

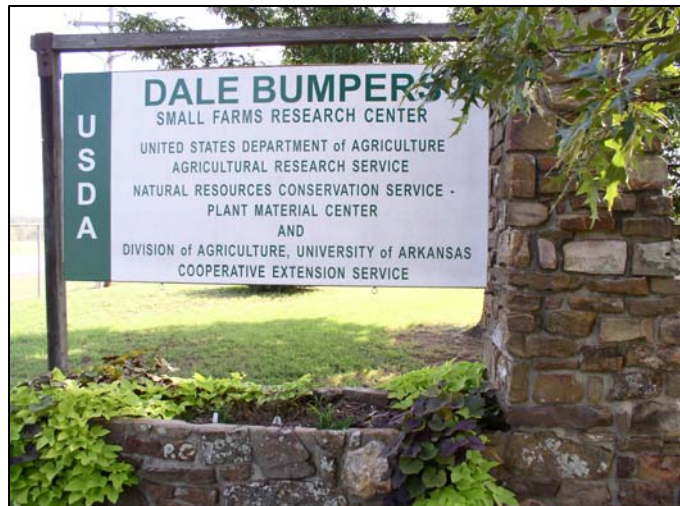
2007 Progress Report of Activities

Booneville Plant Materials Center

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Introduction:

The Booneville Plant Materials Center (PMC) was established and became part of the national system of PMC's in 1987 and serves the plant material needs of the Southern Ozarks, the Arkansas River Valley, the Boston and the Ouachita Mountains. The Center's priorities include protection and enhancement of water quality, protection and enhancement of pastureland, critical area treatment, protection and enhancement of woodlands, and protection and enhancement of wildlife land.



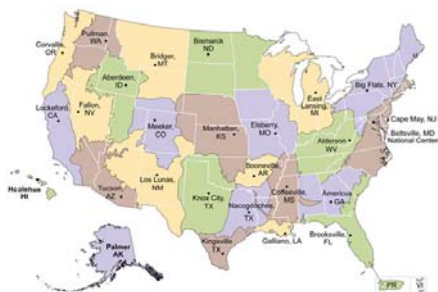
Location:



The Booneville Plant Materials Center is located along the Petit Jean River in Logan County, Arkansas. North edge of the Center lays the Ouachita National Forest. Mt. Magazine is to the northeast of the PMC and is well known as being the highest mountain between the Appalachian and Rocky Mountains. The PMC leases 282 acres from the State of Arkansas

Service Area:

The primary service area of the Booneville Plant Materials Center includes portions of Arkansas, Oklahoma, and Missouri (approximately 54 million acres). This area includes the following Major Land Resource Area's:



Ozark Highland	116A
Ozark Border	116B
Boston Mountains	117
Arkansas Valley and Ridges	118
Quachita Mountains	119
Western Coastal Plain	133B
Alabama, Mississippi &	135
Arkansas Blackland Prairie	

Much of the service area is characterized by rugged terrain with elevations from 300 to 3,000 feet. Average annual rainfall varies from 36 inches in the west to 53 inches in the eastern higher mountain areas. Forage production and woodlands are the major land uses, and small family farms characterize the agriculture.

Staff:

Randy King has served on the Center's staff since its conception in 1987 as Assistant Manager. In 1989 he became manager of the facility. In 1992 Dr. Lance Tharel was hired as assistant Manager. The Center has two Biological Science Technicians: Dale Goff and Eddie Pratt. Deborah Orick holds the title of Office Assistant.

Left to right are: Dr. Lance Tharel, Assistant Manager; Eddie Pratt, Biological Science Technician; Debbie Orick, Office Assistant; Randy King, PMC Manager and Dale Goff, Biological Science Technician.



Soils on the Center include:

Leadville silt loam, 1 to 3 percent slopes. This is a deep, moderately well drained, nearly level soil on old stream terraces in broad valleys. Individual areas range from about 10 to 400 acres in size.

Taft silt loam, 0 to 2 percent slopes. This is a deep, somewhat poorly drained, level to nearly level soil on old stream terraces in broad valleys. Individual areas range from about 10 to 400 acres.

Linker fine sandy loam, 3 to 8 percent slopes. This is a moderately deep, well-drained, gently sloping soil on hilltops. Individual areas range from about 5 to 200 acres.

Enders-Mountainburg association, rolling. This association consists of well-drained soils in a regular and repeating pattern on rolling hillsides. Slopes are 8 to 20 percent. The mapped areas on this association range from about 50 to 700 acres.

