Brooksville, Florida
Plant Materials Center

2004 Annual Technical Report

Aftermath of the 2004 Hurricanes

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United States Department of Agriculture

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MISSION AND MAJOR OBJECTIVES

The mission of the Plant Materials Program is to provide timely and effective vegetative solutions for identified resource needs. Superior accessions of adapted plants are developed, tested, and released for production by commercial growers along with production and management methodology developed by the PMC. The use of native plant materials is emphasized. The following are major resource concerns of the Brooksville Plant Materials Center (PMC):

- Improve and maintain water quality
- Control erosion on cropland and stabilize critical areas
- Improve forage on pastures and rangeland
- Improve wildlife habitat

PLANT EVALUATION PROCESS

Assemble Plant Materials - Assemblies are planned to satisfy a specific objective(s) indicated in a study plan. Collections are made from a wide area within the occurrence of the species to ensure that variability and diversity of genotypes are well represented.

Initial Evaluation - The process of recording performance of the plant under controlled conditions. It allows the observance of characteristics and performance of the various collected plants, in order to select the most promising for the proposed conservation use. These plantings are normally done at the PMC, but off-center initial evaluation plantings can be done to suit study objectives.

Advanced Evaluations - Intensive testing of selected plants that were found to be superior in one or more attributes during the initial evaluation process. Cooperating agencies or other PMCs are encouraged to participate in this process. Installing plantings in areas where climatic conditions are differ significantly from those at the PMC aids in determining a range of adaptation for the plant materials.

Final Evaluations - Selections that exhibit superior qualities for the intended use are placed in field plantings on sites away from the PMC, under actual growing conditions.

Release of New Plant Materials - This is the final step in the process. The plant's proven usefulness for meeting conservation needs is documented. Insofar as possible, materials are released in cooperation with, or with concurrence of, cooperating agencies. Source-identified, selected, and tested germplasm releases require less stringent evaluation and speed the release process compared to a cultivar release.

Breeder and Foundation Increase - PMCs maintain breeder and foundation seed or plants of materials that have been cooperatively released, or they arrange for maintenance with agencies and organizations participating in the release.

SOILS

Soils at the Florida PMC are predominately Kendrick Loamy Fine Sand. Other types of soils at the Center consist of Arredondo Fine Sand, Blichton Loamy Fine Sand, Electra Variant Fine Sand, Fleminton Fine Sandy Loam, Floridana Variant Loamy Fine Sand, Kanapaha Fine Sand, Nobleton Fine Sand, Sparr Fine Sand, and Wauchula Fine Sand.

CLIMATE

There were four named hurricanes that impacted the state of Florida in 2004. The PMC was in the direct path two of these storms and was affected by the outer bands of the other two (See cover photo). Only 24 inches of rain was recorded at the PMC during the first six months of 2004 (Fig. 1). Total rainfall for the year was 64.88 inches, the majority of which came with the hurricanes. The 20-year average rainfall was 56.5 inches.

The last frost occurred on February 19. The first frost occurred on December 21. There were 358 frost-free days in 2004. The lowest temperature recorded at the Florida PMC was 26° F, which occurred on January 29, and the highest was 98° F, recorded on June 15 and July 9-11. Average high temperature for 2004 was 91° F and average low was 47° F. Average monthly temperatures are presented in Figure 2.

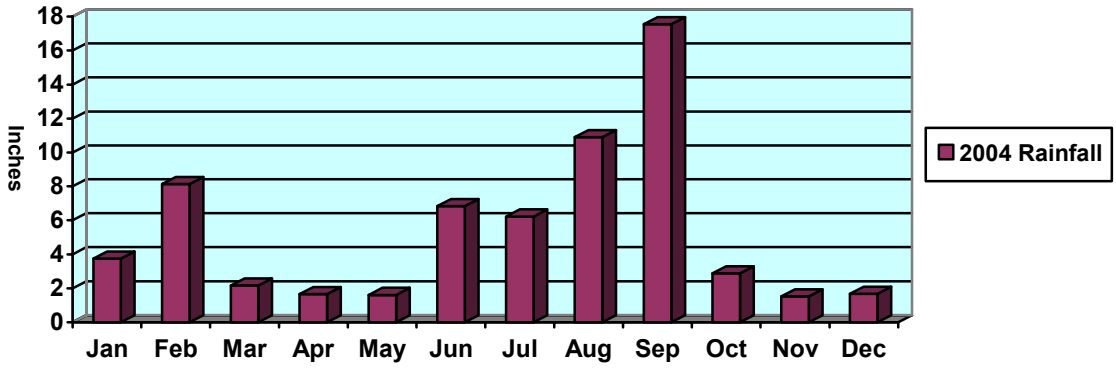

Figure 1. Year 2004 total monthly rainfall.

