JIMMY CARTER PMC
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PLANT MATERIALS TEAM

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INTRODUCTION

The development of plant technology to use native warm-season grasses like switchgrass (*Panicum virgatum*), indiangrass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), and eastern gamagrass (*Tripsacum dactyloides*) in the Southeast is a priority one objective at the Jimmy Carter Plant Materials Center (PMC). This is an interim report that provides the latest information to NRCS field offices, colleges and universities, state and federal agencies, soil and water conservation districts, farmers, partners, and others that are interested in native grasses.

To integrate the Plant Materials Program at the Jimmy Carter PMC with the Grazing Lands Initiative, several native grass demonstrations were established this year. Plant technology related to planting, establishment, and management of native warm-season grasses was developed at the Jimmy Carter PMC.

'Alamo' switchgrass, eastern gamagrass, and Americus, an experimental indiangrass accession, are being evaluated in a native grass/grazing lands demonstration. Sid Brantly, Regional Grazing Lands Coordinator and Dr. Glenwood Hill, Extension Program Leader at Fort Valley State University, are assisting with the grazing demonstrations. In a typical dairy operation in Georgia, eastern gamagrass field plantings would be used for forage, silage, and application of animal waste lagoon effluent.

Dr. Edzard van Santen, Associate Professor and forage crop breeder at Auburn University, is continuing his work with big bluestem to develop a variety for the southeast. He has selected accessions that show potential for forage, biomass production, wildlife habitat improvement, and urban conservation. The biomass selection will be evaluated and tested for bio-fuels. Crossing blocks have been established in isolation for seed increase. A new big bluestem variety that is native to the Southeast should be available in 3 years.

Dr. Mary Miller-Goodman, Assistant Professor at Auburn University, is providing technical assistance on native warm-season grasses for forage. She is providing technical assistance to the Jimmy Carter PMC, coordinating grazing land studies in Alabama, and will be visiting plantings in the field to assist with recommendations and evaluations. She also has a keen interest in the Americus accession indiangrass at the PMC. This accession is well adapted to the southeast. During the extreme drought and heat in the summers of 1995 and 1996, Americus performed better at the Jimmy Carter PMC than 'Pensacola' bahiagrass (*Paspalum notatum*). 'Pensacola' bahiagrass has been considered to be one of the most drought resistant warm season grasses used for forage in the Southeast.

The Georgia Association of Landscape Architects is interested in native plants for use in urban landscapes. Members from the association are assisting the PMC with the evaluation and selection of native grasses (big bluestem, switchgrass, indiangrass, and eastern gamagrass) for urban areas from assemblies at the PMC. Selections from these assemblies are being used for single-specimen plants in areas of metro Atlanta.

Field trials using switchgrass, eastern gamagrass, and indiangrass in Georgia have been successful. Plantings in Metter, Warrenton, LaGrange, Barnesville, Jasper, and Hartwell suggest that the quantity and quality of forage produced by warm-season grasses are adequate for a forage crop in this region.

A 2nd year stand of Americus indiangrass and 'Alamo' switchgrass is well established and used for grazing on Sugarhill Farm in Barnesville, GA.

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PROJECT 13I128R - ASSEMBLY AND EVALUATION OF BIG BLUESTEM (*ANDROPOGON GERARDI)*

INTRODUCTION:

Big bluestem (*Andropogon gerardi*) is a perennial, warm-season grass. It is cross-pollinated and has several ploidy levels (X = 20, 40, 60). Big bluestem is photoperiod sensitive. It is widely distributed in the United States. It occurs in tall grass prairies of the Midwest as well as in forested areas of the Southeast. It has been utilized for forage and hay production. This study attempts to evaluate big bluestem ecotypes for cultivar development.

Vegetative ecotypes of big bluestem collected in the southeast have been assembled and evaluated for grazing land, erosion control, wildlife, and urban conservation.

MATERIALS AND METHODS:

In 1989 and 1990, the PMC assembled 750 vegetative ecotypes of southeastern big bluestems. These ecotypes were placed into an initial evaluation block. Each accession was planted in 10-ft rows with 1 ft between clones. All accessions were separated by 3-ft spaces. Each accession was replicated twice.

Dr. Edzard van Santen and grad students from Auburn University helped to select ecotypes for crossing blocks.

RESULTS AND DISCUSSION:

In 1990 and 1991, the accessions were evaluated for 1) vigor, 2) stem color, 3) inflorescence color, 4) foliage amount, 5) foliage height, 6) foliage color, 7) forage potential, 8) disease/insect resistance, 9) boot date, bloom date, maturing date, and percent germination, 10) seed amount, 11) uniformity, 12) height of leaves on stem, 13) total height, 14) stem size, 15) tillering, 16) leaf/stem ratio (steminess), 17) basal foliage, and 18) lodging,

In spring 1992, Dr. Edzard van Santen of Auburn University began a cooperative big bluestem study with the Jimmy Carter PMC, and the following criteria were added to the existing evaluation process: 1) percent stand, 2) forage mass, 3) green-up date, 4) biomass at flowering (green weight and dry weight), 5) surface area of plot, 6) morphological data, and 7) % acid detergent fiber (ADF) of stem.

