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ANNUAL TECHNICAL REPORT

Jimmy Carter
Plant Materials Center
2003

KINCHAFOONEE VIRGINIA WILDRYE

A Technical Summary of Plant Materials Studies
At the Jimmy Carter Plant Materials Center
Americus, Georgia

STATE CONSERVATIONIST

Leonard Jordan

PLANT MATERIALS SPECIALIST/TEAM LEADER

Edward D. Surrency

NAT'L PLANT MATERIALS SPECIALIST

Vacant

PLANT MATERIALS CENTER STAFF

Charles M. Owsley	Manager
Malcome S. Kirkland	Asst. Manager
Vacant	Biol. Technician
Larry L. Vansant	Biol. Technician

STATE CONSERVATIONISTS ADVISORY COMMITTEE

Purpose: To provide leadership to the Plant Materials Program

Leonard Jordan – Chairman	Athens, GA
Walter Douglas	Columbia, SC
Robert Jones	Auburn, AL
Mary K. Combs	Raleigh, NC
James Ford	Nashville, TN

PLANT MATERIALS TECHNICAL COMMITTEE

The Plant Materials Technical Committee provides input to the PM Advisory process. The PM Technical Committee may be on a state, multi-state or other regional/local level for a single PMC or for multiple Plant Materials Centers. Responsibilities include:

- Provides overall technical leadership in the identification, integration, and prioritization of plant technology needs.
- Develops recommendations for addressing needs and submits information to the State Conservationist's Plant Materials Advisory Committee for review and approval.
- Promotes the transfer of developed applied science technology.

Technical Committee Members

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Rick White, NPL-NRCS	Washington DC
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Ken Rogers, SRC NRCS	Auburn Ala
Ronnie Feaster, SRC NRCS	Columbia SC
Don Surrency, RPMS NRCS	Athens Ga
Sam Sanders, PMS NRCS	Gainesville Fla
Roger Hansard ,PMS NRCS	Raleigh NC
Vic Simpson, RTCoord NRCS	Atlanta Ga
Dr Jorge Mosjidis, Res Auburn Univ	Auburn Ala
Dr Mary Goodman, Res Auburn Univ	Auburn Ala
Dr Edzard VanSanten, Res Auburn Univ	Auburn Ala
Dr Mark Latimore, Res FVSU	Fort Valley GA
Dr Glenwood Hill, Res FVSU	Fort Valley Ga
Dr Richard Lowrance, Res ARS	Tifton Ga
Tom Wilburn, EPA	Atlanta Ga
Merrill Varn, Okefenokee Growers	Folkston Ga
Mike Permenter, SERO NRCS	Atlanta Ga
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Dr Errol Rhoden,Res Tuskegee UNiv	Tuskeegee Ala
Dr Makonnen Lima Res, Ala A&M Univ	Normal Ala
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Larry Dyck,Res Clemson Univ	Clemson SC
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Steve Carmichael, EPA Liaison Reg 4 NRCS	Atlanta Ga
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Greg Mason,US F&W	Brunswick Ga
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Pete Martinez, SE Regional Strat Plan Team NRCS	Atlanta Ga
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Sid Brantly, Reg Grazing Spec NRCS	Auburn, Ala
Richard Oliver, ASTC-Tech, NRCS	Athens Ga
Ed Hackett, Wildlife Bio Wildlife Inst NRCS	Madison Miss
Mike Owsley, Mgr JCPMC NRCS	Americus Ga
Malcome Kirkland, AMGR JCPMC NRCS	Americus Ga

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INTRODUCTION

The Jimmy Carter Pant Materials Center (PMC) is part of a national plant materials program operated by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), formerly recognized as the Soil Conservation Service (SCS). The purpose of the PMC is: to assemble, evaluate, and release new plant materials for conservation use; to determine techniques for their successful use; to provide for their commercial increase; and to promote the use of plant materials needed to meet the objectives of the National Conservation Program.

The PMC serves NRCS field offices, public agencies, commercial seed and plant producers, and the general public in Georgia, Alabama, South Carolina, North Carolina, and parts of Florida and Tennessee. These states present a wide range of climatic and soil conditions and include a total of 13 major land resource areas (MLRAs) representing 120,377,913 acres across the Southeastern United States.

PMC activities are guided by a five-year program focusing on the development of the following high-priority items for **Farm Bill Implementation**:

I. Evaluation of native grasses for grazing lands that support sustainable agriculture. (Conservation buffers, forage, erosion control, wildlife, urban landscapes)

II. Evaluation of native plants for water quality (riparian forest areas, conservation buffers, filter strips, constructed wetlands, and streambank stabilization).

III. Evaluation of plants for conservation tillage(green manure, organic gardening , carbon sequestration and winter cover)

LOCATION AND FACILITIES

The PMC is located on the northwest corner of Americus, Georgia approximately 40 miles north of Albany, Georgia. The facility consists of 327 acres of land with 19 buildings, including a new office building (conference room), greenhouse, seed cleaning /seed storage facilities, pesticide storage, and an underground irrigation system that covers approximately 85 acres. The center's land includes seven soil types, with Orangeburg predominating. Approximately two-thirds of the acreage is open for cultivation, and Muckalee Creek runs through the southwest corner.

HISTORY

The PMC was established in 1936 to produce planting material, mainly pine seedlings for use by the Civilian Conservation Corps (CCC) and for former SCS demonstration projects. The site was originally rented, but was purchased by the federal government in 1942. The center was operated on contract by the University of Georgia Experiment Station from 1954 to 1975, was SCS-operated from 1976 to 1994, and is currently NRCS-operated. Historically, the PMC's objective has been to find erosion-minimizing plants. Today the center seeks to solve problems confronting soil, water, air, plants, and animals.