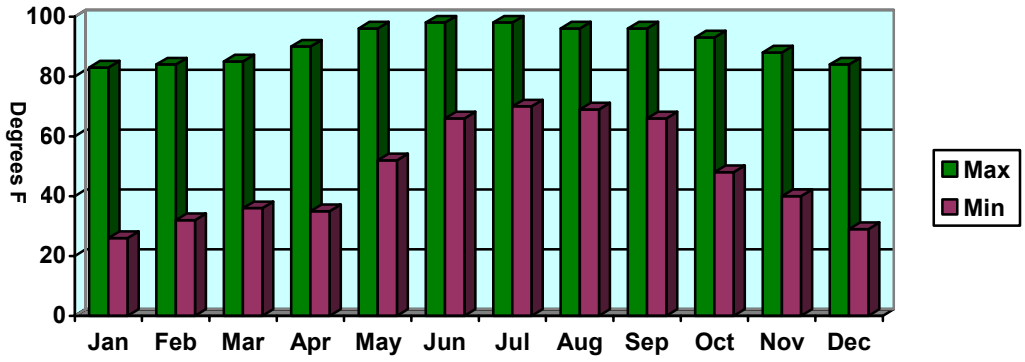

Figure 2. Year 2004 average monthly high and low temperatures.

PLANT DEVELOPMENT STUDIES
INITIAL EVALUATIONS
Switchgrass (*Panicum virgatum*) (FLPMC-P-0001-RA)

Objective: Develop one or more strains of Florida switchgrass with high seed production capabilities, whose primary use will be for reclaiming native areas, wildlife food and cover, and controlling erosion. If selections are identified that produce high amounts of forage, these will be released for range and pasture improvement.

Project Stage: Nearing the end of the initial evaluation phase. Advanced evaluation and seed increase phases are expected to take five or more years.

Cooperators: K. Quesenberry, Department of Agronomy, University of Florida, Gainesville, FL, M. Williams, USDA, Agricultural Research Service, Subtropical Agricultural Research Station, Brooksville, FL, and Ann Blount, North Florida Research and Education Center, Marianna, FL

Introduction: Switchgrass has excellent potential for use in revegetating reclaimed mined lands [Conservation Practice (CP) numbers 543, 544, 342] and native areas, providing high quality livestock forage (CP 512, 550) and wildlife food (CP 645), controlling erosion (CP 601, 386) and improving water quality. There are a few commercially available cultivars of switchgrass, such as Alamo from Texas, that will grow in Florida's environmental conditions. However, studies have shown that Florida ecotypes perform better than those from other states. The primary problem hindering development of a Florida cultivar of switchgrass has been poor seed production.

Progress: During the fall of 2000, a total of 88 accessions were collected from 42 counties in Florida in the form of plants and also seed if it was available. Sixteen accessions had been collected previously, so that the final assembly totaled 104 accessions. Seeds were available from 80 of these accessions, and were planted in 6 inch cone trays in the greenhouse in December of 2000. Transplants of all 104 accessions (originating from seed or from original plants if seed was not available) were planted in a crossing block at the PMC on August 2, 2001. Five plants were planted of each accession in a randomized complete block design, with each plant acting as a plot. All five plants of one accession have died since the initial planting date, currently leaving 103 accessions.

In the fall of 2004, each plant was to be evaluated for growth characteristics, and seed samples taken; however, the hurricanes flattened the plants and scattered the seeds. A seed collection was attempted; however, it was not possible to complete even the first replication, therefore, it would not be possible to derive any useable data from the samples. The seed samples were disposed of without germination testing being performed. Seeds will be collected in 2005, weather permitting, and germination tests will be run on each sample. It is quite possible that the improved switchgrass(es) to be released from this study will not be single lines, but the result of polycrosses of several accessions in the assembly.

Growth characteristics in the assembly are highly diverse. In later evaluations, plants may need to be separated by bloom dates (early, middle, and late) to allow crossing. Differences, especially in biomass production, are probably due to differences in ploidy levels. Plants with higher ploidy levels are known to have more robust growth habits. Drs. Quesenberry and Williams are assisting with testing to determine the ploidy levels of several accessions. Ploidy will also affect crossing ability and may be an additional factor affecting grouping in later testing.

Future Research Needs: Once the superior cultivars are developed, they will need to be tested for performance and adaptation in Florida as well as surrounding states to determine their areas of adaptation. If one or more of the cultivars proves to have a growth habit that is suitable for forage production, additional testing may be required to determine its quality characteristics and optimum management system.

Annual Phlox (*Phlox drummondii*) (FLPMC-P-0202-CR)

Objective: To develop a cultivar of annual phlox that is well adapted to Florida growing conditions with unusual flower types for roadside beautification.

Project Stage: This study is still in the initial evaluation phase. Some selections have been made, but further evaluation of these selections is necessary to begin advanced evaluations.

Cooperators: Steve Melton, Jack Melton Family, Inc.

Introduction: The main wildflower that the Florida Department of Transportation currently plants along roadsides for beautification purposes is annual phlox and their seeds primary come from producers in Texas. They would prefer to have local sources of wildflower seeds. In 2001, Steve Melton located a pasture two miles west of Trilby that had been disked in the early spring. A thick stand of annual phlox germinated following this operation. Mr. Melton was allowed to collect seed from this area and the PMC staff provided technical assistance. Within this stand, there were some plants with unusual star-shaped corollas. Several of these plants were dug and relocated to the PMC.

