



Status of Plant Materials at the Nicholls State University Farm

Louisiana Native Plant Initiative

2010

**Louisiana Native Plant Initiative
Nicholls State University Farm
Annual Report
2010**

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Natural grassland ecosystems from coastal prairie, pineland forest, to coastal wetlands have experienced significant reductions in habitat over time. Expanses of natural grasslands and other wild habitats have been converted to cropland, and residential and industrial developments. However, the most critically imperiled ecosystem is Louisiana's coastal wetlands and barrier islands. The coastal area encompassing vast grasslands, natural ridges with herbaceous and woody vegetation, beach and dune plant associations, and barrier island complexes is essential to the health and existence of Louisiana residents, human and wild.

The emphasis of this project is to identify, collect, increase, and make available indigenous flora for the preservation and conservation of grassland and other wild habitats important to Louisiana landscapes.

Seed or vegetative plant materials have been collected from naturally occurring grassland populations for establishment at the Nicholls State University Farm in Thibodaux, Louisiana. Plant materials assembled have been planted in polycross blocks or in plant and seed increase blocks at the Nicholls Farm. Plant performance of each accession has been evaluated since 2007 and performance was based on anthesis ((the period during which a flower is fully open and operational), foliage characteristics, and persistence of plant health and vigor.

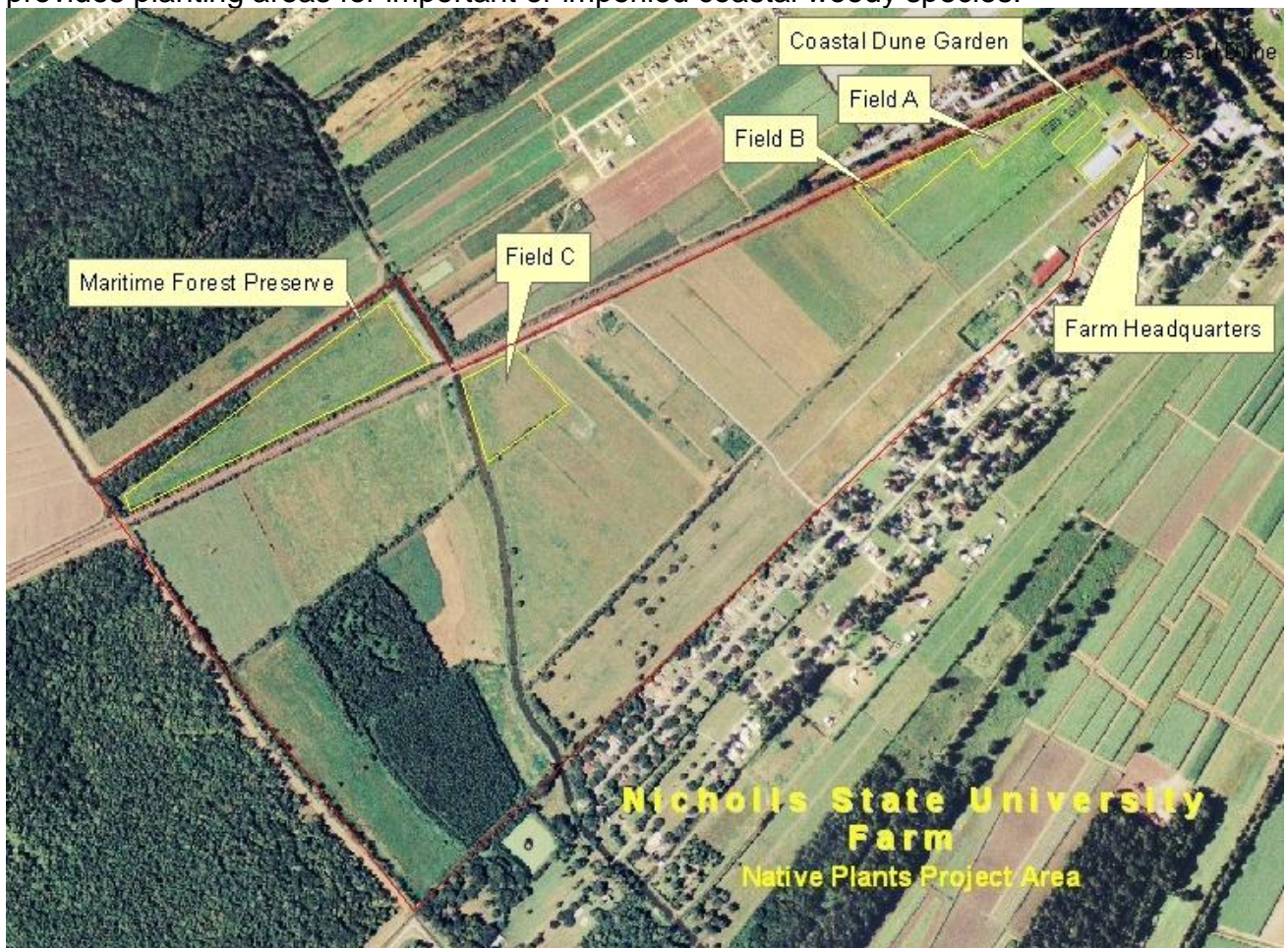
Two principle objectives important to this project's success are; 1) the study and development of adapted and promising native plant germplasm that can be used to conserve vanishing or imperiled grassland ecosystems important to Louisiana, and 2) to provide performance tested plant materials for the development of a locally-adapted native plant seed industry.