In June 1993, 4 pairs of cow/calf units were allowed to graze the big bluestem area. Cattle were removed and Dr. van Santen evaluated the cattle's preference for specific ecotypes. After regrowth, cattle were again allowed to graze the vegetation down to 8-inch stubble residues.

Dr. van Santen's data was processed and helped to determine which ecotypes were selected for biomass production. Crossing blocks of these selections were established in 1994 to produce germplasm for future comparison testing against a standard big bluestem cultivar. Three separate blocks were set up: the first consisted of 31 early maturing ecotypes, the second consisted of 40 medium maturing ecotypes, and the third consisted of 29 late maturing ecotypes. Each line was represented by 3 replications per crossing block to ensure proper pollination. In 1995, seed was collected from the crossing blocks. All seed collected expressed high dormancy characteristics. Dr. van Santen is currently working to resolve this seed dormancy problem.

In March 1998, Dr. van Santen selected ecotypes for production of big bluestem forage type germplasm and established 3 separate crossing blocks. The first crossing block consisted of 38 early maturing ecotypes, the second consisted of 38 medium maturing ecotypes, and the third consisted of 38 late maturing ecotypes. Each line was replicated 3 times per crossing block to ensure proper pollination. Seed will be collected from these blocks for increase and future forage study.

In February 1998, 26 entries of big bluestem were used in an urban landscape evaluation area in Marietta and Griffin, Georgia. Evaluation information on percent survival, esthetic value, and urban usefulness will be gathered on this planting in the future.

Evaluation of Native Grasses

PROJECT 13I131R - ASSEMBLY AND EVALUATION OF SWITCHGRASS (*PANICUM VIRGATUM)*

INTRODUCTION:

Switchgrass (*Panicum virgatum*) is a perennial, warm-season grass. It is cross-pollinated and has several ploidy levels (X = 18, 36, 54, 72, 90 and 108). Switchgrass is photoperiod sensitive. It is widely distributed in the United States. It occurs in tall grass prairies of the Midwest as well as in forested areas of the Southeast. It has been utilized for forage and hay production. This study attempts to evaluate switchgrass ecotypes for cultivar development.

The PMC assembled 1,098 vegetative ecotypes of southeastern switchgrass. They are evaluated for grazing lands programs, erosion control, urban conservation, and wildlife.

MATERIALS AND METHODS:

In 1990-1992, the PMC assembled 1,098 vegetative ecotypes of southeastern switchgrass. These ecotypes were placed into an initial evaluation block. Each entry was planted in 13-ft rows, with 3 plants per row. All entries were separated by 3-ft spaces and each entry was replicated twice.

RESULTS AND DISCUSSION:

In 1993, plants were evaluated for 1) green-up date, 2) forage mass, 3) vigor, 4) stand, 5) leafiness, 6) disease/insect resistance, 7) foliage height, 8) stem size, 9) boot date, 10) leaf texture, 11) leaf size, 12) leaf/stem ratio (steminess), 13) bloom date, 14) foliage color, 15) maturing date, and 16) seed amount.

In 1994, evaluation emphasized regrowth, height, blooming, maturing, and seed collection. A greenhouse compatibility study was also conducted to help determine crossing compatibility of lines with like and unlike morphological characteristics.

In 1995, seeds from 7 lines selected for biomass production and 13 lines selected for forage qualities were collected for future germplasm work.

Evaluation procedures were repeated in 1996 and in 1997, all seed was cleaned and processed for future germplasm tests. In 1998, the switchgrass nursery block was maintained for vegetative utilization. In February 1999, switchgrass lines will be selected for urban landscape evaluation and tested in Atlanta.

PROJECT 13A139R - GRAZING TEST OF INDIANGRASS CULTIVAR FOR PLANT SURVIVAL

INTRODUCTION:

Yellow indiangrass, (*Sorghastrum nutans*), is a native, perennial, warm-season grass. It has been utilized for forage and hay production. This test attempts to determine the survivability of PI-514673 indiangrass, 'Lometa' indiangrass, and 'Pensacola' bahiagrass in a controlled grazing test.

An experimental indiangrass accession (PI-514673) is in the final stage of testing before being released as an official new variety for the Southeast.

MATERIALS AND METHODS:

This test is a split-plot design with main plots called grazed and ungrazed. Within the main plots are 12 replications each of the 3 grasses. These plots, called sub-plots, are 10 ft x 10 ft in size. Survivability is determined by taking stem counts during the life of the test. The grazed main plot is grazed when indiangrass reaches 18 inches in height. Cattle were allowed to graze the indiangrass to an 8-inch stubble.