Progress and Future Needs: Seeds collected from the plants in 2001 were planted into trays in the PMC greenhouse in 2002. When the seedlings emerged, many had the unique flower patterns, shapes, and colors of their parents, although there were also some common types. The seedlings were put in the shadehouse in the spring, so that natural pollinators could access them. All types were allowed to cross, and seed was hand collected as it ripened. Seeds collected from the plants in the shadehouse in 2002 were planted into trays in the greenhouse in November of 2002 and then transplanted and placed in the shadehouse for another selection cycle. In this cycle, all seedlings that did not have the desired flower types were removed. These cycles will be continued until adequate seed is available for commercial release. Only a small amount seed was collected in 2004 because clean up after the hurricanes consumed a majority of the available staff hours.

Wiregrass (*Aristida beyrichiana*) (FLPMC-P-0337-WO)

Objective: To develop one or more varieties of wiregrass with good seedling establishment characteristics and high seed production.

Project Stage: Some materials were assembled but an initial evaluation planting was never made. These plants were initially identified as *A. stricta*; however, the native range of that species does not include Florida. The correct nomenclature is *A. beyrichiana*.

Introduction: Wiregrass is a warm-season perennial bunchgrass distributed throughout Florida and north through South Carolina and west to the southern portions of Mississippi. It is adapted to a broad range of soil and moisture regimes, from wet flatwoods to longleaf pine-turkey oak sandhills. Once established, it is very drought resistant and hardy. Wiregrass is considered to be one of the most important grasses in a pineland habitat, because of its ability to carry fire. In native situations, wiregrass contributes a large percentage of the fuel for understory burn management programs (CP 338, 384). Livestock readily graze new growth after a burn. Wiregrass also provides cover and nesting sites for wildlife. It produces fair quantities of seed if old residues are removed during the growing season.

Progress: Results from previous work with wiregrass and consultations with plant breeders suggest that viable seed production could be rapidly improved in this species using genetic selection. To do this large assemblies of wiregrass plants from several stable populations (e.g., parks or preserves) should be gathered to form the base population from which these selections will be made. Once an assembly is established, individual plants will be evaluated for seed production, seed quality, and growth characteristics.

Forty-eight accessions were collected in 1995 and 1996, however, the technical committee decided that a wiregrass release was not an immediate priority, so collections ceased and an initial evaluation planting was never installed. Since that time, the accessions have been maintained in pots and some materials have been lost.

Future Research Needs: There is still no commercial source of wiregrass seed; only vegetative materials can be purchased. Since this is such an important plant in the ecosystems that it occupies, there is a continuing need to develop a wiregrass seed source. The PMC has two options: 1) to recollect material, or 2) to move forward with initial evaluation of the materials that are currently available.

Slender Woodoats (*Chasmanthium laxum*) (FLPMC-P-0501-PA)

Objective: To develop one or more strains of slender woodoats with high seed production capabilities, whose primary use will be for forage production and critical area plantings.

Project Stage: In the first year of the assembly phase.

Introduction: Slender woodoats is a grass that can be found commonly growing in hammocks and woodlands in Florida. The foliage remains green during the winter, indicating that it may have potential for use as a cool-season forage (CP 533, 512). Since it is generally found in more shaded locations, its ability to tolerate higher light situations in pastures and rangelands needs to be determined. Its shade-tolerance indicates that it also has potential for use in critical area (CP 345) and buffer plantings (CP 393, 386) in or adjacent to wooded areas. Accessions of slender woodoats will be evaluated for ease of establishment, vigor, seed production, and disease and insect resistance. If possible, superior accession(s) will be selected from each of the three major climatic regions in Florida (north, central and south Florida) for release.

Progress: In 2004, 48 accessions of slender woodoats were collected, mainly from the eastern Panhandle and northeastern part of the state. Additional collections will be made from other areas in the state in 2005. No collections were made in the counties in south Florida in 2004. This portion of the state may be beyond the native range of this species; however, the area will be resurveyed in 2005 to confirm that no plants can be located for collection. The accessions will be planted in an initial evaluation block at the PMC in the spring of 2006.

Future Research Needs: At the same time as the initial evaluation plots are planted, a forage management will also be planted using local accession(s). The plants will be clipped and fertilized according to standard forage production practices to determine the potential yields, quality, and durability of this grass under regular harvesting.

ADVANCED EVALUATIONS

Chalky Bluestem (*Andropogon capillipes*) (FLPMC-P-9601-RA)

Objective: To evaluate, develop, and release a Florida native variety of chalky bluestem for conservation use, especially erosion control, wetland restoration, and wildlife cover.

Project Stage: The superior accessions from initial evaluation were planted in a polycross block and the seed from this block is being increased prior to release. The material is expected to be released in the next two years.

Introduction: Chalky bluestem is a native warm season perennial bunchgrass distributed throughout Florida, southern North Carolina, South Carolina, Georgia, and west to East Texas. It is adapted to flatwoods, seeps, and the margins of freshwater marshes and ponds. It produces high quality livestock forage (CP 381, 533, 512) and is considered to be one of the most palatable native grasses on flatwoods sites. It is also an important plant for upland water quality and erosion control. Chalky bluestem is a prolific seed producer, and will readily colonize disturbed areas in wet flatwood sites.