NSU FARM DEDICATED STUDY AREAS

A 2.25 acre (Field A) native plant nursery and study site has been established at the Nicholls State University (Nicholls) Farm near Thibodaux, Louisiana. Ten cultivated blocks of varying sizes have been established for the purpose of planting, testing, and increasing locally adapted Louisiana native plant materials. An irrigation system has been installed providing water to each cultivated planting block. Soils on all of the planting blocks are Commerce silt loam. The site is well drained and soil conditions are favorable for planting, producing, maintaining, and harvesting many native terrestrial plant species.

An additional eight acres have been dedicated for project growth. Two acres (Field B) near the original nursery site provides space for additional plot needs. A six acre site (Field C) isolated from the original nursery site has been provided by Nicholls State University for foundation seed increase. A 20 acre block was dedicated in 2009 for the establishment of a Maritime Forest Preserve. This field provides planting areas for important or imperiled coastal woody species.



NATIVE PLANT SPECIES ASSEMBLED IN ESTABLISHED PLOTS

Plant materials for the restoration and conservation of coastal prairie and longleaf pinelands originated as the major emphasis of this program. Other grassland habitats of importance included at Nicholls to advance avian species habitat across Louisiana include:

- Coastal Beach and Dune
- Marsh Ridge and Maritime Forest

There currently 20 species of plants assembled at the Nicholls farm as a result of this project (Table 1). There are currently five established fields divided into multiple plots that are used for crossing blocks, foundation increase, foundation seed increase, seed increase, plant increase, or germplasm preservation (Tables 2 and 3).

SEED HARVEST

Seed crops for were all harvested by hand. This is conducted by cutting the terminal end of plant stems with seed units attached.

Cut stems are then run through a Kincaid Bundle Thrasher to separate seed units from plant stems. The thrashing process leaves seed units, stem, leaf pieces, and other inert materials that need separating.

Harvested and thrashed materials are then hand screened to remove all inert materials leaving clean seed units. The USDA NRCS Plant Materials Center, Galliano, LA also assists with final processing of seed crops using an air screen cleaning machine and debearding for chaffy grass seeds.



Table 1. Native plant species assembled and being maintained for seed and plant increase at the Nicholls State University Farm.

Botanical name	Common Name(s)	Growth Habitat
<i>Andropogon gerardii</i>	Big Bluestem	Graminoid
<i>Baptisia sphaerocarpa</i>	Yellow Wild Indigo	Forb
<i>Callicarpa Americana</i>	American Beautyberry	Shrub
<i>Chasmanthium latifolium</i>	Inland Sea Oats	Graminoid
	Indian Woodoats	
<i>Helianthus mollis</i>	Ashy Sunflower	Forb
<i>Ipomoea pes-caprae</i>	Railroad Vine	Forb
	Bayhops	
<i>Muhlenbergia capillaries</i>	Gulf Muhly	Graminoid
<i>Panicum amarum</i>	Bitter Panicum	Graminoid
<i>Panicum virgatum</i>	Switchgrass	Graminoid
<i>Pycnanthemum tenuifolium</i>	Narrowleaf Mountainmint	Forb
	Slender Mountain Mint	
<i>Quercus virginiana</i>	Live Oak	Tree
<i>Rudbeckia grandiflora</i>	Rough Coneflower	Forb
<i>Schizachyrium maritimum</i>	Gulf Bluestem	Graminoid
	Seacoast Bluestem	
<i>Silphium gracile</i>	Slender Rosinweed	Forb
<i>Sorghastrum nutans</i>	Indiangrass	Graminoid
<i>Spartina patens</i>	Marshhay Cordgrass	Graminoid
	Wiregrass	
<i>Spartina spartinae</i>	Gulf Cordgrass	Graminoid
<i>Tripsacum dactyloides</i>	Eastern Gamagrass	Graminoid
<i>Uniola paniculata</i>	Sea Oats	Graminoid
<i>Zanthoxylum clava-herculis</i>	Hercules club	Tree
	Toothache Tree	
	Southern Prickly Ash	

Table 2. List of current species and type of planting for each block number (size in acres in parenthesis) and the type of planting block for field A. Blocks 2, 3, and 10 did not have any plants at the time of this report.