RESULTS AND DISCUSSION:

Grazed plots were grazed twice each year over a 3-year period (June and August in 1996, July and August in 1997 and 1998) and data was collected on grass survivability in grazed and ungrazed plots. Each year, a stem ratio was used to determine survivability:

$$\left[\frac{\text{final stem count current year (1996, 1997, or 1998)}}{\text{initial stem count 1995}} \right] \times 100$$

Analysis of variance indicated an interaction between grazing and the grasses; therefore, grazed and ungrazed plots were analyzed separately.

The Saithewaite method was used to determine degrees of freedom of error, and an LSD was calculated for stem ratio of PI-514673 under grazed and ungrazed conditions and 'Lometa' under grazed and ungrazed conditions.

Tables 1 and 2 summarize 1996-1998 data. 'Pensacola' bahia expressed good survival ratios whether under grazed or ungrazed conditions. Under grazed conditions, there was no difference between PI-514673 and 'Lometa' survivability; however, under ungrazed conditions the survivability of PI-514673 was higher than 'Lometa'. PI-514673 produced a better survival ratio ungrazed than it did when grazed, while 'Lometa' showed no difference in survival ratio between grazed or ungrazed.

TABLE 1 JIMMY CARTER PMC STEM COUNT (INDIANGRASS AND BAHIAGRASS)

	Stem Ratio					
	1996		1997		1998	
Cultivar	**Grazed**	**Ungrazed**	**Grazed**	**Ungrazed**	**Grazed**	**Ungrazed**
PI-514673	37.83	124.80	25.74	57.31	23.04	63.07
'Lometa'	51.58	66.75	32.89	34.02	31.18	37.92
'Pensacola' bahia	86.83	90.58	72.91	66.65	69.08	57.47
LSD (.05)	13.83	31.42	13.91	17.36	15.63	15.15
CV	27.8%	39.45%	37.47%	38.93%	44.92%	33.88%

TABLE 2 JIMMY CARTER PMC STEM COUNT (INDIANGRASS)

	Stem Ratio					
	1996		1997		1998	
Cultivar	**Grazed**	**Ungrazed**	**Grazed**	**Ungrazed**	**Grazed**	**Ungrazed**
PI-514673	37.83	124.83	25.74	57.31	23.04	63.07
'Lometa'	51.58	66.75	32.89	34.02	31.18	37.92
LSD (.05)	22.78		15.42		15.10	

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PROJECT 13A142R - GRAZING MANAGEMENT OF EASTERN GAMAGRASS

INTRODUCTION:

Eastern gamagrass, (*Tripsacum dactyloides),* is a warm-season, native, perennial grass suited to most of the eastern United States. One of its potential uses is forage for livestock. The Jimmy Carter Plant Materials Center in Americus, Georgia is demonstrating intensive grazing management of this plant.

Eastern gamagrass grazing demonstration at the PMC.

MATERIALS AND METHODS:

In the spring of 1994, a 4.5 acre field of eastern gamagrass, (variety 'Pete'), was planted in 36-inch rows using a corn planter. This 4.5 acre pasture was allowed to establish through 1994 and into 1995. The pasture was then divided into 10 paddocks of equal size using 1-strand electrical fence. A portable water system was installed.

In 1996 an attempt to obtain cattle for a grazing demonstration failed, but in 1997, 15 heifers, weighing about 700 lbs each, were on loan from the University of Georgia Experiment Station in Tifton, Georgia. These heifers only grazed the eastern gamagrass pasture for about 1 month in August before the water supply ran dry. PMC staff were still able to obtain nutritional information from fecal samples taken during this period.

On May 5, 1998, the Kennedy farm in Tattnall County provided young stocker calves for the eastern gamagrass grazing demonstration. The Kennedys are small farmers that are participating in a Plant Materials Small Farm Demonstration. The objectives are to demonstrate the potential of native warm- season grasses, such as eastern gamagrass, to improve forage programs for small farmers and to demonstrate good health and nutrition to small farm producers by inoculating animal to prevent diseases, worming the animals, using implants, and providing supplemental feed requirements based on the Grazing Land Application grazing lands nutritional balancer. Fort Valley State University extension specialists and veterinarians provided assistance to perform the animal health and nutrition objective

The Kennedy Farm provided 25 crossbred cattle, heifers and steers, to the Jimmy Carter PMC to graze the 4.5 acre eastern gamagrass demonstration.

After arrival of the calves, they were fed hay and 12% sweet feed during a training period to familiarize the calves with electric fencing. The calves were then weighed on May 14, 1998. The average weight of the calves at this time was 342 lbs. After an extended training period, the calves were moved to the first paddock in the eastern gamagrass pasture on June 8, 1998. Because of the small size of the calves, it was decided to supplement their diet with 50 lbs of 12% sweet feed and 50 lbs of cracked corn per day for the 25 head.

On June 16, 1998, the cattle were vaccinated, given growth implants, and put on wormer and fly control applied by Dr. Mobeney and Dr. Hill of Fort Valley State University.

The cattle were rotated from paddock to paddock on a 3.5 day schedule. On June 26, 1998 the cattle were supplemented with a custom ground feed ration recommended by grazing specialist Sid Brantly, Auburn, Alabama. The ration was fed at 100 lbs per day.