Progress: Ten superior accessions were selected for seed increase and advanced testing in 1999 (Table 1). Seeds from the original collections that had been stored in the seed cooler were used to start seedlings in the greenhouse in April of 2000. In February of 2001, the accessions were randomly planted together on an irrigated, poorly drained site and the resulting composite was given the accession number 9060461.

Table 1. Ten superior accessions planted in chalky bluestem polycross block at the USDA-NRCS Brooksville PMC, Brooksville, FL in 1999.

Accession No.	County	Collector
9060226	Orange	Fults
9060251	Nassua	PMC
9060277	Hardee	PMC
9060318	Brevard	Fults
9060331	Sarasota	Deal
9060340	Bay	PMC
9060347	Taylor	PMC
9060363	Citrus	PMC
9060394	Polk	Sheehan/Baxter
9060396	Polk	Sheehan/Baxter

Hurricane damage severely impacted the seed harvest in 2004; however, a small quantity was collected with the Flail Vac in November. Average germination was 39%.
Seeds need to be harvested again from this nursery for the next 1 to 2 years, to obtain enough material for planting foundation fields. Extra seed will be placed in long-term storage to maintain stocks for future generations. Release documentation should be prepared in 2005 for this selected-class plant release.
Future Research Needs: Once sufficient seed is available, the new cultivar needs to be tested for adaptation and performance throughout Florida, and possibly other states. Seed

conditioning and planting techniques also need to be developed for this species to ensure establishment success.

Hairawn Muhly (*Muhlenbergia capillaris*) Seeded Types
(FLPMC-P-0108-RA)

Objective: To evaluate, develop, and release Florida native varieties of hairawn muhly for conservation use, especially erosion control (CP 342, 391), native area restoration (CP 327, 562), xeriscapes, and wildlife cover (CP 392, 645).

Project Stage: The initial evaluation study (FLPMC-P-9236-RA) identified several accessions of hairawn muhly with superior characteristics. Accessions with ornamental potential were selected for vegetative increase (FLPMC-P-0102-UR). In this study, which is in the second year of advanced evaluation, accessions with seed production potential were selected for placement in polycross nurseries to develop varieties with high seed production. Advanced evaluation and increase for these materials is expected to take five or more years.

Introduction: Hairawn muhly is a hardy warm-season perennial bunchgrass distributed throughout Florida and several states in the southeastern U.S. It is adapted to a broad range of sites, from seeps and marshes to longleaf pine-turkey oak sandhills. It is more common on wetter sites. In its vegetative state, muhly looks very similar to wiregrass, and fills the same role in the ecosystem. Livestock and wildlife graze early growth. In native communities, it provides fuel for understory burn management programs and cover for wildlife. Because of its attractive purple inflorescence, it is becoming very popular for use in buffers (CP 393), roadsides (CP342), and as an ornamental for xeriscapes. It is known to produce viable seed, but more information is needed on pollination methods and seed production characteristics.

Progress: Seeds collected from ten hairawn muhly accessions identified for their superior production of viable seeds and growth characteristics during initial evaluation (Table 2) were planted in the greenhouse to produce plants for a polycross nursery in 2001. The seedlings are undergoing further evaluation to determine the individuals with the best growth and seed production characteristics. These individuals will be used to increase seed in preparation for release to the commercial seed industry.

Table 2. Ten superior accessions of hairawn muhly planted in the late-blooming polycross nursery at the USDA-NRCS Brooksville PMC, Brooksville, FL in 2001.

Accession No.	County	Collector
9059224	Levy	Sikes, Borst & Stankey
9059516	Manatee	Stankey & Maura
9059523	Dixie	Stankey & Gonter
9059524	Taylor	Stankey & Gonter
9059544	Bay	Stankey & Gonter
9059885	Okeechobee	Pfaff & Gonter
9060044	Brevard	Fults & Millard
9060048	Osceola	Fults
9060317	Hernando	Santucci
9060437	Collier	Gonter & Black

Two additional accessions were also identified with consistently high seed viability in 2000 and 2001. These accessions are 9060304, collected from Jackson Co., and

9060428, collected from Bradford Co. They are much smaller and bloom a month earlier than most of the other collections in the assembly. Plants of these accessions were divided and planted in an isolated block to increase seed for advanced evaluation. Seeds harvested from these plants will also be increased for release.

No seed was collected from either crossing block in 2004 due to the hurricanes.

Future Research Needs: Once sufficient seed has been collected from these crossing blocks, field planting sites will be installed throughout Florida and possibly in other states. It could take between three and five years before material is available for these plantings. Other research topics that need to be addressed include testing insecticides for use in controlling aphids on seedheads. Seeding studies also need to be conducted in order to develop recommendations for seed establishment of hairawn muhly.

Hairawn Muhly Ornamental Vegetatively-propagated Types
(FLPMC-P-0201-UR)

Objective: Determine the range of adaptation of eleven accessions of hairawn muhly in Florida in low maintenance settings. Evaluation is to include performance, ornamental qualities, and plant persistence in three different climatic zones on different soil types.

Project Stage: In the second year of advanced evaluation. Superior materials will be released in two to four years.

Introduction: Hairawn muhly is a perennial bunchgrass that is native from Massachusetts to Nebraska, south to Florida and Texas. It grows 1 to 4 feet in height, depending on ecotype, and produces very showy seedheads that range in color from pink to purple. Rarely, white-flowering types have also been found in some populations. Hairawn muhly is becoming a very popular grass for planting in xeriscapes along roadsides and in urban areas.

