active germination, and 87.43% pure live seed. Seed yield from Kingsville plantings was 400 lbs. pure live seed per acre. Seed harvested from Beeville plots in May 2007 had 98% viability, 45% dormancy, 53% active germination, and 89% pure live seed. Seed yield in Beeville was 387 lbs. pure live seed per acre.

Pests and Potential Problems

Thrips have been observed in the seed heads, however they are fairly easy to control with organophosphate (e.g.Malathion) and carbamate (e.g. Sevin) insecticides. Please contact your local agricultural extension specialist or county pest specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

Cultivars, Improved, and Selected Materials

STN-496 Germplasm is a selected class release developed from seed originating from Bexar County, Texas. It was released cooperatively between the South Texas Natives Project, Texas AgriLife Research-Beeville, and the E. Kika de la Garza Plant Materials Center in 2009. STN-496 Germplasm will be marketed as part of a blend of 2 accessions of *Plantago* called Divot Tallow Weed Blend. STN-496 Germplasm was selected for excellent observed forage characteristics, ease of mechanical harvest and agronomic production, good active seed germination to dormancy ratio, and extremely high seed yields in comparison to other South Texas collected accessions. It is intended to provide food for wildlife. Certified seed is available and Breeder Seed will be maintained by South Texas Natives, Kingsville, Texas.

Prepared By and Species Coordinator:

John Lloyd-Reilley & Shelly D. Maher, USDA NRCS, E. "Kika" de la Garza Plant Materials Center, Kingsville, Texas

Forrest S. Smith, South Texas Natives, Caesar Kleberg Wildlife Research Institute,
Texas A&M University-Kingsville, Kingsville, Texas

Edited:

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Presentations for STPMC in FY 2009

Date	Title	Presenter(s)
10/08/2008	Native Species and Genetic Diversity	J. Lloyd-Reilley
11/13/2008	Seeds for Conservation PMC Field Tour	J. Lloyd-Reilley & S. Maher
11/13/2008	NRCS Restoration Workshop	S. Baggett, J. Hohlt & R. Ziehr
11/13/2008	Choices and Partnerships	J. Lloyd-Reilley
11/19/2008	CPCI Endemic Species Progress Report	J. Pittman III & J. Lloyd-Reilley
12/08/2008	Native Texas Plants and PMC Equipment	S. Maher
12/16/2008	King Ranch; Forage Plants Progress Report	J. Lloyd-Reilley
02/02/2009	Kika de la Garza PMC Current and Future Releases	J. Lloyd-Reilley
02/03/2009	STPMC Overview and Demonstration Plantings	S. Maher
02/23/2009	PMC Accomplishments & Direction	J. Lloyd-Reilley
04/06/2009	PMC Operations- West Texas Introduction	J. Lloyd-Reilley
05/14/2009	Native Plants for Critical Area Seedings	J. Lloyd-Reilley
05/20/2009	Texas-Louisiana Coastal Cooperation	J. Lloyd-Reilley
07/06/2009	South Texas - Plant Materials Workshop	J. Lloyd-Reilley & S. Maher
07/07/2009	So Texas PM Workshop	J. Lloyd-Reilley & S. Maher
07/08/2009	So. TX PM Workshop	J. Lloyd-Reilley & S. Maher
07/09/2009	South Texas PM Workshop	J. Lloyd-Reilley
07/29/2009	PM CoOperations	J. Lloyd-Reilley
09/17/2009	Plant Materials Technical Meeting	J. Lloyd-Reilley
09/30/2009	Kika de la Garza PMC serving the STX Assoc SWCD	J. Lloyd-Reilley
11/04/2009	Seed Collection Workshop	J. Lloyd-Reilley& S. Maher