Block # (acres)	Species	Type Planting
1 (0.04)	<i>Sorghastrum nutans</i>	Crossing block (sexual)
2 (0.06)	OPEN	
3 (0.08)	OPEN	
4 (0.10)	<i>Andropogon gerardii</i>	Crossing block (sexual)
5 (0.12)	<i>Muhlenbergia capillaris</i>	Plant and Seed increase
6 (0.14)	<i>Tripsacum dactyloides</i>	Crossing block (sexual)
7 (0.16)	<i>Panicum virgatum</i>	Crossing block (sexual)
8 (0.18)	Various Native Forbs	Seed increase
9 (0.20)	<i>Spartina spartinae</i> <i>Spartina patens</i>	Plant increase (vegetative)
10 (0.18)	OPEN	

Table 3. List of current species and type of planting block for four established fields located at the Nicholls Farm.

Established Field	Species	Type Planting
Field B	<i>Panicum virgatum</i> <i>Tripsacum dactyloides</i>	Plant and Seed Increase Plant Increase
Field C	<i>Andropogon gerardii</i> <i>Panicum virgatum</i> <i>Sorghastrum nutans</i> <i>Tripsacum dactyloides</i> <i>Helianthus mollis</i> <i>Rudbeckia grandiflora</i>	Foundation Seed Increase Foundation Seed Increase Foundation Seed Increase Foundation Seed Increase Foundation Seed Increase Foundation Seed Increase
Maritime Forest Preserve	<i>Quercus virginiana</i> <i>Zanthoxylum clava-herculis</i>	Germplasm Preservation / Future Seed Production Germplasm Preservation / Future Seed Production
Beach-Dune Habitat	<i>Ipomoea pes-caprae</i> <i>Panicum amarum</i> <i>Muhlenbergia capillaries</i> <i>Spartina patens</i> <i>Spartina spartinae</i> <i>Schizachyrium maritimum</i> <i>Uniola paniculata</i>	Plant Increase Plant Increase Plant Increase Plant Increase Plant Increase Plant Increase Plant Increase

REVIEW BY SPECIES

We have worked with several species throughout the course of this project. Specific activities for each species follows.

Terrestrial Grassland Species

BIG BLUESTEM, *Andropogon gerardii* Vitman

An assembly of big bluestem plant collections originating from remnant populations found naturally occurring in the Coastal Prairie ecoregion of Louisiana was established at the Nicholls State University Farm in the spring of 2007 (Table 2). The assembly represents a cross-pollinating block which is managed for seed production. This is



considered a breeder block of which the first filial (F1) generation seed produced and harvested is used for planting to an isolated foundation seed increase block (Field C; Table 3). Seed production resulting from the foundation block is second filial generation (F2) used for actual use-testing for performance and adaptation and for distribution to seed growers interested in growing and producing seed crops.

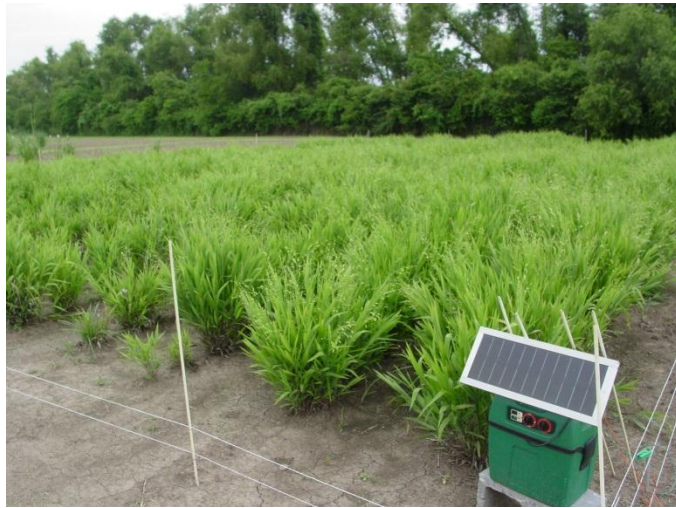


Plant materials assembled and established exhibited excellent vigor and persistence for the duration of this project. Seeds harvested for the 2010 crop year appear to be the best production year to date. The seed lot was thrashed in early November, 2010 and hand screened to remove inert materials. Final processing has resulted in 40 bulk pounds (18.2 kg) of seed harvested from a 0.06 acre block

(estimated 666 bulk pounds (302 kg) per acre). Germination tests will be used to determine pure live seed (PLS) as a measure of seed quality and yield next spring. The PLS determination will be used to efficiently plant an F1 foundation seed increase block in 2011.