PARTNERSHIPS

The PMC has conducted cooperative programs with the following organizations:

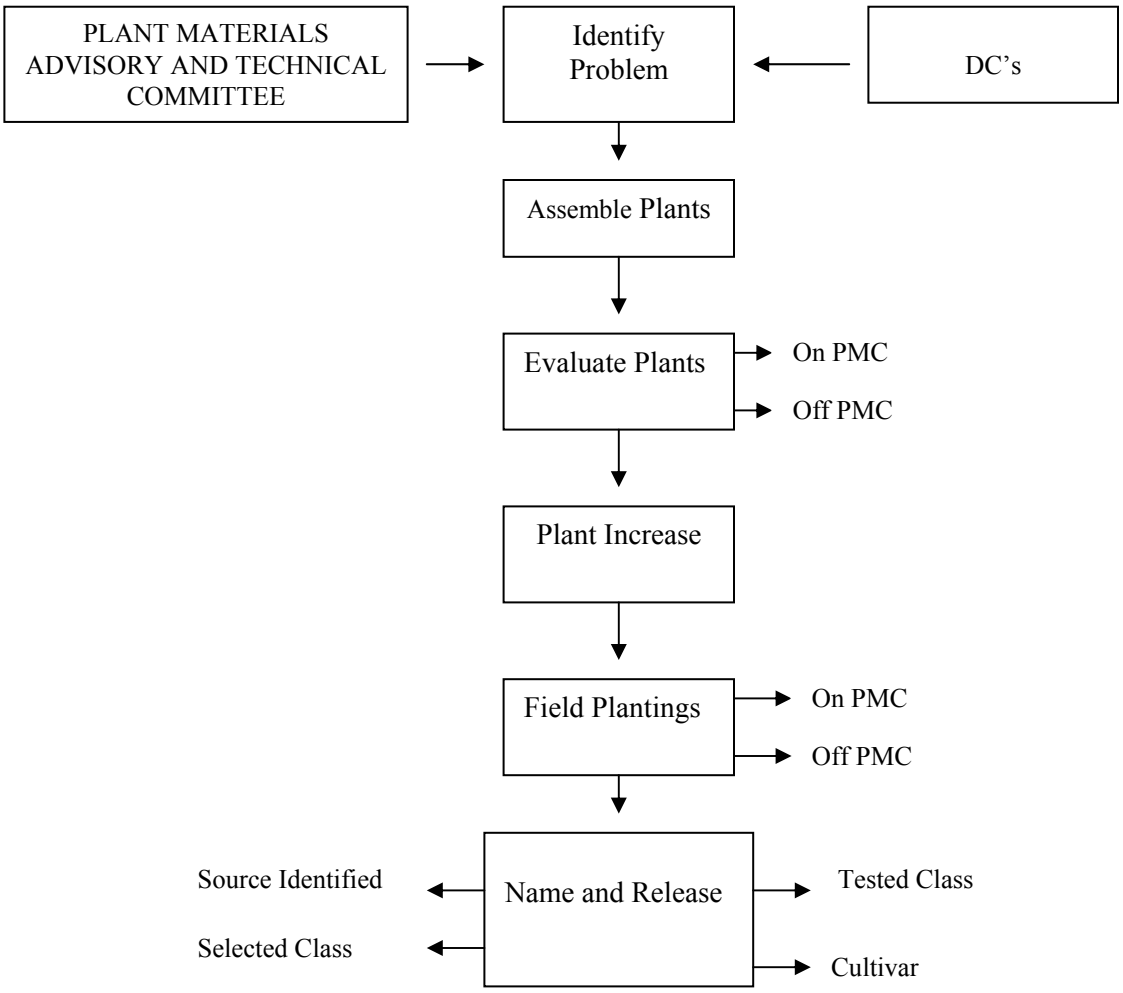
Alabama Agricultural Experiment Stations
Alabama Crop Improvement Association
Fort Valley State University
Georgia Crop Improvement Association
Alabama S&W Conservation Commission
Alabama A&M University
Auburn University
Georgia Forestry Commission
Georgia Department of Transportation
RC & D Councils

PARTNERSHIPS (CONTINUED)

Georgia Seed Development Commission	Georgia Agricultural Experiment Stations
Jekyll Island Authority	Georgia Department of Natural Resources
The University of Georgia	Tuskegee University
United States Environmental Protection Agency	United States Army Corps of Engineers
United States Department of Energy	United States Forest Service
United States Fish & Wildlife Service	Georgia Soil & Water Conservation Comm.
United States Department of Defense	Lamar Co. S&WCD
United States Department of Agriculture (ARS)	Flint River S&WCD
Lower Chattahoochee S&WCD	Alabama Forest Commission

PLANT MATERIALS PROGRAM

The Plant Materials Program has established a **systematic process to evaluate and release plants** to address the conservation problems outlined in the long-range program. The intensity and time of evaluation will vary according to the class of release. A cultivar will require many years of intense evaluation whereas a source identified plant can be released in 1-2 years with little evaluation. The following flow chart illustrates the steps involved in this process:



In addition to the release of new plants, the **PMC develops new technology to better utilize plant materials for our high priority concerns.**

DESCRIPTION OF THE AREA

The Jimmy Carter PMC serves Alabama, Georgia, South Carolina, North Carolina, and parts of Tennessee and Florida. These states present a wide range of climatic and soil conditions.

Elevations range from sea level to over 6,000 feet. Low temperatures will vary from -20 degrees F at the higher elevations to 10 degrees F along the coast while summer high temperatures range from 70 F in the mountains to 110 F at lower elevations.

Frost-free days vary from 260 days near the coast to 130 days at the higher elevations.

Annual rainfall over the area ranges from 45 to 80 inches.

The states served by the center are represented by the eleven major land resource areas.

MAJOR LAND RESOURCE AREAS SERVED

123 Nashville Basin
128 Southern Appalachian Ridges and Valleys
129 Sand Mountain
130 Blue Ridge
133A Southern Coastal Plain
134 Southern Mississippi Valley Silty Uplands
135 Alabama and Mississippi Blackland Prairies
136 Southern Piedmont
137 Carolina and Georgia Sandhill
152 Gulf Coast Flatwoods
153 Atlantic Coast Flatwoods

Soil Conditions vary widely -- deep droughty sand, heavy plastic clay subject to excessive intermittent wetness and drying, highly acid to alkaline extremes, and swamps and marshes - fresh and salt. Farming enterprises also vary widely. The area contains a number of heavily populated suburban areas surrounding centers of industry and commerce. The mountains, seashore, and other areas of natural beauty are being rapidly developed to meet the demand for recreation.
Such diversity of climate, soil, and enterprises requires many different types and kinds of vegetation to provide for protecting the land when it is properly treated for soil and water conservation.

Summary of Weather Conditions- Jimmy Carter PMC-2003
1929-2003

	TEMPERATURE (°F)		PRECIPITATION (Inches)			
Month	**2003 Max**	**2003 Min**	**Month Total 2003**	**74 Year Average**	**74 Year High Month**	**74 Year Low Month**
January	56	33	1.01	4.36	11.19	.64
February	64	40	4.56	4.56	12.28	.56
March	70	48	4.85	5.35	12.11	.48
April	76	53	5.39	3.81	12.26	.00
May	86	64	6.77	3.29	8.35	.14
June	88	69	4.64	4.26	11.69	.03
July	90	72	5.91	5.19	24.79	1.25
August	86	71	6.34	3.99	11.76	.99
Sept	81	64	2.33	3.44	11.54	.10
October	77	54	2.36	2.10	9.60	.00
Nov	73	47	1.15	3.00	10.63	.05
Dec	58	33	2.38	4.13	12.29	.42
Total	-	-	47.69	47.51		

PROJECT 13I128R - EVALUATION AND INCREASE 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.