Publications for STPMC in FY 2009

Title	Author(s)
NRCS Species for Plant Collection - Sand Dropseed	S. Maher
NRCS Species for Plant Collection - Sand Lovegrass	S. Maher
NRCS Species for Plant Collection - Texas Peachbush	S. Maher
NRCS Speices for Plant Collection - Engelmanns Daisy	S. Maher
Plant Profile: Black Eyed Susan	S. Maher
Plant Profile: Clammyweed	S. Maher
Plant Profile: Erect Dayflower	S. Maher
Plant Profile: Hairy grama	S. Maher
Plant Profile: Low Prairie Clover	S. Maher
Plant Profile: Texas Grama	S. Maher
Plant Profile: White Prairie Clover	S. Maher
Seed Increase of South Texas Natives' Plant Releases	P.Maywald, J.Lloyd-Reilley, et al
Evaluation of South Texas Native Plants for Use in Horticulture	P.Maywald, R.Harkey, S.Maher, & F.Smith
Native Species and Genetic Diversity	J. Lloyd-Reilley, V.Hipkins, & S. Maher
Screening SouthTexas Plant Seedlings for Salinity Tolerance	L.Rock, J.Lloyd-Reilley, & S. Nelson
Seed Germination Responses to Varying Levels of Salinity	L.Rock, J.Lloyd-Reilley, & S. Nelson
Effects of Nitrogen Fertilizer on Bristlegrass Seed Production in Texas	J. Lopez Garcia, J. Ortega-Santos, W. Ocumpaugh & J.Lloyd-Reilley
Windmillgrass Seed Yield Response to Nitrogen Fertilization in Texas	J. Lopez Garcia, J. Ortega-Santos, W. Ocumpaugh & J.Lloyd-Reilley
Orange Zexmenia Seed Release for Wildlife Mixes	J.Lloyd-Reilley, S. Maher, P. Maywald, & F.Smith
Redseed Plantain Plant Fact Sheet	J. Lloyd-Reilley, S. Maher, & F. Smith
Hookers Plantain Plant Fact Sheet	J. Lloyd-Reilley, S. Maher, & F. Smith
Rio Grande Clammyweed Plant Fact Sheet	J. Lloyd-Reilley, S. Maher, & F. Smith
2008 Annual Technical Report	J. Lloyd-Reilley & S. Maher
2008 Progress Report of Activities	J. Lloyd-Reilley & S. Maher

Publications for STPMC in FY 2009 (continued)

Title	Author(s)
Native Legumes for Rangeland Restoration ,Pastures, and Wildlife Habitat	J. Muir, T. Butler, W. Pitman, J. Lloyd-Reilley, P. Maywald, & R. Cragar
Evaluation of Three Endemic Plant Species of the Refugio-Goliad Prairie	J. Pittman, III, J. Lloyd-Reilley, & T. Fulbright
Notice of Release of Redseed Plantain	F. Smith & P. Maywald
Notice of Release of STN-561 Germplasm Hookers Plantain	F. Smith & P. Maywald
Notice of Release of Zapata Germplasm Rio Grande Clammyweed	F. Smith & P. Maywald
Divot Tallowweed Blend Release Brochure	F. Smith
Zapata Germplasm Rio Grande Clammyweed Release Brochure	F. Smith
Development of Native Forb Germplasm Releases for Habitat Restoration	F. Smith, W.Ocumpaugh, P.Maywald, J. Lloyd-Reilley, S. Maher, & K. Pawelek
Evaluation of South Texas Native Plant Germplasm for Ecotype Development	F. Smith, K. Pawelek, P. Maywald, J. Lloyd-Reilley, S. Maher, W. Ocumpaugh, & J. Garza
Notice of Release of La Salle Germplasm Arizona Cottontop Selected Class of Natural Germplasm	F. Smith, W.Ocumpaugh, P.Maywald, J. Lloyd-Reilley, S. Maher, K. Pawelek, A. Scott Jr. & J. Garza
Evaluating Native Windmillgrasses for Use on Texas Right-of-Ways	A. Lund, T. Fulbright, & J. Lloyd-Reilley
Mowing Regimen Evaluation for Assessing Sustainable Long-term Cover	A. Lund, T. Fulbright, & J. Lloyd-Reilley
Reseeding Texas Right-of-Ways: Drill Seeding versus Broadcast Seeding	A. Lund, T. Fulbright, & J. Lloyd-Reilley
Revegetating Texas Right-of-Ways with Native Seed Mixtures	A. Lund, T. Fulbright, & J. Lloyd-Reilley
Evaluation of Texas native Grasses for TxDOT Right of Ways	A. Lund, T. Fulbright, & J. Lloyd-Reilley
Interspecific Plant Competition Along South Texas Roadsides	A. Lund, T. Fulbright, & J. Lloyd-Reilley
Forage Yield and Nutritive Value of Four Native Texas Warm Season Grasses	A. Lee, J. Lloyd-Reilley, B. Lambert, & J. Muir

New Release for STPMC in FY 2009

Zapata Germplasm Rio Grande clammyweed
STN-561 Germplasm Hookers plantain
STN-496 Germplasm redseed plantain

Other Active Releases for STPMC

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