INDIAN WOODOATS, *Chasmanthium latifolium* (Michx.) Yates

Two planting blocks (Table 1) of Indian woodoats were installed in early (block A5) and late (block A3) spring of 2007. Both planting blocks were maintained for seed production. Seeds were harvested from both blocks on 3 October 2007. Poor stand persistence (plant thinning within rows) was first observed after the 2007 seed harvest in planting block A5. Stand decline in block A5 was also notably evident after spring recovery



in 2008 as only approximately 15% of the original plants recovered. After assuring that plant materials in A5 were not recovering, the stand was destroyed. Block A3 remained healthy and vigorous with excellent stand density until mid-summer of 2008, and some stand thinning became apparent by October. A Nicholls State University plant pathologist assisted sampling plant materials to assess potential problems and provide potential solutions. A Nicholls State University plant pathologist assisted sampling plant materials to assess potential problems and to provide potential solutions and found the root mass was infested by both *Rhizoctonia* (a fungus) and unidentified nematodes. The field had been experiencing extreme of wet and dry periods. The pathologist suggested that plant root health and growth was reduced by *Rhizoctonia* during wet periods and then further impacted by nematodes during dry periods. The combination of factors probably reduced plant vigor and health resulting in mortality. Block A3 followed the same pattern of decline as block A5. About 25% of the woodoats stand in A3 recovered in the spring of 2009. All of the healthy vigorous plant materials persisting into 2009 was lifted from block A3 and transplanted to Field B for observation.



Field B transplants persisted and remained vigorous through 2010. All plants in Field B have been transplanted to trade-gallon containers for vegetative increase. Plant materials established in containers will be divided and increased for replanting and evaluated for adaptation and potential use in 2011. Seed crops harvested from woodoat stands in 2007 and 2008 were

delivered to the USDA NRCS Plant Materials Center in Galliano, Louisiana. The PMC is providing seeds to the U.S. Forest Service, Kisatchie National Forest.

GULF MUHLY, *Muhlenbergia capillaris* (Lam.) Trin.



Gulf Muhly was added to this project by planting vegetative propagules in block A5 (Field A) on 24 June 2009. Gulf muhly is native to much of Louisiana and has several common names such as hairawn muhly, mist grass, purple muhly, and pink muhlygrass. This species is tolerant of dry to wet soil conditions and can be found growing on uplands to coastal beaches and barrier islands. Gulf Muhly is a clump forming, perennial, warm-season grass with

stout upright stems and blue-green needlelike foliage. This plant is especially showy in the fall when it's pinkish seed culms stand out and are notable at considerable distances.



Gulf muhly produces panicles with small seeds on the terminal ends of seed culms. Seeds of

Gulf muhly are an important food source for many bird species and provides shelter habitat for many bird species and other wildlife (USDA Plants Database).

Two sources of Gulf Muhly are established at the Nicholls Farm. One coastal prairie source was provided by the USDA, NRCS East Texas Plant Materials Center. The second source was collected from a wild stand found growing on Fourchon Beach in 2009. Plant characteristics vary considerably between the two ecotypes. The Louisiana source flowers and matures later than the coastal prairie source. Stem and flower color, density, and plant robustness is more evident for the Fourchon source. We are currently marinating this stand for future development.

SWITCHGRASS, *Panicum virgatum* L.

An assembly of switchgrass collections originating from natural populations found growing throughout south Louisiana was established to block A7 (Field A) in 2007. Five representatives from 32 populations (N = 160 total plants) were planted within a completely randomized block that was managed for seed production. A small sampling of seed was collected from the crossing block in the fall of 2007. Germination testing resulted in 0% germination, which is a

typical germination rate for first year seed production for this species. Seed production in 2008 was poor. Only 3 bulk pounds (1.4 kg) of clean processed seed was collected prior to the



winds of Hurricane Gustav stripping what seeds remained on seed culms. The 2009 seed crop year resulted in 11 bulk pounds (5 kg) of clean processed seed. Seeds harvested from the 2010 crop year are to be processed early 2011. Though total seed yield is anticipated to be much greater than past years, seed quality is still a concern and needs further study. Seed fill appeared poor from small grab samples taken while harvesting the 2010 seed crop.

One accession originating in Jefferson Parish, Louisiana flowers and matures seed approximately a month prior to other ecotypes in the block. This accession is a small statured switchgrass compared to other ecotypes in the assembly. Because this accession is not compatible for cross pollination with other plants in the crossing block, all five plants were



lifted in 2008, divided, and transplanted to an isolated block in field B. This ecotype will be evaluated for potential use as a small early maturing switchgrass. Seeds were hand harvested and evaluated for seed quality. Because this is a small seed lot, seeds will be planted to germination flats and viable seedlings will be transplanted to containers for increase and field planting in 2011.