MATERIALS AND METHODS:

In 1989-1990, the PMC assembled 750 vegetative ecotypes of southeastern big bluestems. These ecotypes were placed into an initial evaluation block. Each entry was planted to ten-foot rows with one foot between clones. All entries were separated by three-foot middles. Each entry was replicated twice.

RESULTS AND DISCUSSION:

In 1990 and 1991, the evaluation process began. The following were the evaluation criteria: 1) vigor, 2) stem color, 3) inflorescence color, 4) foliage amount, 5) foliage height (cm), 6) foliage color, 7) forage potential, 8) disease/insect resistance, 9) boot date, bloom date, maturing date, and percent germ, 10) seed amount, 11) uniformity, 12) leaves height on stem, 13) total height, 14) stem size, 15) tillering, 16) steminess, 17) basal foliage, 18) lodging, 19) late maturity.

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

In June 1993, four 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 determined which ecotypes were selected for 'biomass type' crossing blocks in 1994. These blocks should produce germplasm for comparison testing against a standard big bluestem cultivar. The three blocks consist of early maturing ecotypes, late maturing ecotypes and median maturing ecotypes.
Early maturing crossing block
Lines - 23, 52, 54, 62, 71, 78, 81, 84, 94, 97, 140, 142, 161, 231, 260, 305, 322, 336, 351, 368, 481, 484, 542, 561, 578, 595, 624, 661, 676, 704,719
Median maturing crossing block
Lines - 1, 7, 10, 18, 20, 38, 44, 57, 61, 69, 75, 77, 85, 88, 89, 91, 93, 111, 116, 159, 200, 204, 223, 373, 432, 438, 452, 496, 497, 513, 532, 560, 580, 592, 598, 627, 689, 691, 709, 738
Late maturing crossing block
Lines - 4, 14, 32, 42, 46, 48, 50, 58, 59, 66, 73, 76, 98, 99, 106, 107, 122, 123, 124, 126, 127, 130, 131, 134, 143, 366, 399, 406, 692

Each line was represented by three replications per crossing block to ensure proper pollination.

In 1995, seed was collected from the three-biomass 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 determined which ecotypes should constitute crossing blocks for production of big bluestem 'forage type' germplasm. The crossing blocks consist of early maturing ecotypes, median maturing ecotypes and late maturing ecotypes. Each line was replicated three times per crossing block to ensure proper pollination.

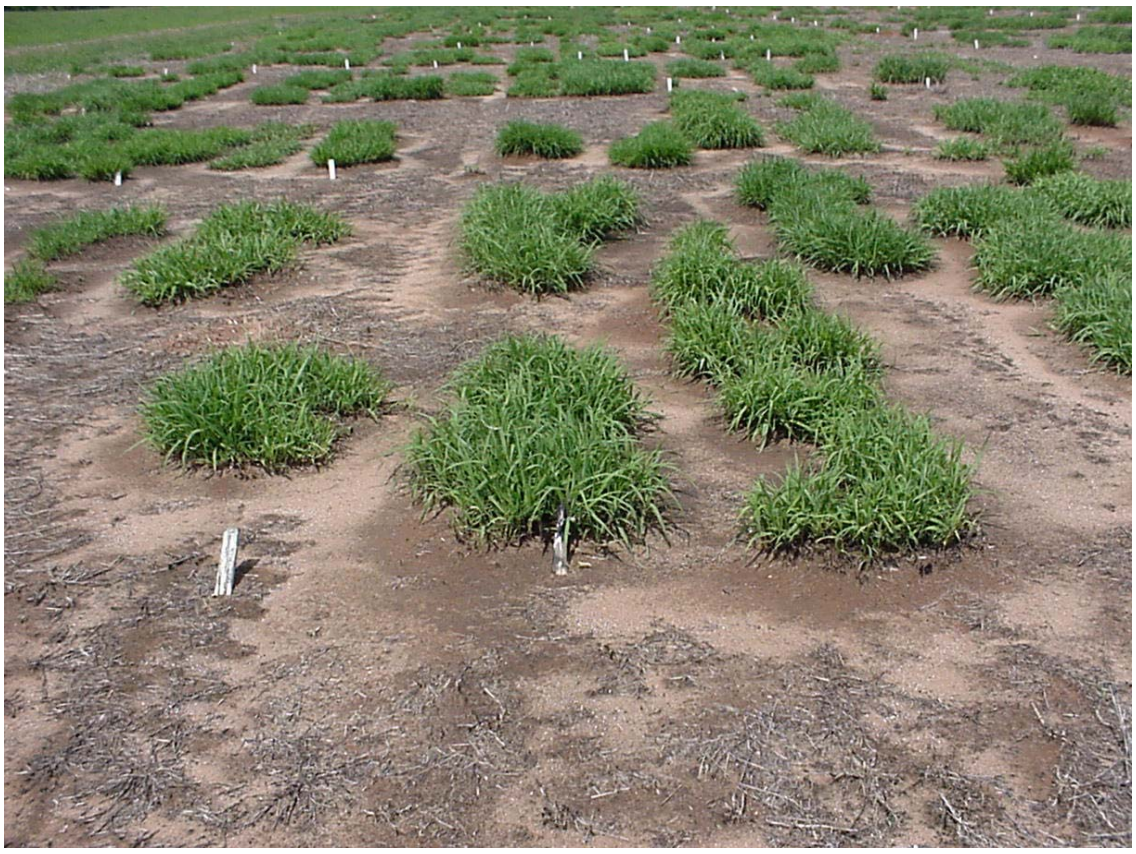
Early maturing crossing block
Lines - 15, 84, 105, 110, 135, 136, 140, 154, 166, 179, 198, 215, 216, 218, 245, 247, 260, 290, 297, 361, 364, 385, 389, 397, 436, 439, 455, 484, 488, 500, 548, 561, 568, 641, 661, 693, 707, 743.

Median maturing crossing block
Lines - 7, 17, 18, 26, 77, 114, 155, 181, 200, 214, 228, 234, 252, 266, 296, 328, 334, 377, 414, 420, 446, 447, 472, 482, 505, 510, 520, 524, 537, 559, 569, 584, 649, 651, 689, 700, 717, 725.

Late maturing crossing block
Lines - 3, 4, 14, 42, 46, 49, 59, 60, 66, 90, 98, 122, 124, 126, 131, 144, 170, 206, 219, 249, 254, 261, 298, 312, 325, 333, 341, 362, 366, 406, 426, 540, 575, 635, 658, 678, 679, 747.