Progress: Eleven accessions with desirable ornamental qualities were selected during initial evaluation from an assembly of 88 hairawn muhly accessions planted at the Brooksville PMC (Table 3). Plants of the eleven accessions were planted at three locations (Okaloosa, Alachua, and Hendry Counties) in 2002. Cooperators agreed to water and weed plants as necessary. Plots were evaluated in the fall of 2003. No evaluations were made in 2004 and some of the sites have not been maintained properly.

Table 3. Eleven superior vegetatively-propagated accessions of hairawn muhly planted at the PMC in Brooksville, FL in 2002.

Accession No.	Source/Site	Growth Habit at PMC
9059237	Pasco (wet)	Tall, very robust
9059516	Manatee (wet)	Tall, very robust
9059717	Citrus (wet)	Medium, (white bloom)
9059812	Marion (wet)	Medium, robust
9059825	Gilchrist (dry)	Small, robust
9059826	Suwanee (wet)	Medium, robust
9059929	Jefferson (wet)	Tall, robust, upright
9060317	Hernando (wet)	Medium, fine leaves
9060424	Putnam (dry)	Medium, robust
9060425	Putnam (wet)	Small, compact, robust
9060428	Brandford (wet)	Small, compact, robust

Future Research Needs: The number of candidates needs to be narrowed to the top performers. Additional plantings are probably warranted to confirm long-term performance and the most promising materials need to be released. This process will likely take another two or three years.

White Muhly Cultivar Development (FLPMC-P-0102-UR)

Objective: To develop a cultivar of white-flowered hairawn muhly for landscape use.

Project Stage: Increasing plants in preparation for release.

Introduction: A white-flowered muhly (accession 9059717) was found in a native population of the normally pink-flowered plants. This white selection has tremendous potential for use in the commercial landscaping industry, especially for xeriscapes. A high percentage of seedlings from these plants also produce white flowers like the parent plant. However, seedling vigor decreased when the white variety was grown in isolation, possibly because of inbreeding depression. Tests were conducted to determine pollination mechanisms. It appears that the white blooms occur because of a recessive gene. White-flowered types also have lower vigor than pink-flowered ones, and almost all seed is sterile when plants are forced to self-pollinate. Therefore, this accession needs to be released as a vegetatively propagated cultivar.

Progress: Adaptation studies were initiated in 2002, along with the ornamental muhly advanced evaluation project. These plants were planted on cooperator's land in Crestview in Okaloosa Co.; Gainesville in Alachua, Co.; and LaBelle in Hendry Co. Since this material is highly valued for the ornamental market and extensive adaptation testing is not required, the release time-table should be advanced. It should be available for release in the next two years.

Future Research Needs: To increase plants of this accession for commercial release.

Lopsided Indiangrass (*Sorghastrum secundum*) (FLPMC-P-9602-RA)

Objective: To evaluate, develop, and release a native Florida variety of lopsided Indiangrass for conservation use, especially for erosion control (CP 342, 391), native area restoration (CP 327, 562), and wildlife cover (CP 392, 645).

Project Stage: The development and increase phases are expected to take an additional three years.

Introduction: There is a growing demand for seed sources of native species that can be used to restore native habitats. Lopsided Indiangrass is one of the dominant grasses on native uplands in Florida. It is a warm-season, perennial bunch grass, adapted to a wide variety of soils and hydrologic regimes. It produces good quality livestock forage and is important for erosion control and also provides wildlife habitat. Lopsided indiangrass has good seed production and seedling vigor compared to other Florida native grass species.

Progress: Plants of three superior early-flowering accessions of lopsided Indiangrass (9060186 from Marion Co.; 9060197 from Levy Co.; and 9060205 from Gilchrist Co.) were divided and planted in a polycross block to form accession 9060564. Another accession, 9060120 from Santa Rosa Co., flowered several weeks before any of the other accessions tested and is being maintained as a single line.

The remaining twenty-one superior lopsided Indiangrass accessions (Table 4) were planted together to form a composite (9060565). In 2002, seed was collected from all plots of the 21 accessions in the initial evaluation planting and used to establish seedlings for the foundation field. It is expected that at least three years will be required to produce enough foundation seed for advanced evaluations and eventual release.

No seed was collected from the polycross blocks in 2004.

Table 4. Twenty-one superior accessions of lopsided Indiangrass planted in polycross nurseries at the PMC in Brooksville, FL in 2001.

Accession No.	County	Accession No.	County
9059725	Citrus	9060173	Lake
9059727	Citrus (Ft. Cooper St. Park)	9060182	Madison
9060105	Osceola	9060184	Hamilton
9060110	Sarasota (Myakka St. Park)	9060187	Desoto
9060118	Okeechobee	9060199	Citrus
9060128	Desoto	9060207	Orange
9060133	Desoto	9060208	Hernando
9060137	Desoto	9060209	Citrus
9060146	Manatee	9060210	Hernando
9060147	Manatee	9060351	Dixie
9060168	Levy	----------	----------

Future Research Needs: Once foundation seed has been increased, advanced evaluations may need to be conducted around Florida to determine performance and adaptability. One problem encountered at the PMC is that seed production fields tend to thin out after several years of harvesting. Further studies need to be conducted to find ways to increase the longevity of production fields. Possible areas of study may include residue management trials and inoculation of seedlings with protagonistic organisms, such as mycorrhizae.