GULF BLUESTEM, *Schizachyrium maritimum* (Chapman) Nash

Gulf bluestem is ranked on the Louisiana State Heritage Conservation Status list as an S1 (extensive rarity and factors which make it especially vulnerable to extirpation or local extension). Gulf bluestem is endemic to coastal and offshore island beach and dune habitats in Louisiana. This is an important native plant used for restoration and enhancement of coastal beach and dune habitat.



Block A2 (Field A) was planted with vegetative plant materials originating from Timbalier Island, Terrebonne Parish, Louisiana in 2007. Maintaining and preserving plant materials of the Timbalier source is essential to preserving



this germplasm for future restoration and conservation use. One goal of planting at the Nicholls Farm is to serve as a repository of important germplasm and to protect from potential genetic loss due to catastrophic coastal events and coastal land loss.

The planting has persisted in a healthy vigorous condition from 2007 through 2009. Excessive wet, saturated field conditions experienced from July through the fall of 2009 caused a decline in stand vigor and survival. Therefore, all plants were removed and planted in containers in 2010 for increase and replanting on raised bed culture. A source originating from Elmer's (Goat) Island near Grand Isle, Louisiana was collected and added to the plant assembly at Nicholls in 2010. Both sources are planted in trade-gallon containers for increase and field planting to preserve this imperiled germplasm.

INDIANGRASS, *Sorghastrum nutans* (L.) Nash

An assembly of Indiangrass collections originating from natural populations growing in the Coastal Prairie of southwest Louisiana was established in block A1 (Field A) in 2006. Five individuals from 22 populations (N = 110 total plants) were planted within a completely randomized block that was managed for seed production. A small quantity of seed (0.5 lbs) was harvested in 2007.



Because seed culms were stripped of maturing flowers by winds from Hurricane Gustav, we did not collect any seeds from this block in 2008. Seeds were harvested by hand stripping on 12 October 2009; however, the seed crop was poor and only yielded just over a pound (480 grams) of clean processed seeds.



Interior plants lodged reducing potential seed yield. Also, wet rainy days during flowering probably adversely affected pollen distribution. The 2010 crop year, though still experiencing interior lodging, produced 3.0 bulk pounds (1.4 kg) of seed or an estimated 150 pounds (68 kg) per acre.

All established plots (110 ea.) remain

vigorous and are persisting well. A fungal disease identified as *Puccinia virgata* (rust) has been reported to be specific to Indiangrass, but has not been found in plots at the Nicholls Farm.

EASTERN GAMAGRASS, *Tripsacum dactyloides* (L.) L.

Eastern gamagrass populations were collected from natural populations growing in southeast Louisiana in 2006 and 2007. Five propagules from 35 populations

(N = 175 total plants) were planted to a completely randomized block in 2007 (Block A6, Field A). Seed crops were hand harvested 23 July 2008, which resulted in 12 bulk pounds (5.4 kg) of clean



processed seed. The 2009 seed crop was hand harvested on 14 July 2009 and yielded 11 bulk pounds (5.0 kg) of clean processed seed. Seed tests without any stratification treatments resulted in approximately 20% germination. Seed crops for 2008 and 2009 were bulked together and planted in Field C on 29 March 2010. Unfortunately, no seedlings have been observed to date. The 2010 seed crop was hand harvested from Block A6 (Field A) 21 July 2010 and processed.

Clean seed yielded 10 bulk pounds (4.5 kg) of seed from a 0.08 acre plot or estimated 125 pounds (57 kg) per acre. The current seed crop will be used to attempt another F1 Foundation seed increase block in Field C in late December 2010. A successful planting will be managed for seed production and subsequent seed distribution for field testing and field increase at other locations if shown promising for conservation use.

A note of interest, E.J. Raynor, graduate student, Nicholls State University Department of Biological Sciences, observed and photographed a vermilion flycatcher (*Pyrocephalus rubinus*) foraging for insects in the eastern gamagrass plots in September, 2008.



Wildflowers

Five coastal prairie wildflower species have been established at the Nicholls Farm for seed increase. Vegetative plant materials were planted to small blocks in 2007 to evaluate performance and adaptation, and to develop seed production and management protocols. Yearly seed harvests have been conducted and seeds used to plant seed increase plantings at Nicholls Farm and USDA Natural Resources Conservation Service Plant Materials Center in Nacogdoches, Texas.



Plants established at the Nicholls Farm originate from seeds collected from naturally occurring populations growing on remnant sites in the Coastal Prairie Ecoregion of southwest Louisiana. Seeds were delivered to the USDA NRCS Plant Materials Center in Galliano, Louisiana, germinated, and transplanted to containers for grow out. The container grown plant materials were then used to plant to plots at the Nicholls Farm.

All of the wildflower plots have been noted to attract abundant numbers of pollinators. Honeybees are prevalent in the mountainmint plot, but of special note, native bees are prevalent in the slender rosinweed and rough coneflower plots.