October 2003 seed was harvested from the late maturing crossing blocks. The late maturing seed will be bulked and planted for seed increase in spring 2004. Prior seed collection has yielded poor stands. There was no improvement with cold–wet stratified seed processes, therefore the big bluestem seed will be directly planted to the field in early spring 2004.

Subsequent seed harvest will be initially used for comparative forage testing.



Spring growth of Big bluestem by March 31at PMC Big bluestem nursery

Big bluestem forage type crossing block in August prior to harvest

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

Yellow indiangrass, (*Sorghastrum nutans*), is a native perennial warm season grass. It has been utilized for forage and hay production. Results from this study lead to release of a new cultivar.

The PMC in cooperation with the Alabama Crop Improvement Association released PI-514673 as 'Americus' Indiangrass in the summer of 2002. 'Americus' originated from germplasm collected in Alabama and Georgia. This new cultivar is the first indiangrass developed for the Southeastern U.S. It can be utilized for forage, erosion control, landscape beautification and restoration. It is now being grown for commercial use by Sharp Brothers Seed Company of Clinton, Missouri.

Americus Indiangrass Production Field

Lamar Co S&WCD Cattle Strip-Grazing Americus Indiangrass at PMC

PROJECT 13A140S - EVALUATION AND SELECTION OF PLANT MATERIALS FOR FOREST BUFFERS IN THE SOUTHEASTERN UNITED STATES

INTRODUCTION:

This test consists of the following species: ogeche lime, red maple, blackgum, green ash, cherry bark oak, loblolly pine, yellow poplar, bald cypress, water oak, sweetgum, white oak, and sycamore. The goal of the project is to determine which tree buffer produces optimal growth and uptakes the most applied fertilizers.

MATERIALS AND METHODS:

Plantings were established by use of dibbles in the winter of 1993/1994. One 54 foot x 100 foot block per species was planted on 6 foot spacings. Each block runs perpendicular to the slope, and was planted with 160 trees.

RESULTS AND DISCUSSION:

Information contained in Tables 1-2 provides vegetative data to accompany chemical analysis. All growth means represent means of surviving material. Through 2001 sweetgum, green ash and cherrybark oak produced the most height growth. Through 2003 ogeche lime has the greatest trunk diameter growth. However, it also has a low percent survival reading.Through 2003 the highest survival means were recorded by green ash and cherrybark oak.

In June 1998 and June 1999, the PMC staff in cooperation with Dr. Richard Lowrance of ARS (Tifton, Ga.) took soil, stem, leaf, and fruit samples from selected specimens in the tree blocks. These were analyzed for N & P content. PMC staff fertilized the blocks in May 1999 (158 lbs N/Ac and 30 lbs P/Ac). Dr. Lowrance is evaluating and analyzing the N & P data for future reports. If funds become available further analysis should determine which block of trees has the highest capacity for fertilizer uptake.

TABLE 1 MEAN % SURVIVAL OF FOREST BUFFER TREES

Tree Species	Aug 1995	Aug 1996	Sep 1997	Jul 1998	Aug 1999	Oct 2000	Aug 2001	Aug 2002	Sep 2003
Loblolly Pine *	16	13	13	13	13	12	12	12	12
Yellow Poplar *	14	8	8	8	8	7	7	7	7
Sycamore *	27	20	20	20	20	20	20	20	18
Blackgum	68	66	63	63	62	62	62	62	62
Cherrybark Oak	89	89	89	88	87	87	87	87	87
Sweetgum	77	73	74	74	74	74	71	70	70
White Oak	49	46	44	44	43	43	43	43	43
Bald Cypress	71	70	68	68	68	66	66	66	66
Green Ash	81	82	82	82	82	81	81	81	81
Red Maple	76	71	72	71	71	71	68	67	67
Ogeche Lime	35	35	34	35	35	35	34	34	33
Water Oak	73	70	70	70	70	70	70	70	70

* Low survival trees were not included in further data tables

Forest Buffer Evaluation Area at Jimmy Carter PMC

TABLE 2 TRUNK DIAMETER OF FOREST BUFFER TREES

Mean Diameter Main Trunk Ground Level (mm)

Tree Species	Aug 94	Aug 95	Jul 96	Sep 97	Jul 98	Aug 99	Oct 00	Aug 01	Aug 02	Sep 03
Blackgum	7.232	14.4	26.6	35.2	54.4	84.5	88.9	109.3	112.5	127.5
Cherrybark Oak	5.61	12.1	28.0	46.0	63.6	96.5	122.4	151.1	152.5	170.6
Sweetgum	10.54	24.5	42.3	65.5	88.9	116.1	134.6	172.8	186.7	225.8
White Oak	6.73	11.0	19.4	24.5	35.6	52.1	63.6	95.6	109.4	138.8
Bald Cypress	8.06	18.0	31.0	43.7	63.2	76.5	105.0	114.6	127.8	151.3
Green Ash	25.49	46.4	69.7	82.7	107.8	1l5.9	119.0	122.2	135.6	160.6
Red Maple	8.19	20.7	43.0	56.0	76.9	90.6	110.1	125.9	151.4	178.8
Ogeche Lime	16.57	35.6	64.3	110.5	126.6	149.7	162.2	210.5	258.1	289.6
Water Oak	9.23	21.7	30.9	49.9	66.2	86.9	96.8	118.2	143.5	158.8

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. The Lamar County Soil and Water Conservation District is cooperating by providing cattle for the demonstration.

MATERIALS AND METHODS:

In the spring of 1993, 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.

This demonstration is located on the northwest side of the town of Americus, Georgia, where mean annual precipitation is 125 cm (about 49"), and the mean annual temperature is 18.5 degrees Celsius (about 65.3 degrees Fahrenheit).

The demonstration site is divided into ten paddocks, approximately 0.2 hectares (about 0.45 acre) each, using a single strand of electric fence wire about 90 cm high. Water is provided to each paddock using one inch black plastic pipe and 60 gallon portable water trough. The water source is muckalee creek.

In April 2003 the Lamar County Soil and Water Conservation District provided ten heifers. Each heifer weighed about 580 pounds prior to grazing.

The heifers were weighed, vaccinated, wormed, dusted, and ear tagged.

May 6, 2003 the heifers were moved into the first eastern gamagrass paddock to begin a 2.5-3.5 day grazing period in each paddock.

In the spring, 600 pounds per acre of 10-10-10 fertilizer was applied to the pasture, then approximately 150 pounds of ammonium nitrate was applied to each paddock after each grazing event.