Blue Maidencane (*Amphicarpum muhlenbergianum*) (FLPMC-P-9604-WE)

Objective: To evaluate, develop, and release a Florida native variety of blue maidencane for conservation use, especially for erosion control (CP 322, 580, 397, 390) and wetland restoration purposes (CP 659, 646).

Project Stage: Advanced evaluations are expected to take one or two more years.

Introduction: Blue maidencane is a native, warm-season perennial rhizomatous grass distributed throughout Florida and coastal areas of Georgia and South Carolina. It is adapted to acid or neutral sandy soils that are wet for part of the year. It grows in sloughs and intermittently ponded areas in flatwoods range sites. Cattle preferentially graze this species, which produces high quality forage. Because it often forms solid stands, it is important for erosion control and maintaining water quality in fresh water systems.

Progress: From 1996 through 1998, a total of 157 accessions of blue maidencane were collected from throughout the state of Florida in the form of root and shoot stock. Initial evaluation plots were planted at the PMC in March of 1999. Because this species spreads aggressively by rhizomes, plots could only be evaluated for one year before accessions began growing together. Eleven superior accessions were selected for advanced evaluation (Table 5). In March of 2000, accessions were increased by planting rhizomes in tubs. Accessions 9059859, 9060309, and 9060311 were combined to form accession 9060489, since they have very similar performance and come from the same basic location. Accessions 9059866, 9060066, and 9060067 were also combined to form accession 9060490 for the same reasons.

Table 5. Eleven superior blue maidencane accessions selected for increase and evaluation.

Accession No.	County	Collector
9059859	Pasco	Deal/Pfaff
9060309	Pasco	Deal/Pfaff
9060311	Pasco	PMC
9060489	**Composite**	
9059866	Charlotte	PMC
9060066	Sarasota (Myakka State Park)	Perry/Lackman
9060067	Sarasota (Myakka State Park)	Perry/Lackman
9060490	**Composite**	
9059869	Palm Beach	PMC
9059956	Madison	PMC
9059971	Citrus	PMC
9060008	St. Johns	PMC
9060295	Polk	PMC

Future Research Needs: The superior candidate(s) needs to be selected and plants increased for release. It would also be prudent to conduct field plantings of the selected accessions at three or more sites in Florida to determine environmental and soil tolerances.

Eastern Gamagrass (*Tripsacum dactyloides*) (FLPMC-P-9605-RA)

Objective: To evaluate, develop, and release one or more accessions of eastern gamagrass for conservation use including for buffer strips (CP 393, 386, 601) pasture and rangeland improvement (CP 512, 550), and wildlife food and cover (CP 645).

Project Stage: Advanced evaluations are expected to take another one to two years.

Introduction: Eastern gamagrass is a warm-season perennial bunchgrass with a broad area of distribution throughout the U.S., including all of the southern states. It has received a great deal of attention in recent years because of its tremendous forage production. It typically grows in moist fertile sites, and is often found lining the edges of canals and freshwater bodies in Florida. Eastern gamagrass is noted to have poor seed production and seed dormancy that interferes with establishment. Florida ecotypes are markedly different than strains from other states, in terms of growth and winter dormancy characteristics. There is a demand in Florida for commercial seed sources of local ecotypes. From 1996 through 1998, an assembly of Florida eastern gamagrasses was evaluated for their forage and seed production characteristics. Four accessions were selected with superior performance in these two categories; they were 9059213 (Clay Co.), 9059264 (Dixie Co.), 9059266 (Polk Co.), and 9059287 (Citrus Co.). All four accessions are apomictic and will not out-cross.

Progress: Advanced evaluation plots of all four eastern gamagrass accessions were planted at sites in Collier Co., Polk Co., and Hamilton Co. Accession 9059266 appears to be the superior candidate for release due to its vigor, uniform appearance, and higher than average seed production.

Future Research Needs: Seed needs to be increased in preparation for release. Additional advanced demonstration plantings in Florida and possibly outside the state would confirm its forage production potential and determine its range of adaptation. If seed production of this species is to become economical, field management recommendations need to be developed, especially in areas such as fertility and plant spacing.

Inter-center Strain Trial Partridge Pea (*Chamaecrista fasciculata*)
(FLPMC-0208-WL)

Objective: To determine range of adaptation data on partridge pea releases from the Plant Materials Program. The information obtained by this study will be used to support elevation of Lark Selection and possibly Riley Germplasm to cultivar status.

Project Stage: This is the final year of testing.

Introduction: The annual legume partridge pea is an excellent food source for wildlife (CP 645) and is also suitable for planting on many critical areas (CP 342). The only commercially available cultivar of partridge pea is 'Comanche', released by the Texas PMC in Knox City. Lark Selection, was released by the Jamie L. Whitten PMC in Coffeeville, MS and Riley Germplasm by the Kansas PMC in Manhattan, KS. The full range of adaptation of these two pre-varietal releases is not known. This inter-center strain trial will determine the survival and growth potential of these releases at sites throughout the Southeast and southern Plains states, using Comanche as the standard of comparison.

