



Jamie L. Whitten

Plant Materials Center

2003 Progress Report of Activities

April 2004



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This document highlights several activities and products of the USDA-NRCS Jamie L. Whitten Plant Materials Center completed during 2003

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What We Do

The Jamie L. Whitten Plant Materials Center (PMC), located in Coffeerville, Mississippi, is operated by the USDA Natural Resources Conservation Service (NRCS). Our mission is to develop, test, and transfer effective state-of-the-art plant science technology to meet the resource needs of our customers. Our program has an excellent internal system for identifying future plant materials needs, coupled with a seamless system of product development and program delivery.

By working with a broad range of plant species, including grasses, forbs, trees, and shrubs, the PMC seeks to address priority needs of NRCS field offices and land managers in both the public and private sectors.

Conservation Objectives

The PMC works closely with NRCS field offices and land managers on a broad range of conservation concerns and issues. Pastureland Improvement, Cropland Erosion Control, Critical Area Erosion Control including Urban Conservation, Wildlife Habitat Enhancement, and Water Quality Improvement are the major conservation issues in our service area, which includes Mississippi, the delta regions of Arkansas, Louisiana, western Tennessee, southeastern Missouri, southwestern Kentucky and the Blackland prairie of central Alabama.

To accomplish our mission objectives, we generate numerous products including plant releases, written plant science information, and public presentations. This document provides a brief review of many PMC activities accomplished during 2003.

PMC Service Area



Warm-Season Grass Cultivar Development

Recognizing the importance and need for adapted native, warm season grasses for NRCS conservation practices (e.g., 327, 386, 512, 601, 643, 645) and USDA farm bill programs (e.g. CRP, WRP, EQIP), the PMC began working cooperatively with Mississippi State University (MSU) to accelerate the development of cultivars of beaked panicum (*Panicum anceps*), purpletop (*Tridens flavus*), big bluestem (*Andropogon gerardii*), switchgrass (*P. virgatum*), Indiangrass (*Sorghastrum nutans*), and little bluestem (*Schizachyrium scoparium*).

MSU is concentrating on developing cultivars of big bluestem, Indiangrass and a tall, high-yielding switchgrass for bioenergy production. The PMC is addressing the other species listed, as well as attempting to develop a shorter switchgrass cultivar for forage and conservation use.



A clump of big bluestem in flower

Establishing native, warm-season grasses is a challenge. Seed dormancy often hinders uniform seedling emergence and excessive weed competition seriously affects early stand development and seedling growth. The PMC and MSU are using a selection strategy that capitalizes on early germinating seeds within the population to develop cultivars with reduced seed dor-

mancy that germinate quickly, compete with weeds, and are more appealing for use in conservation practices (e.g. erect growth and short stature).

Early germinating seeds of little bluestem and purpletop from the mother plant nursery, established at the PMC 2002, were used to establish a new nursery block in 2003. Germination tests confirm that significant progress has been made to increase early germination in these populations. We plan to advance these lines for additional testing.



Collecting seed of little bluestem at the PMC

Twelve, low growing (< 4 ft.) switchgrass accessions were identified from an assembly of 92 accessions and used to establish a mother plant nursery. Seeds were collected from each plant in the nursery in September 2003. Germination tests are underway to select early germinating elites for further evaluation and selection.

Progress with beaked panicum has been slow compared to the other grasses, but several early germinating plants were identified for further testing. Additional plants will be added to the existing population in 2004.

MSU has isolated early germinating individuals of Indiangrass, big bluestem and switchgrass. They have had some difficulty growing out seedlings of Indiangrass and big bluestem, but significant progress has been made with their switchgrass selections.

Highlander Eastern Gamagrass

Seventeen years ago, the PMC began working to develop a cultivar of eastern gamagrass (*Tripsacum dactyloides*) that is well adapted for forage (512) and erosion control (327) in the Southeast. This year, we successfully completed this mission by releasing 'Highlander'. It was released with the cooperation of the Mississippi Agricultural and Forestry Experiment Station (MAFES) and the Jimmy Carter PMC in Americus, Georgia.



Highlander eastern gamagrass

Highlander is capable of producing hay yields in excess of 5 tons per acre per year when properly managed. It can also be grazed; however, it is susceptible to damage from overgrazing and animals should be rotated regularly to allow adequate regrowth. The massive root system of Highlander also provides erosion control and the stems and leaves provide cover for wildlife.

Eastern gamagrasses, including Highlander, are not abundant seed producers. We have been working for several years to increase our seed supply. This seed will be provided to the MAFES Foundation Seed Stock to increase for commercial seed producers.

Eastern gamagrass seed lots are difficult to clean effectively without specialized seed cleaning equipment (e.g. gravity separator). In order to ensure that all

commercial producers produce high quality seed, we will be applying for Plant Variety Protection. Data collection for this application began in 2003 and the application will be submitted in 2004 when data collection is completed.