In previous years manure samples were taken on a periodic basis to determine crude protein and digestible organic matter of the eastern gamagrass consumed by the animals. The Grazing Animal Nutrition Laboratory at Texas A&M University was utilized to determine these readings. The NUTBAL Nutritional Balancer software was used to predict animal nutritional needs.

RESULTS AND DISCUSSION:

Cattle were rotated successively through the ten paddocks with 2.5-3.5 days grazing period in each paddock for four cycles. Eight to ten inches of plant stubble was left after each grazing event. The cattle were rotated through the entire ten paddocks until September 25, 2003.

The results from typical manure samples taken from the heifers are as follows:
Crude Protein ranged from 11.8 to 14.14%. Digestible organic matter ranged from 63.68 to 66.49 %.

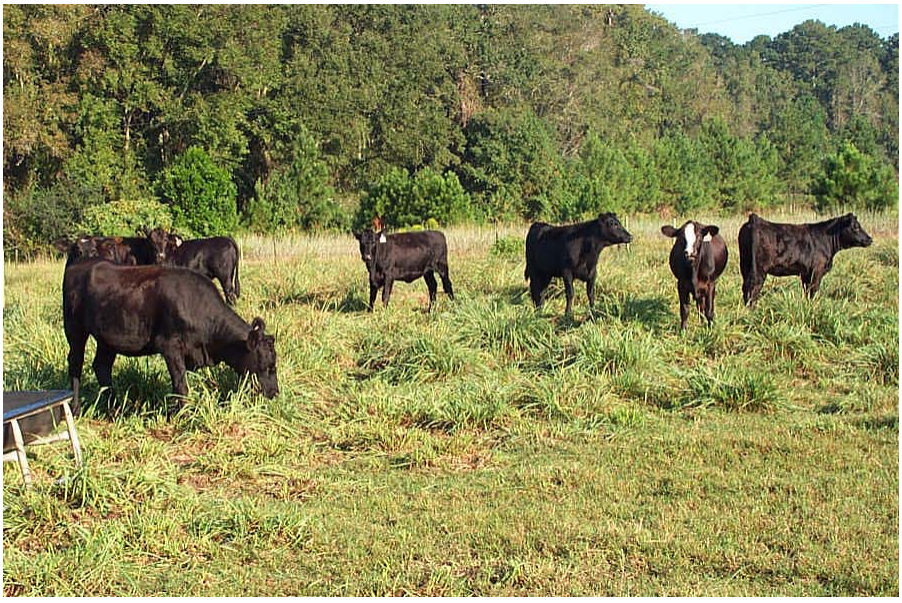
AVERAGE WEIGHTS 2003

	DATE	WEIGHT	TOTAL GAIN	AVG. DAILY GAIN
Beginning	May 06	580 lbs	-	-
Ending	Sept 25	742 lbs	162 lbs	0.96 lbs

In 2001-2003 heifers have shown an average daily weight gain (ADG) of approximately 1.0 after grazing the eastern gamagrass at the Jimmy Carter Plant Materials Center in Americus, Georgia. Similar procedures with steers in 1999 and 2000 produced an average daily gain of 1.75 and 1.5 respectively.

Observations and results of NIRS analysis of fecal samples for crude protein suggest that forage quality is adequate for typical livestock operations in this region.

After each grazing period cattle were moved to a new paddock



Lamar Co S&WCD cattle grazing paddocks in 2003

Cattle leaving PMC for Lamar Co after being weighed

PROJECT 13A144R - GRAZING MANAGEMENT OF YELLOW INDIANGRASS (*SORGHASTRUM NUTANS*)

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 three-acre bahia grass pasture was sprayed with Roundup. In February 1994, the pasture was disked. In March 1994, 450#/Ac of 0-14-14 fertilizer was applied. On May 5, 1994 the pasture area was disked and cultipacked to firm the seedbed. Indiangrass seed was applied with a Solo fertilizer spreader set on No. 24 for a 12-14 foot swath. The rate of seeding was 25 #/Ac or 10# 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 1995 - 1996.

In May 1997, 10-10-10 fertilizer was applied at the rate of 600 #/Ac. The first week of June, 150 #/Ac of ammonium nitrate were spread on the area. On May 27, 2, 4-D herbicide was sprayed at 1 qt/Ac to control broadleaf weeds. Similar cultural practices were followed thereafter.

RESULTS AND DISCUSSION:

In 2000, 12 steers from Lamar Co. S&WCD strip grazed the indiangrass field from late June until early July. Cattle quickly adapted to the new source of forage. Fecal samples from this grazing episode indicated plant crude protein of 7.64 - 10.03 % and digestible organic matter of 64.14 - 67.60 %. In October 2001- 2003 the pasture was combined for indiangrass seed to help support a new release called 'Americus'.

Additional rotational grazing of the indiangrass is planned for future years when needed to supplement other grazing studies.

Cattle grazing 'Americus' indiangrass field

PROJECT 13A148R - GRAZING MANAGEMENT OF SWITCHGRASS (*PANICUM VIRGATUM*)

INTRODUCTION:

Switchgrass is a native perennial warm season grass. It can be utilized for forage and hay production. This test attempts to demonstrate the use of 'Alamo' switchgrass. Emphasis will be placed upon establishment and management techniques for forage production demonstration.

MATERIALS AND METHODS:

May 1995, a six-acre field was bottom plowed and disked. In June 1995, the field was leveled with a field cultivator. The field was fertilized with 30 #/Ac of phosphorus and potassium. Switchgrass seed was applied to the cultipacked field, using a fertilizer spreader. Seeding rate was approximately 10 pounds pls/Ac. After seeding, the field was cultipacked perpendicular to the first cultipacking. Depth of seed was approximately 1/4 inch. A dry period delayed germination, however, a good stand was observed by the fall of 1995. Pigweed was controlled with one qt/Ac of 2, 4-D.

The field is divided by electric wire into ten separate paddocks with accompanying water tanks.

600 lbs. /Ac of 10-10-10 fertilizer were applied to the Alamo field in spring 2000.

On May 25 2000, ten Brangus heifers from Fort Valley State University (Dr. Glenwood Hill) arrived for the switchgrass demonstration. The animals were wormed, vaccinated, and dusted by personnel of Fort Valley State University.

RESULTS AND DISCUSSION:

The heifers began grazing on June 5, 2000. They were rotated through the ten-paddock system on a five-day grazing period per paddock. Approximately 8 -10 inches of plant stubble was left after each grazing event. They grazed through two complete cycles and produced an average daily gain of .7 pounds. This was down from 1 pound of ADG in 1999. This reduction is attributed to severe drought experienced in 2000.