The cattle were continually moved from paddock to paddock every 3.5 days and 50 units (equivalent to 125 lbs/ac) of N in ammonium nitrate form, were applied immediately to each paddock after each grazing. <u>The exact number of days per paddock was not concrete, but was determined by the amount of grass available.</u>

On July 11, 1998, the supplemental feed was reduced to 50 lbs per day. The first rotation of the 10 paddocks was completed July 13, 1998. The cattle were then moved to an indiangrass survival test area and allowed to graze until July 16, 1998. They were then returned to the eastern gamagrass pasture to begin the second rotation. The cattle were again moved every 3.5 days to a new paddock.

The calves were weighed for the second time on July 30, 1998 and additional wormer and fly control applied.

The cattle were continually moved from paddock to paddock and ammonium nitrate applied after each grazing. The second rotation was completed on August 19, 1998. The cattle were again allowed to graze the indiangrass survival

test and then returned to the eastern gamagrass on August 21, 1998 to begin the third rotation of the paddocks. The previous month had been very dry and the eastern gamagrass was not recovering from the grazing as quickly as we would have liked, therefore, again we began supplemental feeding the cattle 100 lbs of 12% sweet feed per day. Because of the drought, the grazing period was reduced to only 1.5 days per paddock. On September 8, 1998, the cattle were removed from the pasture and weighed for the final time.

The Grazing Animal Nutrition Laboratory (GANLAB) at Texas A&M University (College Station, TX) was utilized to determine diet quality, and NUTBAL Nutritional Balancer software was used to predict animal nutritional needs. PMC staff collected manure samples from the herd about 30 hours after the herd entered a paddock and shortly after the herd left the paddock (to account for digestion and passage time) and found that diet quality fell off as diet selectivity was reduced, encouraging staff to shorten the grazing period.

RESULTS AND DISCUSSION:

Weights of calves: May 5, 1998 - average 342.20 lbs
July 31, 1998 - average 440.68 lbs
September 8, 1998 - average 490.24 lbs

GANLAB Data

Date	CP	DOM	Forage
8/15/97	8.83	59.21	Eastern gamagrass
8/18/97	7.77	57.34	Eastern gamagrass
8/19/97	11.31	58.38	Eastern gamagrass
8/21/97	10.11	59.84	Eastern gamagrass
6/02/98	10.10	65.50	Switchgrass
6/16/98	11.10	62.06	Eastern gamagrass
7/17/98	8.38	60.78	Bahiagrass/Indiangrass
7/30/98	11.72	63.62	Eastern gamagrass
9/03/98	11.67	62.25	Eastern gamagrass

SUMMARY:

Observations and results of Near Infrared Reflectance Spectroscopy (NIRS) analysis of fecal samples for crude protein suggest that forage quality is adequate for typical livestock operations in this region. Vegetation observations suggest that the quantity of forage produced compared to the fertilizer inputs is adequate for practicable use of eastern gamagrass as a forage crop in this region.

PROJECT 13A144R - HAY AND GRAZING MANAGEMENT OF YELLOW INDIANGRASS

INTRODUCTION:

Yellow indiangrass (*Sorghastrum nutans*) is a native, perennial, warm-season grass. It can be utilized for forage and hay production. This test attempts to demonstrate the use of a PMC selection known as PI-514673. Emphasis will be placed upon establishment and management techniques for forage production.

MATERIALS AND METHODS:

In the fall of 1993, a 3-acre bahiagrass pasture was sprayed with Roundup. In February 1994, the pasture was disked. In March 1994, 450 lbs/ac of 0-14-14 fertilizer was applied. On May 5, 1994, the pasture area was disked and cultipacked to firm the seedbed. Then the indiangrass seed was applied with a Solo fertilizer spreader set on No. 24 for a 12-14 ft swath. The rate of seeding was 25 lbs/ac or 10 lbs PLS/ac. The area was then cultipacked perpendicular to original cultipacking for proper seed covering. In June 1994, broadleaf weeds were sprayed with 2, 4-D at a rate of 1 qt/ac. A good stand of indiangrass was observed during the summers of 1994 and 1995. In 1996, this field was utilized for indiangrass seed production.

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In May 1997, 10-10-10 fertilizer was applied at the rate of 600 lbs/ac. The first week of June, 150 lbs/ac of ammonium nitrate, 34-0-0, was spread on the area. On May 27, 2, 4-D herbicide was sprayed at 1 qt/ac rate to control broadleaf weeds. It was applied again on June 10 because of poor results from first spraying. On October 28, seeds were combined and yielded only 28 lbs.

In 1998, similar cultural practices were conducted. Following an extensive drought period, the indiangrass field yielded 550 lbs of seed. Rotational grazing techniques are planned for implementation in future years.