Progress: Seed samples were obtained from the relevant PMCs. Plots were planted at MSPMC, ARPMC, ETPMC, TXPMC, STPMC, GAPMC, FLPMC, and other locations as available. Plot size is 5' X 10' with 3 replications and plots were prepared and managed according to standard practices used at the testing sites. The planting rate was 6 PLS pounds of seed/ac, and seeds were inoculated with proper inoculant prior to planting. None of these releases performed particularly well this far south. No seed production data could be collected due to the hurricanes. A report on all locations is published in the Annual Technical Report prepared by the Jamie L. Whitten PMC.

Inter-center Strain Trial Florida Paspalum (*Paspalum floridanum*)
(FLPMC-P-0463-WL)

Objective: To determine area of adaptation for accession 9043874 (Harrison Florida paspalum Select Germplasm) in the southern U.S. The information gathered from this study will be used to support a cultivar re-release of Harrison select germplasm.

Project Stage: This is the establishment year for this study.

Introduction: Florida paspalum is a native warm-season perennial grass. This grass produces a large seed that is eaten by gamebirds (CP 645). Florida paspalum is adapted from New Jersey, southeastern United States, Midwestern states, and east Texas. However, the specific adaptation area of accession 9043874 has not been determined. This accession was collected from Harrison Co., Texas by NRCS personnel, Ross Brown and Paul Leggett. This accession has been evaluated against other Florida paspalum accessions at the East Texas PMC. It is the only named release of this species.

Progress: Rod rows will be planted in the spring at the participating PMCs: TXPMC, STPMC, MSPMC, FLPMC, GAPMC, ARPMC. Rod rows were to be planted and managed according to practices used at the individual PMCs. PMC staff will collect the requested data as noted on the evaluation form. Stand vigor was fair and density was good. Seed production data could not be collected due to the hurricanes.

TECHNOLOGY DEVELOPMENT STUDIES

Eglin AFB Native Species Erosion Control Mats (FLPMC-T-0105-CR)

Objective: Develop methods of establishing native species on coir mats, and determine if these vegetated mats can successfully colonize and control erosion on critical areas (CP 342) with high slopes.

Project Stage: This is the final year of a four year study.

Introduction: Natural Resources personnel at Eglin Air Force Base wish to restore borrow pits and other critical areas with native species. Because many of these areas have very steep slopes, erosion is a serious problem, and native species often grow too slowly to stabilize critical areas. Biodegradable mats made out of coconut fiber (coir) are often used to stabilize severe slopes. Establishing grasses and forbs on these mats prior to placement on the site is one planting method could be used to revegetate critical areas with slow-growing native species.

Progress: On December 4 and 5 of 2001, Eglin personnel supplied a seed stripper pulled with an ATV to collect seed from two native sites. In addition, PMC personnel made hand collections of selected grasses and forbs. The two sites ranged from xeric to mesic and were dominated by wiregrass. Growing season burns had effectively stimulated the wiregrass to flower and produce viable seed. Seed germination tests were conducted at the PMC laboratory (Table 6) in order to calculate seeding rates. Coir blanket mats (1/4" to 1/2" thick) measuring 3' x 40' were placed on asphalt and plastic at the PMC and were framed with 2" x 4" lumber. Mats were seeded on February 14, 2002, and covered with approximately 1/2" of potting soil. Because of cooler weather, seeds did not begin to germinate for 1 to 2 months. Once plants had developed a strong root system, they were transported to Eglin AFB and planted in June 2003. Plantings were evaluated in March and July of 2004; however, no later evaluations were possible due to the hurricanes.

Table 6. Laboratory germination of various native species collected from Eglin AFB in 2002.

Site	Species	Common Name	Seed Viability (%)
Indigo Pond	*Andropogon gyrans*	Elliott bluestem	46
	Andropogon ternarius	Splitbeard bluestem	32
	Liatris spp.	Gayfeather	48
	Pityopsis	Grass leaf golden aster	42
	Schizachyrium stoloniferum	Creeping bluestem	4
Range 78	*Aristida beyrichiana* (stripper mix)	Wiregrass	39
	Aristida beyrichiana (hand clipped)	Wiregrass	35
	Schizachyrium stoloniferum	Creeping bluestem	0

Future Research Needs: A final evaluation will be made in 2005 and a technical note will be written on the results this study.

Lopsided Indiangrass Residue Management Study (FLPMC-07RNGE-igS)

Objective: To determine how residue management method affects viable seed production and stand persistence.

Project Stage: This residue management study will continue for another 1 to 2 years. Seed will be collected annually until stand density declines to a point where harvesting is not feasible.

Introduction: Lopsided Indiangrass is an important component of native uplands in Florida. It has good seed production and has established well in critical area plantings (CP 342), on reclaimed minedlands (CP 543, 544). Unfortunately, seed production plots at the Brooksville PMC have been very short-lived, lasting only about 3 years on irrigated sites. Soil pathogens are most likely the cause of plant death, although this species may be a naturally short-lived perennial.