Results from manure samples (forage quality) and weights from the heifers are as follows:

DATE	% CRUDE PROTEIN	% DIGESTIBLE ORGANIC MATTER
June 12	9.65	65.11
June 13	9.65	65.63
June 22	12.53	65.25
June 28	10.44	63.92
July 21	13.39	68.08

WEIGHTS

	DATE	AVERAGE WEIGHT	TOTAL GAIN	AVERAGE DAILY GAIN
Beginning	Jun 5	664 lbs	-	-
Ending	Aug 23	726.67 lbs	62.67 lbs	.7 lbs/day

Cattle selectively grazed leaves and attempted to avoid the stemy growth of the Alamo. Forage quality data and weight gain seems to indicate 'Alamo' can sustain heifers under a rotational grazing system.

Due to drought conditions in previous years the switchgrass pasture was divided and planted again equally between 'Alamo" switchgrass and 'Cave-in-Rock' in spring 2003.This planting resulted in a poor stand of switchgrass. Therefore, in 2004 the area will be sprayed to control competitive invasive weeds and planted again to switchgrass . Hopefully this will result in a complete switchgrass stand for grazing work. This should facilitate future grazing trials.

PROJECT 13A150R - QUANTITATIVE AND QUALITATIVE RESPONSE OF NATIVE GRASSES VERSUS INTRODUCED WARM SEASON PASTURE PLANTS AS INFLUENCED BY DIFFERENT BURN REGIMES

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 include species composition, and species frequency. This is a cooperative effort between the NRCS and Dr. Mary S. Goodman of Auburn University.

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 three (3) reps. Main plots (50' x 300') are burn #1 and burn #2. Split plots (50' x 50') are six cultivar and cultivar mixes. (1) pure 'Cave-In-Rock' switchgrass (2) pure 'Earl' big bluestem , (3) pure 'coastal' bermudagrass, (4) pure 'Pensacola' bahiagrass, (5) a mixture of 30% little bluestem, 25% big bluestem, 20% 'Americus' indiangrass, and 25% switchgrass, (6) a mixture of 50% little bluestem and 50% 'Serala' lespedeza. Grass seeds were planted at a rate of 10 # PLS/Acre and coastal bermuda was planted at a rate of .15 Bu/120 sq. ft. Serala lespedeza was seeded at 20 #/Acre.

RESULTS AND DISCUSSION:

In 1998 all plots were burned. Since 1999, burn #1 plots were burned every year and burn #2 plots burned every two years. In 1998 - 2002, percent species composition was recorded for each plot. In 1999- 2002, species frequency was recorded for each plot. Dr. Mary S.Goodman conducted analysis of percent species composition and species frequency. The following is an abstract from a poster based on this study presented by Dr Goodman and the PMC at the Second National Conference on Grazing Lands held in Nashville Tennessee December 7-10 2003.
Accumulation of desirable canopy cover is necessary during pasture establishment to protect pasture soil and provide optimum forage quantity and quality. The objective of this study was to evaluate long-term responses of desirable and invasive cover components of forage swards to burn frequency during pasture establishment in a humid, southeastern environment. Forages were sown or sprigged spring 1997 at Americus Ga. in 6 blocks of six 50 by 50 foot plots that included (a) little bluestem+big bluestem+switchgrass+indiangrass (b) little bluestem+serecia lespedeza (c) bahiagrass (d) bermudagrass (e) big bluestem (f) switchgrass. All blocks were burned spring 1998; thereafter, one-half of the blocks were burned every, and one-half every-other year.Percent canopy cover was estimated each fall (1998-2002) and analyzed as a split plot design with year after establishment the main plots; burn frequency the subplots. Percentages of 70-yr average rainfall (48in) for 1997 to 2002 were 117,92,60,77,100,98, respectively. Burn frequency had significant and varying impacts on cover of specific desirable and invasive species and these impacts often occurred in interaction with impacts of year after establishment and mixture. For example, little bluestem cover in first mix was not different in year 1 (13%) versus year 5 (17%) after establishment if the mix was burned every year. However, when burned every other year, little bluestem cover in first mix was higher (P=. 016) in year 5 (38%) versus year 1 (16%). In second mix little bluestem cover was higher (P=.010) after year 5 when burned every year (32%) versus every other year (16%). Also bahia as an invasive was reduced after year 5 compared to year 1 in some

cases. During pasture establishment, desirable and invasive cover components responded positively and negatively to burn frequency over time and these responses varied within a species when sown in different mixtures.

Data collection from burn plots

The burning regime will be changed in 2004 from a cool season burn to a growing season burn. After this new regime is established new data on species composition and frequency will be generated and reported.

PROJECT 13A151B - Silvopasture Demonstration Project

INTRODUCTION:

In past years, silvopasture studies were conducted by various research institutions in the southeast. They found that tree production and cattle production could be accomplished in one management regime. However, there is a lack of silvopasture demonstration at the present time. This study was established to demonstrate the establishment, management and maintenance of a system designed to produce several valuable products (cattle, pasture, and trees) over the long-term.

MATERIALS AND METHODS:

In January 2001, longleaf pine trees were planted to two (north & south) 4 Ac blocks on the PMC. Containerized trees were planted on 6 foot spacing within a row with 10 feet between double rows and 40 feet between outside rows. Tree density was about 290 trees/Ac. Trees were planted into existing 'coastal bermudagrass' and 'pensacola' bahiagrass mixed pasture. Pasture was sprayed to reduce grass competition. Spraying was continued in 2002.

RESULTS AND DISCUSSION:

In 2002 % species transect data indicated the south area with no trees had 90% bahia and 10% Bermuda, while the south area with trees had 70% bahia and 24% Bermuda. The north area with trees had 60% bahia and 26% Bermuda while the north area with no trees contained 64% bahia and 36% Bermuda. Tree survival through 2002 was 76% for the north area and 85% for the south area. Forage dry matter production in 2002-2003 was calculated by hay bale production from May and August cuttings .In 2002 the south area with trees produced an average of 2143 #/Ac and the south area with no trees produced an average of 3016 #/Ac. In 2002 the north area with trees produced an average of 2304 #/Ac while the north area with no trees produced an average of 3279 #/Ac. In 2003 the south area with trees produced an average of 2576 #/Ac and the south area with no trees produced an average of 2485 #/Ac. In 2003 the north area with trees produced an average of 3152 #/Ac and the north area with no trees produced an average of 4000 #/Ac.

Containerized longleaf pine during third year of study

AU Sunrise Crimson Clover being planted for additional study evaluation

In 2003 and 2004 Dr Mary Goodman of Auburn University began a study on the silvo-pasture area to compare fertilizer versus clover cover effects on the silvo-pasture composition and growth.