Americus indiangrass is an experimental accession that is in the final stages of testing at the Jimmy Carter Plant Materials Center. It is a native of the Southeast (Georgia and Alabama). It has a wide range of adaptation and performs better than 'Lometa' in most sites in the southeast. It also competes well with 'Pensacola' bahiagrass and performs better than bahiagrass on drought sites.

PROJECT 13A147R - EASTERN GAMAGRASS INTER-CENTER STRAIN TRIAL

INTRODUCTION:

Eastern gamagrass (*Tripsacum dactyloides*) is a native, warm-season (C4), perennial bunchgrass. It has long been recognized as a highly productive and palatable forage plant. Eastern gamagrass is a monoecious grass with morphology similar to corn. Diploid plants reproduce sexually while most tetraploids are facultative apomicts and hexaploids are obligate apomicts. A gynomonoecious sex form with the potential of increased seed production has been identified.

Eastern gamagrass is adapted to a wide variety of growing conditions. Its native range extends from Massachusetts, west to Michigan, Iowa and Nebraska, south to Florida, Oklahoma, and Texas. In addition to a wide range of adaptation, eastern gamagrass shows potential for a wide range of agricultural uses.

Since corn silage is such a large contributor to cropland erosion in the nation, the Big Flats, NY, PMC is developing eastern gamagrass as perennial silage that could reduce soil erosion and water quality problems.

There is growing interest in eastern gamagrass as a forage plant for the southern United States. Several PMCs in the south are making progress in developing new eastern gamagrass cultivars. They have screened large populations of eastern gamagrass ecotypes for forage characteristics. The best materials from these screenings have been incorporated into a multi-regional study known as an Inter-Center Strain Trial (ICST). The ICST was initiated in 1995 at 6 southeastern PMC locations: Knox City, TX; Booneville, AR; Coffeeville, MS; Americus, GA; Brooksville, FL; and Nacogdoches, TX.

Since little information has been gathered in the South concerning eastern gamagrass forage quantity and quality, these two evaluation criteria are being emphasized in the ICST study. The results of this study should provide data for new eastern gamagrass cultivar releases adapted to the southern United States. This report details the establishment and 3-year results of the ICST conducted at the Jimmy Carter PMC in Americus, GA.

MATERIALS AND METHODS:

In 1995, plots were established with vegetative material from 13 accessions and 1 standard called 'Pete', released by NRCS in 1988. Table 10 lists the plant materials and their origin. Plots were arranged in a randomized complete block design with 4 replications. In the spring, after most accessions were in boot stage, plants were clipped to 8 inches from the ground. Additional clippings were taken each year on an approximate 45-day schedule. Plants were fertilized each spring and after each clip event. Dry matter yields were determined for each clip and yearly total clip. Forage quality measurements (% protein, % acid detergent fiber or % ADF, % neutral detergent fiber or % NDF) were also determined. An analysis of variance was generated for each clip stage by utilizing MSTAT statistical package.

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In 1995, 13 accessions of eastern gamagrass and a standard called 'Pete' were assembled and evaluated for grazing, erosion control, wildlife habitat improvement, and urban erosion control.

Eastern gamagrass used for erosion control at the 1996 Atlanta Olympic Games skeet shooting venue.

RESULTS AND DISCUSSION:

Seven entries produced the highest total dry matter yield over 3 years of data collection (1996-1998): Montgomery, TN; Jackson, TX; New Mexico; Williamsburg, SC; Medina, TX; Hays, TX; and FLR 3 (Tables 4, 5, 6, 7). During the first 2 years of the study, 'Pete', a standard for comparison, displayed reduced dry matter yield results as the growing season progressed. In 1998, forage quality data from 1996-1997 was analyzed. Forage quality data was more difficult to analyze than yield data. However, 'Pete' appeared to have a fairly consistent high % protein content (Tables 8, 9). Low % acid detergent fiber (ADF) and % neutral detergent fiber (NDF) readings were recorded by Jackson, TX; ARK I; and 'Pete' (Tables 10, 11, 12, 13).

TABLE 3EASTERN GAMAGRASS ENTRIES

Accession	State	County	PMC Origin
434493	TX	Hays	James E. "Bud" Smith, Knox City, TX
9066165	TX		Los Lunas, NM
9043762	TX	Medina	East TX, Nacogdoches, TX
9043629	TX		Nacogdoches, TX
9043740	TX	Jackson	TX
9062680	TN	Montgomery	Jamie L. Whitten, Coffeeville, MS
9062708	SC	Williamsburg	Jamie L. Whitten, Coffeeville, MS
9055975	FL1		Brooksville, FL
9059213	FL2		Brooksville, FL
9059215	FL3		Brooksville, FL
9058465	AR1		Booneville, AR
9058495	AR2		Booneville, AR
9058569	AR3		Booneville, AR
'Pete'			Commercial

TABLE 4-DRY MATTER YIELD OF EASTERN GAMAGRASS ENTRIES AT THE JIMMY CARTER PMC (1996)