Status of Terrestrial Wildflower Species

YELLOW WILD INDIGO, *Baptisia sphaerocarpa* Nutt.

Yellow wild indigo is a native herbaceous perennial important to the Coastal Prairie region of southwest Louisiana. Plant specimens have been reported to occur in northwest Louisiana and including St. Tammany Parish of southeast Louisiana (NRCS Plants Database). Plants are shrub-like, heavily branched and erect to 39 in (1 m) tall. Showy yellow flowers appear in early summer with seed maturing in mid-July. Several seeds are encapsulated in round woody-like pods. This species may have potential for conservation uses throughout wildland habitats of Louisiana.



Plant materials have persisted and maintain vigor and health since planting in 2007. Annual seed harvests have been collected and bulked to use for foundation seed increase. First generation seeds were planted to Field C in March, 2010. The planting was unsuccessful with no germination and plant establishment realized

through late 2010. Current year seeds will be used to document seed quality (germination). Remaining seeds will be planted to Deepots® for vegetative plant increase and planting to Field C in 2011. Seeds from a foundation seed increase block will then be used for distribution and field testing.

ASHY SUNFLOWER, *Helianthus mollis* Lam.

Ashy sunflower is an herbaceous perennial in the family Asteraceae reaching heights of 39 in (100 cm). Leaves are opposite, stiff, sessile clasping at the stem, entire to lightly serrate, rough-hairy or pubescent. Stems are erect, densely gray pubescent. Flowers are composed of central yellow disk florets and 15-30 yellow petal-like ray florets. Fruits are dark brown achenes tipped with two pointed scales that enclose a small single seed. Plants arise from branched rhizomes generally forming dense colonies. An excellent pollinator species, ashy sunflower attracts native bees and hummingbirds.



Seeds were hand collected from indigenous populations of *Helianthus mollis* growing in the Coastal Prairie region of Louisiana in 2006. Harvested seeds represent the genetic potential of what remains of remnant populations endemic to this historical grassland ecosystem. Seeds were processed, stratified, and planted to germination flats. Healthy vigorous seedlings were then lifted from germination flats and transplanted to IP200 Rigi-pots (multipot trays), each housing 25 growing cells (4.7 in X 2 in; 12 cm x 5 cm). Established plant materials were planted to a polycross block in the spring of 2007. Plots were planted with 3 ft (1 m) between rows and 1 ft (0.3 m) within rows to compete a 23 ft x 40 ft (7 m x 12 m) polycross plot managed for seed production. Management criteria, anthesis period, seed maturation, and harvest dates have been documented.

Good seed crops have been realized each production year since 2007. A stem boring insect *Dectes texanus* (long horned beetle) was noted in the plot in 2009. When impacted by the long horned beetle, axillary portions of stems begin to droop, brown, and die. An entry hole with oozing pitch can be found just below a drooping stem. The infestation was not at a threshold level in 2009 but seed yields were less than previous harvests. Boring insect infestation was significant in 2010 with a large percentage of the stand being infected resulting in minimal seed production. Available seeds will be used to facilitate greater opportunities for plant and seed increase.



Seeds were provided to the NRCS East Texas Plant Materials Center, Nacogdoches, Texas in 2009. The PMC has been successful establishing a 0.25 acre planting. They were able to make a significant seed harvest resulting in 10 pounds (4.5 kg) of clean seed

for the 2010 crop year. These seeds will be used to further expand the planting at the Texas PMC and the Nicholls farm, and to provide seeds for field testing and advancing the potential commercial release of a Louisiana ecotype.

NARROWLEAF MOUNTAINMINT, *Pycnanthemum tenuifolium* Schrad.

Narrowleaf mountainmint is an herbaceous perennial of the Lamiaceae family. Like other mints this species has four-ranked stems with small opposite leaves. Plants grow to about 76 cm in height with clusters of white flowers terminating stems. Tiny black hard coated seeds appear like finely ground pepper grains.



A small crossing block was established in 2007 with plants in rows on 39 in (100 cm) centers. Plants have persisted well and are easily maintained. Flowering plants have been noted to attract large numbers of honeybees, native bees, and wasps.

Annual seed production has been consistently good. Seeds from the 2008 and 2009 seed crops were used to plant an increase block to Field C on April 9, 2010. The planting was unsuccessful, and no plant establishment has been realized through the 2010 growing season. Seeds from 2009 and 2010 seed lots will be used to plant to containers and transplanting to the increase block in 2011.

ROUGH CONEFLOWER, *Rudbeckia grandiflora* (D. Don) J.F. Gmel. Ex DC.