Progress: Study plots were imposed on the composite Accession 9060564 polycross nursery which was planted February 21, 2001, using seedlings from 6" containers. All plots were fertilized annually with approximately 50 lb/ac of 10-10-10 at the time of spring greenup. Winter burn treatments were applied in January or early February before plants began spring regrowth. Winter clip treatments were applied at the same time as the burn treatments. Summer clip treatments were applied in late June, prior to production of reproductive tillers. Plant counts were made at approximately the same time as the summer clipping treatment. Seed collection was not possible in 2004 because the hurricanes scattered the seed.

Future Research Needs: Seed collected from this project will be used to establish the foundation field for Accession 9060564. Further research into fertility management may also improve productivity.

Eastern Gamagrass Row Spacing and Fertility Study (FLPMC-T-0106-RA)

Objective: To determine the optimum row spacing and fertility level to maximize seed production of eastern gamagrass in a Florida setting using a Florida ecotype (accession 9059266).

Project Stage: This study is in its second year of harvesting.

Introduction: Eastern gamagrass is a large, native, bunch grass that is well adapted for erosion control (CP 386, 601) and pasture and range plantings (CP 512, 550). Florida ecotypes being studied at the PMC have not produced seed yields that are comparable to those reported for ecotypes grown in other parts of the U.S. Since the Florida ecotypes are larger, more robust plants, they may require wider row spacings than those used commercially for other ecotypes of eastern gamagrass. In this study, 2', 4', 6', and 8' row spacings will be utilized. Also, the effect of nitrogen fertility on eastern gamagrass seed production has not been determined. It is anticipated that the plants require nitrogen to sustain adequate plant growth required for seed production; however, excess nitrogen may negatively affect seed production by favoring vegetative growth. Fertilizer rates used were 0, 50, 100, and 200 lb N/ac applied as 10-10-10 on all row spacing treatments at spring greenup.

Progress: Seed stalks in the study plots are hand cut to simulate a combine harvest. Seed is then removed from the stalk and run through a South Dakota seed blower to remove empty and poorly-filled seeds. Seed lot weights are taken both before and after treatment with the seed blower. Seed germination tests are then run on the seed lots using standard germination testing methods. The seed was just beginning to ripen when the hurricanes came through the PMC study site and the winds scattered the seeds.

Future Research Needs: All plants in this study were planted with the same in row spacing (3'), so variation of in row spacing may be another factor to study. Also, planting in closely spaced double rows with wider spacing between sets of rows may be an alternative planting method that should be explored. Timing of the fertilizer applications may also need to be examined with possible split applications in the fall and spring.

PLANT MATERIALS RELEASED BY THE BROOKSVILLE, FL PMC

Year	Species	Cultivar	Cooperating Agency
1944	*Paspalum notatum* (Bahiagrass)	Pensacola	GA PMC
1960	*Panicum texanum* (Texas millet)	Artex	N/A
1962	*Lupinus elegans* (Mexican lupine)	Armex	N/A
1963	*Lupinus angustifolius* (Blue lupine)	Orlando	N/A
1969	*Aeschynomene americana* (American joint vetch)	F-149	N/A
1978	*Hemarthria altissima* (Limpograss)	Bigalta	Univ.FL-I.F.A.S.
		Greenalta	" " "
		Redalta	" " "
1978	*Arachis glabrata* (Perennial peanut)	Florigraze	N/A
1985	*Arachis glabrata* (Perennial peanut)	Arbrook	FL Agri. Exp. Sta.
1990	*Spartina patens* (Marshhay cordgrass)	Flageo	GA PMC & Ft. Valley Agri. College
1991	*Helianthus debillis* (Beach sunflower)	Flora Sun	N/A
1992	*Panicum amarum* (Bitter panicum)	Northpa	N/A
		Southpa	N/A
1994	*Spartina patens* (Marshhay cordgrass)	Sharp	GA PMC
1995	*Zea mexicana* (Mexican teosinte)	Chapingo	N/A
1996	*Panicum virgatum* (Switchgrass)	Miami	N/A
		Wabasso	N/A
		Stuart	N/A
1998	*Panicum hemitomon* (Maidencane)	Citrus	N/A
2000	*Tripsacum dactyloides* (Eastern gamagrass)	Martin	N/A
		St. Lucie	N/A
2002	*Arachis glabrata* var. *hagenbeckii* (Perennial peanut)	Brooksville 67	N/A
2002	*Arachis glabrata* (Perennial peanut)	Brooksville 68	N/A
2003	*Liatris elegans* (Blazing star)	Floral Passion Germplasm	N/A

PUBLICATIONS AVAILABLE FROM THE BROOKSVILLE, FL PMC

1997	Technical Note No. 35: Collecting Plant Materials
1997	Plant Materials Program Fact Sheet
1997	Florida Native Plant Collection, Production and Direct Seeding Techniques: Interim Report
June 1995 - Oct. 2003	Semi-Annual Newsletter: Sunshine State's PMC Impact
1998	Forage Species on Sprayfields – Fact Sheet
2000	Fact Sheet: Gully Stabilization in North Florida
2003	Plant Materials Center, Brooksville, Florida - Visitor Information
2002	Florida Native Seed Production Manual
Through 2003	Annual PMC Activity Reports