Entry	lbs./ac			Total Yield
	5/22	7/9	8/27	
Montgomery	8974.625	6275.85	4386.85	19,637.3
Williamsburg	5576.65	6764.28	5017.03	17,358.0
Nacogdoches				
Jackson	3695.40	7376.20	6319.80	17,391.4
Medina	3422.83	6096.80	5091.08	14,6l0.70
Hays	5600.95	6627.47	4844.18	17,072.60
New Mexico	6827.08	7377.03	5062.88	9,267.00
Ark 1	5259.08	5535.08	4505.90	15,300.1
Ark 2	4224.75	6151.45	5786.30	16,162.5
Ark 3	3216.20	4352.73	3l48.05	10,717.00
Flr 1	856.60	3153.15	2525.60	6,535.4
Flr 2	2557.88	6429.10	4554.03	13,54l.00
Flr 3	3l4l.35	74l4.73	4762.30	15,3l8.4
'Pete'	785l.4	5031.20	3578.20	l6,460.8
LSD (0.05)	1551	1076	768.7	2657
CV	22.98%	12.41%	11.70%	12.08%

TABLE 12-DRY MATTER YIELD OF EASTERN GAMAGRASS ENTRIES AT THE JIMMY CARTER PMC (1997)

Entry	lbs./ac			Total Yield
	5/20	7/15	9/4	
Montgomery	8362.65	4646.80	4396.78	17,406.23
Williamsburg	4896.53	7258.08	4293.85	16,448.46
Nacogdoches	435.68	3533.74	3379.20	11,248.62
Jackson	8497.65	8089.99	5811.56	22, 399.21
Medina	6126.28	6067.40	4310.44	16,504.11
Hays	6963.80	5732.85	5006.13	17,702.78
New Mexico	7686.20	4947.75	4338.25	16,972.22
Ark 1	7726.83	5001.28	3345.86	16,073.96
Ark 2	6171.50	3500.58	3121.26	12,793.33
Ark 3	3605.93	1966.96	342.99	5,915.86
Flr 1	2416.35	3059.17	2219.57	7,695.09
Flr 2	5498.95	6324.82	4359.44	16,183.20
Flr 3	6589.70	6703.80	4659.28	17,952.78
'Pete'	6636.30	3585.31	2507.94	12,729.54
LSD (0.05)	1224	1001	1072	2846
CV	14.00%	3.91%	20.15%	13.39%

TABLE 13 - DRY MATTER YIELD OF EASTERN GAMAGRASS ENTRIES AT THE JIMMY CARTER PMC (1998)

Entry	lbs./ac				Total Yield
	6/17	07/29	09/10	10/20	
Montgomery	6813.73	2460.73	2821.58	2069.11	14,165.18
Williamsburg	5896.84	3224.95	3001.05	353.39	14,476.23
Nacogdoches	4790.05	2476.73	2235.10	191.15	11,693.08
Jackson	5207.21	2644.42	1787.23	1555.95	11,194.85
Medina	5520.75	3163.30	2872.70	2324.93	13,881.66
Hays	6377.77	3240.33	3054.02	2376.77	15,048.96
New Mexico	5955.73	3308.93	2428.23	2408.62	14,101.52
Ark 1	5172.38	2697.65	2361.60	1640.60	11,872.22
Ark 2	3381.65	2391.28	2133.25	1966.75	9,872.94
Ark 3	554.32	530.20	919.75	642.30	2,646.34
Flr 1	2256.57	1078.68	1209.10	1177.28	5,721.72
Flr 2	4289.81	2412.50	1542.53	1618.16	9,863.00
Flr 3	4566.60	2856.88	1952.18	1727.63	1,103.25
'Pete'	3741.23	1761.63	1705.85	1351.60	8,560.29
LSD (0.05)	2132	837.8	952.1	778.0	4,154
CV	32.35	23.94	31.04	29.98	26.37

TABLE 14 - TOTAL DRY MATTER YIELD BY YEAR AND AVERAGE OF EASTERNGAMAGRASS (ENTRIES AT JIMMY CARTER PMC 1996 – 1998)

Entry	DM Yield 1996	1997	1998	Avg.
	----------#/acre----------			
Hays	17 073	17 703	15 049	16 608
Nacogdoches	*	11 249	11 693	11 471
Jackson	17 392	22 399	11 195	16 995
Medina	14 611	16 504	13 882	14 999
FLR 1	6535	7695	5722	6651
FLR 2	13 541	16 183	9863	13 196
FLR 3	15 318	17 953	11 103	14 791
ARK 1	15 300	16 074	11 872	14 415
ARK 2	16 162	12 794	9873	12 943
ARK 3	10 717	5916	2647	6427
Williamsburg	17 358	16 449	14 476	16 094
Montgomery	19 637	17 406	14 165	17 070
New Mexico	19 267	16 973	14 102	16 781
Mean	15 243	15 023	11 203	13 726
LSD (0.05)	2144	2910	4297	2623

* Not harvested in 1996.