Rough coneflower is a native herbaceous perennial occurring in most west Louisiana parishes. Seeds were collected from naturally occurring populations growing in remnant coastal prairie sites of southwestern Louisiana in 2006. Plants were grown from seed and vegetatively transplanted to a polycross block at the Nicholls Farm in 2007. Plants were established on 24 in (60 cm) centers within rows and 39 in



(100 cm) between rows to complete a crossing block 23 ft x 40 ft (7 m by 23 m).



Good seed crops have been harvested each production year since 2007. However, stand persistence began declining in 2009 with considerable decline through 2010 resulting in few surviving plants

by the end of the current growing season. Respectively, the 2010 seed crop is significantly lower than previous years. Available seeds will be used for container grow out and transplanting to Field C in 2011 for foundation increase. To enhance seed production potential Nicholls provided seeds in 2009 to NRCS Plant Materials Center in Nacogdoches, Texas.



Slender Rosinweed, *Silphium gracile* A. Gray

Slender rosinweed is an herbaceous perennial found naturally occurring over much of western Louisiana. This species is a member of the Asteraceae family. Seeds were collected from plants growing in remnant coastal prairie sites in southwest Louisiana. Plants were grown from seed and transplanted to a small block at the Nicholls Farm in 2007. Though the plot consists of ten plants, flowers are prolific and produce a fair number of seeds. Flowering plants have been especially noted for the presence of native bees.



Marsh Ridge and Maritime Forest

Nicholls State University dedicated 20 acres to establish selected woody species important to coastal habitats of southeast Louisiana. Many coastal habitats are imperiled or critically eroding due to issues associated with Louisiana's coastal land loss dilemma. Marsh ridge and maritime forest habitats associated with coastal marshlands and barrier islands provide important food, cover, and resting platforms for resident and annual migratory avian species. Major flyways across the Gulf of Mexico are existent largely due to Louisiana's biologically productive coastal ecosystems. The coastal area encompassing vast grasslands, natural ridges with herbaceous and woody vegetation, beach and dune plant associations, and barrier island complexes is essential to the success of migratory birds that make an annual trek across the vast open waters of the Gulf of Mexico. The tenuous crossing of the Gulf only becomes more critical as coastal land masses retreat and supporting plant communities are converted to greater expanses of open water.

One of the more important tree species found occurring along coastal areas of Louisiana is live oak, *Quercus virginiana*. Many natural marsh ridge and



barrier island land masses supported live oak and hackberry associations. These live oak associations have survived and evolved with exposure to annual tropical disturbances and storm events. The locally adapted ecotypes developed the ability to tolerate saltwater spray, short periods of inundation by saltwater, and strong tropical winds.

Coastal land loss affects all coastal ecosystems and these habitats are not without exception. Much of Louisiana's live oak/hackberry associations have eroded along with other marshland habitat or what remains is imperiled.

Nicholls is taking a proactive approach to identify and collect germplasm of imperiled coastal woody plant species. Fruit from specimen trees or populations representing genetic potential found naturally occurring throughout Louisiana's coastal ecosystems are collected, accessioned, and germinated for seedling production. Seedlings then are transplanted to a common garden with two goals; 1) germplasm preservation, and 2) seed tree nursery.

Live oak acorns have been collected from populations found occurring in St. Bernard Parish, Jefferson Parish (Grand Isle), and Terrebonne Parish. Five seedlings representing each accession has been planted to a spaced garden on 40 ft (12 m) centers. Additional germplasm will be added to the woody garden as important specimen trees or populations can be identified, accessed, and fruits collected.



Coastal Beach and Dune Plant Associations

The majority of Louisiana's coastal shorelines exist as estuaries with salt marsh plant associations dominated by smooth cordgrass (*Spartina alterniflora*). However, there are also sandy shorelines associated with barrier islands and spits. These sandy environments are dynamic in that the landscape is always changing. Sands are continually subject to drift and transport by winds, waves, and currents. Drifting sands that move beyond the littoral zone are picked up by wind and transported forming beach and dune complexes. Dunes are formed when vegetation and other obstacles either slow or alter wind patterns causing drifting sand particles to drop out of the wind column. Only a few plant species are adapted with an ability to tolerate and thrive in this ever changing hostile environment. Dune plant species that tolerate and persist can endure:

- rapid accretion and burial by sand
- low nutrient availability
- periodic inundation by seawater
- constant battering by winds and salt-spray
- high substrate temperatures and xeric conditions

Nicholls has dedicated space to establish a dune species garden. Vegetative plant materials representing important coastal dune species have been assembled and planted to a common garden in 2010. The following species have been established to date:

1. bitter panicum, *Panicum amarum*
2. sea oats, *Uniola paniculata*
3. Gulf bluestem, *Schizachyrium maritimum*
4. marshhay cordgrass, *Spartina patens*
5. Gulf cordgrass, *Spartina spartinae*
6. Railroad vine, *Ipomoea pes-caprae*
7. coastal dropseed, *Sporobolus virginicus*
8. Gulf muhly, *Muhlenbergia capillaris*