Stratified Highlander seeds

Hard fruit coverings hinder emergence of eastern gamagrass seedlings. This dormancy is typically treated by exposure to cool, moist conditions (stratification). We wanted to determine the length of the stratification period that provided best germination of Highlander seeds, so we stratified seeds for 0, 2, 4, 6, 8, and 10 weeks. Germination counts were taken weekly for five weeks and then ungerminated seeds were recovered from the potting medium and opened to determine seed quality. From this data, the percentage of good seeds that actually germinated was calculated. In 2003, germination was best for the 6, 8, and 10 week stratification treatments.

We also wanted to determine how long seed producers could hold stratified Highlander seeds in storage without impairing germination. Storage periods tested were 0, 2, 4, 6, 8, 10, and 12 months and testing procedures were the same as for the previous test. Germination percentages for the 2002 seed lot were similar for all storage periods, but the total number of good seeds decreased markedly after 6 months of cool, moist storage.

Other Studies on Highlander Eastern Gamagrass

- Seed production response to N fertilization
- Silage characteristics compared to hybrid corn

Agroforestry/Forestry

Alley Cropping Demonstration (311)

Alley cropping is a type of agroforestry practice that may appeal to many landowners. In alley cropping, trees or shrubs are planted in rows, with agronomic, horticultural, or forage crops grown in the alley between the rows, allowing farmers to derive economic returns from the crop in the alley until the woody plants mature.

The PMC is cooperating with the National Agroforestry Center to demonstrate alley cropping on marginal cropland in the Southeast. Trees species include pecan, which can provide income from nut production as well as high value timber, and green ash, a fairly fast-growing timber species. Trees are planted in single rows along the general contour of a five acre field with 6% slope and on angles convenient for farming.

Two-year-old pecan seedlings planted in January 2003 survived and grew well. Wire cages placed around each tree proved to be an effective method for protecting the seedlings from deer damage. A five-wire, electric fence was installed around the field in October.



Soybeans emerging in wheat stubble

Wheat was drill planted in the alleys between the trees in fall of 2002 and harvested in June. Average wheat yield was 45 bu/acre. A late Group 5, Roundup-tolerant soybean was no-till planted into the wheat stubble and produced an average yield of 40 bu/acre. One explanation for such high yields on this sloping field was normal to slightly above normal, well-

distributed rainfall, from June-September. Corn will be no-till planted in the alleys in 2004.

Pine Site Preparation (612)

Pine seedlings on private lands in Mississippi are often planted without using herbicides to control weed growth. The PMC, in cooperation with Alan Holditch, USDA-NRCS state Forester and Lynn Ellison, Mississippi Area 1 Forester, evaluated herbicide treatments to improve growth and survival of loblolly pine seedlings.

Herbicides used were Roundup, Roundup + Oust, Roundup + Oust + Arsenal, Arsenal + Oust, and Arsenal + Oust + Transline. Roundup was sprayed in September, prior to planting in January 2003. The first two Oust treatments were applied in December, also prior to planting. The other herbicides, including a lower rate of Oust, were sprayed in April. Herbicide treatments were applied in a 6-foot band over the planting row. There was also an untreated control and a summer mowing treatment.

Excessive rainfall for several months after planting severely stressed the young seedlings. Seedling survival was slightly less than in 2002, but no differences could be detected between treatments. Stem diameter and plant height were similar for all treatments. Weed control at planting was excellent for the Roundup treatments. Mid-summer ratings showed that the Roundup + Oust + Arsenal treatment had only 62% weed cover and Roundup + Oust 80% cover. Mid-summer weed ratings for other treatments were no better than the treatments with no herbicides applied.



Wildlife Habitat Enhancement

In addition to developing warm-season native grasses that are considered critical for improving wildlife habitat, the PMC is also actively selecting plants for wildlife food and habitat (643, 645).



Lark plot in inter-center strain trial

Lark Selection partridge pea (*Chamaecrista fasciculata*) is a native legume that was released as a selected-class plant material in 1997. Its excellent performance in the Mid-South indicates that it has potential to be advanced to a cultivar-class material. We are currently making field plantings and conducting an inter-center strain trial with other PMCs

in the Southeast and southern Plains states to gather sufficient performance data to support this status change.

One of the PMC's responsibilities during the evaluation and selection process is to find economical production practices for our releases. Once the PMC has determined the most effective cultural methods for production of a plant, these practices are passed on to seed growers so the release can be produced on a commercial scale for conservation use.

Hopefield Selection trailing wildbean (*Strophostyles helvula*) is a native, vining legume released for wildlife habitat and critical area plantings. Cultural practices to increase seed harvests will be investigated beginning in 2004. Plans are to use a reduced seeding rate of Lark Selection partridge pea as a nurse crop for the wildbean to climb on to facilitate combine harvesting, since both mature seed almost concurrently. Grain sorghum, which was grown as a maintenance crop in 2003, will also serve as a treatment to see if the standing residue can be used as a support for the vines. These treatments will be compared to our standard practice, which is to grow the legume in rows with no companion crop.