PROJECT 13A152R- Rotational Grazing Management of a Mixed Native Grass Pasture

INTRODUCTION:

Native grass pasture systems are used commonly in the Midwestern U.S. However, these systems are rarely utilized in the Southeastern United States. This study attempts to establish a mixture of native warm season grasses and to demonstrate their use in a managed rotational grazing system.

MATERIALS AND METHODS:

In April 2001 the PMC planted a 5-acre native mixed grass pasture using a Truax no-till drill. Since the planting area is sandy soil, a cover of oats was grown to stabilize the soil. Before planting the warm season grasses, the oats were sprayed with herbicide. The oat field was not mowed before planting because the mowed debris can interfere with the planting mechanisms of the planter. The oats were not completely killed before planting. Drill was set to plant switchgrass ('Cave in Rock' and 'Alamo' combined) at 4 # pls/Ac, 'Americus' indiangrass at 2.5 # pls/Ac, Knox City PMC selection of little bluestem at 4.1 # pls/Ac, and 'Earl' big bluestem at 2.5 # pls/Ac. In March 2002 the entire pasture was burned.

RESULTS AND DISCUSSION:

In August 2002 a transect of the field was conducted to determine the percent species composition of the mixture one year after establishment. The results were as follows: Cave in Rock-7 %, Alamo-25 %, Americus-4 %, little blustem-12%, Earl-5%, crabgrass bermudagrass and others-47%. In September 2003 another transect was run with these results, Cave in Rock - 12%, Alamo- 40% , Americus Indiangrass 2%, little bluestem-8%, Earl big bluestem -14%, open-23%, and weed-1%. Alamo switchgrass and Earl big bluestem are the big increasers the second year. Future transects will be conducted to monitor changes in species composition of the mixture over time.

Tour of Native mixed Grass pasture at Southeast Plant Material Conference

PROJECT GAPMC-T-0154-CP Alternative crops for small farmer's demo at the Jimmy Carter PMC (Pharmaceutical Plants)

INTRODUCTION:

Humans have utilized plants for thousands of years. For example therapeutic agents for treating many aliments are derived from various herbs. Several plants produce economically important organic compounds such as phytochemicals and pesticides. The USDA-ARS is looking at many legumes for pharmaceutical purposes such as Velvetbean (contains L-DOPA, which is used to treat Parkinson's disease). Dr. Morris with ARS states many obscure legumes can provide valuable multiple resources in addition to medicines such as human food, animal feed, cover crops, green manure and erosion control. This study will attempt to assemble, grow, increase and demonstrate new and different crops for small farmers. These farmers will subsequently produce valuable plant material for many uses including medicine, food, and conservation.

MATERIALS AND METHODS:

Along with Dr. Brad Morris, the PMC established mung bean, velvetbean, and cowpeas in 2001. In 2002 the PMC planted several accessions of guar, jackbean, and lablab. In 2003 the PMC grew sesame ,crotalaria ,senna ,guar ,and jackbean.

RESULTS AND DISCUSSION:

In 2001 native wildlife, especially whitetail deer, destroyed the legume demonstration crops. However, the PMC constructed an electric fence to protect the crops in 2002. The PMC produced 2.5 pounds of guar seed from 8 accessions and produced 17 pounds of jackbean seed from 5 accessions. The lablab accessions failed to produce seed. In 2003 the PMC produced 96 grams of common sesame, 1 pound of *Crotalaria retusa*,, 91 grams of coffee senna, ,113 grams of guar,and 6 pounds of jackbean.

Alternative crops production area in 2003

Sesame S*esamum indicum* grown in study

PROJECT GAPMC-T-0155-GW Carbon sequestration Study

INTRODUCTION:

Concerns over global warming have increased interest in carbon and carbon sequestration. Scientists estimate agriculture is responsible for about 7 % of the total U. S. contribution of greenhouse gases. Plants remove carbon dioxide from the atmosphere and store it in plant parts as carbon. When plants die and decompose some carbon is released back to the atmosphere while some is sequestered as soil carbon, especially under conservation tillage systems. This amounts to a natural giant carbon storage sink. This study will compare annual and perennial crops ability to sequester carbon. This will be determined by soil carbon testing of several entries in a long-term study.

MATERIALS AND METHODS:

A randomized complete block design with four replications was planted to 'Earl' big bluestem, 'Tropic' Sun Hemp, 'Iuka' eastern gamagrass and 'Alamo' switchgrass in May 2001. Soil carbon content over time will be the main measured variable.

RESULTS AND DISCUSSION:

In 2001,a base line mean soil carbon content was determined for future reference. In 2002 and 2003 soil organic matter was measured from each entry at 0-2 inch depth and 2-6 inch depth. Measurable differences should be recorded over time.

2002-2003 Mean % Organic Matter Content of Soil

Cultivar	*0-2 Inch Soil Depth*	*2-6 Inch Soil Depth*
Alamo	1.95/1.71	1.65/1.39
Earl	2.0/1.80	1.67/1.54
Iuka	1.88/1.85	1.72/1.64
Tropic	1.89/1.78	1.66/1.45

PLANT MATERIAL SHIPPED IN 2003

PLANT MATERIAL	AMOUNT SHIPPED
Americus Hairy Vetch *Vicia villosa*	150 # Seed
Dove Proso Millet *Panicum miliaceum*	26 # Seed
Americus Indiangrass *Sorghastrum nutans*	10.5 # Seed
Ellagood Autumn Olive *Eleagnus umbellata*	20 plants
Big O Crabapple *Malus coronaria*	27 Plants
White Eagle Indian Corn *Zea mays*	700 # seed
Yaupon holly *Ilex vomitoria*	19 plants
Sumter Orange Daylily *Hemerocallis fulva*	50 plants

SEED AND VEGETATIVE STOCK PRODUCERS

PLANT MATERIAL	PRODUCER
AMCLO Arrowleaf Clover *Trifolium vesiculosum*	Georgia Crop Improvement 2425 S Milledge Ave Athens, Georgia 30605 R&R Seeds 724 Beall Springs Rd Gibson, Georgia 30810
Ambro Virgata Lespedeza *Lespedeza virgata*	Ga Crop Improvement 2425 S Milledge Ave Athens, Ga 30605
Pensacola Bahiagrass *Paspalum notatum*	Ga Crop Improvement 2425 S Milledge Ave Athens, Ga 30605 Adams-Briscoe Seed Co P O Box 19 Jackson Ga 31634 Conlee Seed Co Star Route Box 8 A Plainview TX 79073 Douglas King Co Inc 4627 Emil Rd PO Box 200320 San Antonio TX 78220 Texas Seed CO PO Drawer 599 Kenedy, Tx 78119
Dove Proso Millet *Panicum miliaceum*	Ga Crop IMProvement 2425 S Milledge Ave Athens, Ga 30605 Adams- Brisco Seed Co PO Box 19 Jackson, Georgia 31634 Turner Seed Co Rt 1 Box 292 Breckenridge TX 76024