Marshhay Cordgrass



Gulf Cordgrass



Bitter Panicum

REVIEW AND DISCUSSION

Assembly and planting of selected grassland plant species began at the Nicholls Farm in 2006. Nineteen plant assemblies consisting of eleven grasses, seven forbs (wildflowers), and one woody species have been established to replicated crossing blocks and initial plant increase plots. Assemblies of each species originate from endemic plant populations found naturally occurring in Louisiana's grassland landscapes. Seed or vegetative propagules have been collected from wild populations, accessioned, and established by species to a common garden for polycross (sexual production) or vegetative (asexual) plant increase. Plant materials (accessions) planted to a common garden not only provide for seed increase from parental lines but also an ability to evaluate and document morphological and phenotypic characteristics among ecotypes.

Plant performance of each accession has been evaluated since 2007. Observations include anthesis, foliage characteristics, plant vigor, and overall persistence. Each of the grass assemblies are persisting and producing annual seed crops with the 2010 crop year providing the best seed yields to date. Switchgrass is the only seed crop that appears low in quality for each year produced. Seed quantity is generally good but seed quality as related to seed fertility and germination has been poor. Seeds produced from big bluestem, indiagrass, eastern gamagrass, and switchgrass polycross blocks were used to plant to Field C first generation foundation seed increase plots on March 10, 2010. Dry field conditions from planting through July resulted in no seedling germination. Foundation seed increase planting will be attempted again in the spring of 2011.

Each of the wildflower assemblies produced seed crops in 2010, though seed yields declined in comparison to previous years. All of the wildflower plots will need to be replanted in 2011 with the exception of slender mountainmint and slender rosinweed. Seeds harvested from each wildflower plot were also used to plant foundation seed increase blocks in Field C in March, 2010. As with the grass foundation crops attempted, there was no seedling production. Seeds from ashy sunflower and rough coneflower were provided to the USDA NRCS Plant Materials Center (East Texas PMC), Nacogdoches, Texas for planting and foundation seed increase in 2009. The PMC has reported that they have been successful planting and establishing a 0.25-acre ashy sunflower plot. The PMC plans to increase their planting to about 0.5-acres in the spring of 2011. They have also been successful establishing a small seed increase plot of rough coneflower.

All production fields will be managed and used to further increase foundation plant materials for field testing and to provide seeds to partners for additional foundation increase. Casual observations of the native grass plots appear to be presenting habitat for various species of birds. Numerous birds and especially

noted red-wing blackbirds and doves can be seen in and around the grass plots throughout the vegetative growing season. This is especially noted when plots are maturing mid-summer through fall. Doves and other small statured species are noticeably present during winter months in the dormant standing plant vegetation. Of particular interest, native bees were seen foraging and gathering pollen from flowering anthers in eastern gamagrass and big bluestem polycross blocks.

Wildflower species (forbs) established at the Nicholls Farm are notably showy when in full flower. Of interest is the utilization of seed crops by bird species for food and pollinators during anthesis. Heavy infestations of native bees and honey bees are found in all of the forbs when in full flower. Honey bees are notably present in *Helianthus mollis* (ashy sunflower), *Baptisia sphaerocarpa* (yellow wild indigo), *Pycnanthemum tenuifolium* (narrowleaf mountainmint), and *Rudbeckia grandiflora* (rough coneflower). Native bumble bees are notably present in *Silphium gracile* (slender rosinweed).

Nicholls expanded plant materials assembly to include maritime forest and coastal dune plant species in 2010. Live oak (*Quercus virginiana*) acorn collections were made from wild populations found growing in St. Bernard, Jefferson, and Terrebonne Parishes. Acorns were germinated and grown out in multi-pot trays from December, 2009 to June, 2010 when five seedlings representing each accession collected were planted to the dedicated Maritime Forest Preserve site at the Nicholls Farm. Vegetative collections of Toothache tree (*Zanthoxylum clava-herculis*) originating from Bayou Sale, Terrebonne Parish was also added to the maritime forest assembly in 2010. Additional plant materials will be added as specimens or natural populations are located and sampled from.

Coastal dune plant materials originating from Elmer's Island (Goat Island), Jefferson Parish and Fourchon Beach (Lafourche Parish) have been added to the plant inventory at Nicholls. Vegetative increase plots of sea oats, bitter panicum, marshhay cordgrass, Gulf cordgrass, and Gulf muhly were planted throughout 2010. Plant materials will be used to advance coastal hard sandy restoration issues.

In conclusion, all grass assemblies established at the Nicholls Farm are persisting and producing annual seed crops. Forbs need further study to determine suitability of adaptation to southeast Louisiana soils and climate. Seed crops from polycross blocks will be used to advance foundation seed production and field test performance and adaptation.