Water Quality

The PMC long-range program identified a need for plant materials for nutrient management. For the past three years, the PMC and the MAFES at Holly Springs have been evaluating the yield and nutrient (N and P) uptake of warm-season grasses fertilized with poultry litter. One application of litter was broadcast applied in late April based on the N requirement of the grass for maximum yield (4 to 6 tons/acre depending on grass specie). Grasses are harvested using best management practices for forage production. Total N and P uptake in the top growth are determined using yield and nutrient concentrations measured in the plant tissue. Agriculture Research Service will be working with the PMC and MAFES personnel to monitor nutrient movement below each grass plot.



Highlander eastern gamagrass produced over 8 tons/acre and removed 184 and 121 lb/acre N and P₂O₅ at Holly Springs, MS. Other top performing grasses were 'Sumrall 007' bermudagrass and 'Alamo' switchgrass.

Little Barley Cover Crop

Cover crops (340, 327) can prevent soil erosion on cropland during the winter months, but are not widely used in the mid-South due to the annual costs of re-planting. Little barley (*Hordeum pusillum*) is a native, cool-season grass that can form dense natural stands in some crop fields. NRCS agronomists in Mississippi and North Carolina have expressed an interest in either utilizing these natural stands as cover crops for cotton or developing seed sources that could be planted for this purpose. Assuming that burndown for cotton planting would take place on April 15, the naturally early-flowering little barley could possibly produce enough viable seed to maintain stands without replanting, which would increase its usefulness.



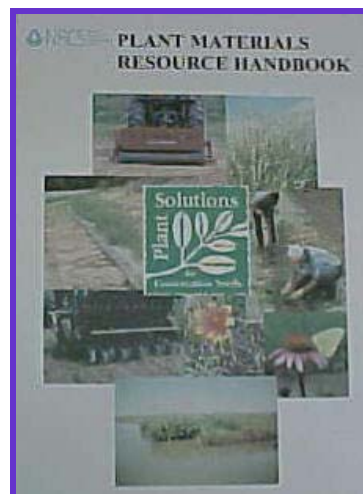
Little barley cover crop plot (foreground)

In order to determine the cover crop potential of little barley, we began a study at the PMC in 2002 to compare it to typical cover crops like wheat, hairy vetch, and crimson clover. The cover crops were planted in October 2002 at their recommended planting rates and little barley was planted at a rate of 75 seeds per sq. foot. Stand ratings were taken once during the winter to determine early cover and in mid-March and mid-April. A small plot harvest was made on the final rating date to determine dry matter yields. Little barley provided 95-100% ground cover at all ratings and the highest yields. Further research on planting rates is needed to determine a rate that would be economically feasible. Hairy vetch provided little early cover compared to the other species.

Burndown chemicals are another expense associated with cover crops. We wanted to determine if it was possible to reduce the recommended rates of Roundup and Gramoxone (1 lb a.i./acre for both) by 1/4, 1/2, and 3/4 and still attain adequate little barley burndown. Visual control ratings were made at 7 and 14 days after spraying and percent control was determined at 14 days. Roundup rates could be reduced by 1/2 and still provide comparable control to the full rate. Gramoxone rates could only be reduced by 1/4 to provide adequate burndown.

Plant Materials Resource Handbook

The *Plant Materials Resource Handbook* is a technical reference tool developed by the PMC for field offices, area and state specialists, and others in Mississippi to assist in planning and implementing conservation programs on public and private lands. The handbook serves as a repository for written plant technology prepared by the PMC. Information found in the handbook includes planting guides on conservation plants, seed sources and vendors of planting stock of woody and wetland plants, informative newsletters, plant and technical notes, and progress and technical reports on a variety of plant materials and related technology.



2003 Highlights

Technology from the Jamie L. Whitten PMC is an integral part of the NRCS strategic plan. The goals of providing a productive natural resource base and a high quality environment can not be realized without sound plant science technology.

Plant Materials in Production

Lark Selection Partridge Pea
 'Quail Haven' Reseeding Soybean
 'Halifax' Maidencane
 'Highlander' Eastern Gamagrass
 'Chiwapa' Japanese Millet
 'Meechee' Arrowleaf Clover
 Morton Germplasm Shrub Willow
 9062821 Switchgrass
 Pangburn Switchgrass
 Wetland Plants (3 species)
 Mississippi Wildflowers (6 species)

Active Studies

PMC Objectives	Number
Cropland	4
Pasture/Hayland	4
Critical Area/Wildlife/Forest	6
Water Quality	1
Total Studies	15

Written Technology Transfer

Type of Publication	Number
Annual Progress Reports	2
Abstracts and Technical Papers	6
Release Documentation	1
Newsletters and Brochures	1
Total Publications	10

Oral Technology Transfer

Type of Presentation	Number
National Presentations	2
Regional Presentations	3
Local Presentations	3
Training Presentations	4
PMC Tours	6
Total Presentations	18

Looking for Information on Vegetative Solutions to Conservation Problems?

Visit the Plant Materials Program Website!
Plant-Materials.nrcs.usda.gov

- Plant Fact Sheets on conservation plants
- Information on obtaining conservation plants
- Publications and technology development from 26 PMCs across the country
- New improved plants, uses, and technology
- Links to websites with additional or supporting information

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