TABLE 15 - PERCENT PROTEIN OF EASTERN GAMAGRASS ENTRIES
BY HARVEST DATE AT JIMMY CARTER PMC 1996

	HARVEST DATES		
Entry	**5/22**	**7/9**	**8/27**
Montgomery	8.25	6.175	8.375
Williamsburg	11.475	6.05	6.775
Nacogdoches	-	-	-
Jackson	9.70	5.475	6.875
Medina	-	-	-
Hays	10.70	5.70	8.70
New Mexico	9.925	6.60	7.00
ARK 1	9.275	5.775	7.85
ARK 2	11.075	6.125	6.50
ARK 3	-	-	-
FLR 1	-	-	-
FLR 2	-	-	-
FLR 3	10.70	5.50	7.425
'Pete'	10.40	5.95	8.875
LSD (0.05)	NS	NS	1.454
CV (%)	14.78	17.04	13.12

TABLE 16- PERCENT PROTEIN OF EASTERN GAMAGRASS ENTRIES
BY HARVEST DATE AT JIMMY CARTER PMC 1997

	HARVEST DATES		
Entry	**5/20**	**7/15**	**9/4**
Montgomery	7.425	7.95	8.025
Williamsburg	9.375	6.825	7.45
Nacogdoches	-	-	-
Jackson	6.625	6.225	6.625
Medina	6.55	6.375	6.125
Hays	7.55	7.50	7.775
New Mexico	6.225	6.90	6.625
ARK 1	6.825	6.85	7.95
ARK 2	-	-	-
ARK 3	-	-	-
FLR 1	-	-	-
FLR 2	7.10	5.775	6.30
FLR 3	7.00	6.575	6.40
'Pete'	5.875	9.525	9.80
LSD (0.05)	1.196	.8559	1.207
CV (%)	11.68	8.37	11.39

TABLE 17 PERCENT ADF OF EASTERN GAMAGRASS ENTRIES
BY HARVEST DATE AT JIMMY CARTER PMC 1996

	HARVEST DATES		
Entry	**5/22**	**7/9**	**8/27**
Montgomery	38.75	41.75	40.00
Williamsburg	36.25	42.75	43.50
Nacogdoches	-	-	-
Jackson	35.75	40.25	38.50
Medina	-	-	-
Hays	38.00	42.75	41.50
New Mexico	38.75	42.00	42.50
ARK 1	35.75	40.75	41.25
ARK 2	36.50	41.50	41.75
ARK 3	-	-	-
FLR 1	-	-	-
FLR 2	-	-	-
FLR 3	35.75	45.25	43.75
'Pete'	37.75	41.00	44.25
LSD (0.05)	1.735	2.496	NS
CV (%)	3.21	4.07	9.36

TABLE 18 - PERCENT NDF OF EASTERN GAMAGRASS ENTRIES
BY HARVEST DATE AT JIMMY CARTER PMC 1996

	HARVEST DATES		
Entry	**5/22**	**7/9**	**8/27**
Montgomery	70.50	72.25	67.76
Williamsburg	69.25	72.50	69.75
Nacogdoches	-	-	-
Jackson	66.00	71.00	69.50
Medina	-	-	-
Hays	69.50	73.75	70.00
New Mexico	74.00	73.25	70.25
ARK 1	68.00	70.25	68.00
ARK 2	71.25	73.50	71.50
ARK 3	-	-	-
FLR 1	-	-	-
FLR 2	-	-	-
FLR 3	70.00	75.50	71.50
'Pete'	69.00	73.00	69.00
LSD (0.05)	NS	1.956	2.261
CV (%)	4.79	1.84	2.22

Evaluation of Native Grasses

TABLE 19- PERCENT ADF OF EASTERN GAMAGRASS ENTRIES BY HARVEST DATE AT JIMMY CARTER PMC 1997

	HARVEST DATES		
Entry	**5/20**	**7/15**	**9/4**
Montgomery	40.25	40.00	39.25
Williamsburg	35.00	42.00	40.00
Nacogdoches			
Jackson	39.50	42.25	40.75
Medina	37.75	41.00	40.75
Hays	39.50	42.25	40.50
New Mexico	41.00	43.00	41.00
ARK 1	39.00	40.75	39.00
ARK 2			
ARK 3			
FLR 1			
FLR 2	39.25	42.00	43.25
FLR 3	39.50	42.50	42.75
'Pete'	40.75	37.25	36.00
LSD (0.05)	1.964	2.152	1.719
CV (%)	3.46	3.59	2.94

TABLE 20- PERCENT NDF OF EASTERN GAMAGRASS ENTRIES BY HARVEST DATE AT JIMMY CARTER PMC 1997

	HARVEST DATES		
Entry	**5/20**	**7/15**	**9/4**
Montgomery	70.75	71.25	70.75
Williamsburg	69.75	73.50	71.25
Nacogdoches			
Jackson	71.75	73.00	70.75
Medina	71.50	71.00	69.75
Hays	70.75	71.75	70.50
New Mexico	72.25	73.00	72.25
ARK 1	69.50	71.00	68.75
ARK 2			
ARK 3			
FLR 1			
FLR 2	70.75	74.25	72.50
FLR 3	72.25	73.75	74.00
'Pete'	72.25	71.75	69.25
LSD (0.05)	1.777	1.213	1.503
CV (%)	1.72	1.15	1.46