PLANT MATERIAL	PRODUCER
Ellagood Autumnolive *Elaeagnus umbellata*	McCorkle Nursery RT 1 Dearing Ga 30808 Hamilton Nursery PO Box 871 Thomson, Ga 30824
GA-5 Tall Fescue *Lolium arundinacea*	Adams-Briscoe Seed Co PO Box 19 Jackson Ga 31634 Pennington Seed Co Madison Ga
Sumter Orange Daylily *Hemerocallis fulva*	Hamilton Nursery PO Box 871 Thomson Ga 30824
Amquail *Lespedeza thunbergii*	Alabama Crop Improvement South Donahue Dr Auburn, Ala 36849 Julian Brown 125 Court St PO Box 8 Morrow, Ga 30655 Adams_Briscoe Seed Co PO Box 19 Jackson Ga 30733 Lambert Seed and Supply Hwy 28 W PO Box 128 Camden Ala 36726 Morgan Dunn Rt 5 Box 105 Troy Ala Edwin Hammond Rt 2 Box 270 Reform Ala 35481 Ronnie Forbis Rt 1 Box 666 Mt Crogham SC 29727

PLANT MATERIAL	PRODUCER
Flageo Marshhay Cordgrass *Spartina patens*	JCPMC 295 Morris Dr Americus Ga 31719 Dr Latimore School Of Agriculture Fort Valley State University Fort Vally Ga 31030 William Smith Rt 2 Box 94 A Wigham Ga 31719 Okefenokee Growers Maybluff Rd Folkston GA 31537
Sharp Marshhay Cordgrass *Spartina patens*	JCPMC 295 Morris Dr Americus Ga 31719 Brooksville PMC 14119 Broad St Brooksville Fla 34601 Okefenokee Growers Maybluff Rd Folkston Ga 31537
Restorer Giant Bulrush *Scirpus californicus*	Varn Companies PO Box 4488 Jacksonville Fla 32201 Flowerwood Nursery Inc 6470 Dauphin Island Parkway Mobile Ala 36605
Au Sunrise Crimson Clover *Trifolium incarnatum*	Ala Crop Improvement S Donahue Dr Auburn, Ala36849

PLANT MATERIAL	PRODUCER
Wetlander Giant Cutgrass *Zizaniopsis miliacea*	Varn Companies PO Box 4488 Jacksonville Fla 32201 Flowerwood Nursery Inc 6470 Dauphin Island Parkway Mobile Ala 36605
Big O Crabapple *Malus coronaria*	HoneyHole Nurseries 3211 Piney Woods Lake Rd Glenwood Ga 30428

PMC TRAINING ACTIVITIES - 2003

19 TRAINING EVENTS HELD AT PMC FOR A TOTAL OF 31 TRAINING DAYS

RELEASES FROM JIMMY CARTER PMC

Common Name (Year of Release)	**Scientific Name**	**Primary Use**
'Pensacola' Bahiagrass ('44)	*Paspalum notatum*	Forage Production
'Amclo' Arrowleaf Clover ('63)	*Trifolium vesiculosum*	Forage Production
'Ambro' Virgata Lespedeza ('71)	*Lespedeza virgata*	Roadbank stabilization
'Dove' Proso Millet ('72)	*Panicum miliaceum*	Wildlife Food
'Ellagood' Autumn Olive ('86)	*Elaeagnus umbellata*	Wildlife Food
'Amquail' Thunberg Lespedeza ('87)	*Lespedeza thunbergii*	Wildlife Food and Cover
'Flageo' Marshhay Cordgrass* ('90)	*Spartina patens*	Beach Stabilization
(The 'Flageo' Marshhay Cordgrass release involved a cooperative effort with Fort Valley State Univ.)		
'GA-5' Tall Fescue ('92)	*Festuca arundinacea*	Forage Production
(The 'GA-5' Tall Fescue release involved a cooperative effort with the University of Georgia)		
'Big O' Crabapple* ('92)	*Malus coronaria*	Wildlife Food
'Sumter Orange' Daylily ('93)	*Hemerocallis fulva*	Landscape Beautification
'Doncorae' Brunswickgrass ('93)	*Paspalum nicorae*	Waterways Stabilization
'Wetlander' Giant Cutgrass* ('93)	*Zizaniopsis miliacea*	Constructed Wetlands
'Restorer' Giant Bulrush* ('93)	*Scirpus californicus*	Constructed Wetlands
'Americus' Hairy Vetch ('93)	*Vicia villosa*	Winter Cover Crop and Conservation Tillage
(The 'Americus' Hairy Vetch release involved a cooperative effort with the University of Georgia)		
'AU Early Cover' Hairy Vetch ('94)	*Vicia villosa*	Winter Cover Crop and Conservation Tillage
(The 'AU Early Cover' Hairy Vetch release involved a cooperative effort with Auburn University)		
'AU Ground Cover' Caley Pea ('94)	*Lathyrus hirsutus*	Winter Cover Crop and Conservation Tillage
(The 'AU Ground Cover' Caley Pea release involved a cooperative effort with Auburn University)		
'Sharp' Marshhay Cordgrass* ('94)	*Spartina patens*	Beach Stabilization
(The 'Sharp' Marshhay Cordgrass release involved a cooperative effort with NRCS PMC in Brooksville, Florida)		
'AU Sunrise' Crimson Clover ('97)	*Trifolium incarnatum*	Winter Cover Crop and Conservation Tillage
(The 'AU Sunrise' Crimson Clover release involved a cooperative effort with Auburn University)		
'Americus' Indiangrass * (2002)	*Sorghastrum nutans*	Forage, landscape, restoration
(The 'Americus' Indiangrass release involved a cooperative effort with Alabama Crop Improvement)		
'Highlander' Eastern Gamagrass * (2003)	*Tripsacum dactyloides*	Forage, buffer, conservation
(The 'Highlander' release involved Coffeeville Miss PMC as primary with MAEP)		
' Kinchafoonee' Virginia Wildrye* (2004)	*Elymus virginicus*	Conservation, log roads, restoration

***Native plants**

Kinchafoonee Virginia Wildrye Selected Class of Natural Germplasm at Jimmy Carter PMC Released in 2003

For more information concerning the plant materials center and its conservation efforts, contact the center's manager at 295 Morris Drive, Americus, Georgia 31709. Phone: (229) 924-4499 or 924-7003.