INTRODUCTION:

Very little comparative testing between native and introduced warm-season forage plants has been documented in the southeastern United States. This test attempts to establish, evaluate, and analyze different warm-season pasture plants and mixtures subjected to different burn regimes. Data should provide qualitative and quantitative information relative to native and introduced pasture species performance in different burn management regimes. Response variables will include species composition and eventually species frequency and dry matter production. This will be a cooperative effort between the NRCS and Dr. Mary Miller-Goodman of Auburn University.

Evaluation of Native Grasses

MATERIALS AND METHODS:

On May 6, 1997, the following experimental split plot design was established:
Split plot (cultivars) with main plots (burn regime) in RBD with 3 replications. Main plots (50 ft x 300 ft) are burn #1 and burn #2. Split plots (50 ft x 50 ft) are 6 cultivar and cultivar mixes: (1) pure 'Cave-In-Rock' switchgrass, (2) pure big bluestem (Knox City PMC), (3) pure 'Coastal' bermudagrass, (4) pure 'Pensacola' bahiagrass, (5) a mixture of 30% little bluestem, 25% big bluestem, 20% indiangrass, and 25% switchgrass, (6) a mixture of 50% little bluestem and 50% 'Serala' lespedeza. Grass seeds were planted at a rate of 10 lbs PLS/ac and 'Coastal' bermudagrass was planted at a rate of 0.15 Bu/120 sq. ft. 'Serala' lespedeza was seeded at 20 lbs/ac.

RESULTS AND DISCUSSION:

In 1998, all plots were burned. In 1998, percent species composition was recorded for each burn regime plot (Table 21). Starting in 1999, burn #1 plots will be burned every year and burn #2 plots will be burned every 2 years. The data from Table l will be used to track changes in species composition and frequency over time.

A study to compare native and introduced warm-season forages performance in response to burn versus no burn management regimes is conducted at the PMC. Response variables includes cover composition, species composition, spatial canopy quality, and dry matter production.

TABLE 21 - PERCENT SPECIES COMPOSITION BY TRANSECT - 10-15-98 BURN REGIME #1

PLOT	MEAN COMPOSITION %	
'Pensacola' Bahiagrass	Bahiagrass	94.7
	Crabgrass	5.2
Little Bluestem, Big Bluestem, Indiangrass, Switchgrass		
	Indiangrass	41.7
	Cave-In-Rock	13.3
	Little Bluestem	13.1
	Bahiagrass	25.1
	Sand Blackberry	3.3
	Crabgrass	2.9
	Big Bluestem	0.5
'Cave-In-Rock' Switchgrass	Cave-In-Rock	34.5
	Sand Blackberry	11.7
	Bahiagrass	48.9
	Crabgrass	1.9
	Bare ground	2.9
'Coastal' Bermudagrass	Bahiagrass	83.0
	Sand Blackberry	11.8
	Cave-In-Rock	0.5
	Crabgrass	1.4
Little Bluestem/ 'Serala' Lespedeza	Little Bluestem	21.0
	Serala	51.7
	Bahiagrass	26.3

	Sand Blackberry	1.0
Big Bluestem	Big Bluestem	15.1
	Bahiagrass	70.9
	Crabgrass	14.0

BURN REGIME #2

PLOT	**MEAN COMPOSITION %**	
Big Bluestem	Big Bluestem	28.6
	Bahiagrass	52.9
	Sand Blackberry	1.4
	Crabgrass	16.6
	Little Bluestem	0.5
Little Bluestem/‘Serala’ Lespedeza	Little Bluestem	21.6
	Bahiagrass	20.2
	Serala	57.7
	Crabgrass	0.5
‘Coastal’ Bermudagrass	Bahiagrass	80.9
	Sand Blackberry	8.1
	Crabgrass	8.5
	Big Bluestem	1.4
‘Cave-In-Rock’ Switchgrass	Cave-In-Rock	28.4
	Sand Blackberry	9.5
	Bahiagrass	56.8
	Crabgrass	5.3
‘Pensacola’ Bahiagrass	Bahiagrass	95.7
	Crabgrass	3.3
	Sand Blackberry	1.0
Little Bluestem, Big Bluestem, Indiangrass, Switchgrass		
	Big Bluestem	2.4
	Indiangrass	42.1
	Cave-In-Rock	9.8
	Little Bluestem	15.7
	Bahiagrass	26.5
	Sand Blackberry	1.5
	Crabgrass	2.4

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Availability

For more information about evaluation of native grasses or to obtain a copy of this publication, contact the Natural Resources Conservation Service in Athens, GA (706 546-2114), Jimmy Carter Plant Materials Center (912-924-4499), or contact your local Natural Resources Conservation Service office.