Studies:

Releases:

- Hampton germplasm big bluestem
- 'Bumpers' eastern gamagrass
- 'OH-370' big bluestem

Release potential:

- Indiangrass (45 accessions in initial evaluation)

Technology Development:

- Irrigation/fertility biofuels study
- Switchgrass Biofuels study (lowland types)
- Switchgrass Biofuels study (upland types)
- Growth curve studies for: Switchgrass, indiangrass, and eastern gamagrass.
- Fruit and nut tree production on reclaimed coal mined land.
- Agroforestry silvopasture study

Oklahoma Department of Transportation:

- Poteau Native grasses species/mulch
- Heavener Native grasses species/mulch
- State Highway 128 Native grasses species/mulch

Fort Chaffee Maneuvers Training Center (MTC)

- MTC-1 Rehabilitation on Maneuver areas
- MTC-2 Rehabilitation on Maneuver areas

Demonstrations:

- Native grasses for Quail habitat (Wildlife Management Institute grant, Franklin Co.)
- Eastern gamagrass 'Pete' (Elm Park)
- Eastern gamagrass 'Pete' (Altus)
- Eastern gamagrass 'Bumpers' (Waveland)
- Big bluestem 'Kaw' (Altus)
- Switchgrass 'Alamo' (Altus)
- Switchgrass 'Alamo' (on Center)
- Eastern gamagrass 'Pete' (on Center)
- Switchgrass 'Alamo' (Morrilton)
- Native Grasses (University of Arkansas Pine Bluff, Lonoke Research Farm)
- Indiangrass 'Cheyenne' (on Center)
- Native Grasses for the United States Forest Service (Cass)
- Grazing trial of 'Bumpers' eastern gamagrass with ARS

Release Potential Summary:

Indiangrass Cultivar: Booneville will release an indiagrass cultivar for the Southern Ozarks in 2011. Indiangrass collections were made from eastern Oklahoma and Western Arkansas in the fall of 2006. Eighty-eight accessions were collected during this effort. The seed was germinated and grown in the greenhouse during the winter and spring of 2007. Seedlings were transplanted to the field in May. Irrigation was used during the establishment year. 'Cheyenne', 'Lometa', and 'Americus' cultivars were used as standards in a randomized complete block arrangement.

Technology Development Study Summaries:

Irrigation/fertility biofuels study:

Switchgrass is a perennial warm-season grass grown for decades on marginal lands not well suited for conventional row crop production. It is being recognized as a potential renewable energy source and an alternative cash crop. Preliminary studies indicate that switchgrass has potential for biomass production.



Switchgrass may one day help ease the heartburn that the American motorist has been experiencing every time they go to the gas pump to fill up. The ability to use energy crops produced on America farms as a source of renewable fuels is a concept with great relevance to current economic and environmental issues. In the near future, switchgrass may provide an answer to this problem.

Development of a substantial capacity to use perennial crops forage crops such as switchgrass for biofuels could benefit our agricultural economy by providing an important new source of income for farmers. Biofuel production from perennial cropping systems would help reduce loss of agricultural soils, reduce our dependence on imported oil supplies, and lower greenhouse gas emissions and other toxic material in the atmosphere.

American produced ethanol may help reduce imports of oil by 1.5 billion barrels a year. Corn which has been used to produce ethanol must first be converted to sugar and the sugar the fermented into alcohol for marketing as ethanol. Cellulosic material, which can be produced directly from switchgrass, may be directly converted into ethanol and this requires less energy to produce.

The PMC has initiated a study using two cultivars ('Alamo' and 'Cave in Rock') of switchgrass, irrigation/non-irrigated, and commercial fertilizer/animal waste fertility to determine the optimum combination of these variables to maximize the production of annual biomass.

This study will be beneficial from the stand point of answering some questions relative to the production and harvesting of switchgrass. Historically, switchgrass has been produced for the leaf portion of the plant which contains the higher nutritive quality. Switchgrass production for ethanol focuses on cellulose and fiber production. This study will also provide an opportunity for tours and demonstrations in the near future.



Dale Goff and Eddie Pratt installing an irrigation system on switchgrass plots

Lowland Switchgrass for a Biofuel Source:

A contract with the Department of Energy and a cooperative agreement with Dr. Charles Taliaferro (Oklahoma State University) as the principal investigator have resulted in the PMC testing Switchgrass for biomass production. 'Alamo', 'Cave-in-rock', 'Kanlow', along with seven of Dr. Taliaferro' experimental lines were planted at Booneville in 1997, harvested annually, and reported to Talafero. The results are also reported annually to other cooperators along with a narrative summary of the study. An accession belonging to Dr. Taliaferro, consistently out yielded all other accessions and cultivars during the four year study.

Upland Switchgrass for a Biofuel Source:

This study is identical to the above, with the exception of cultivar entries which are upland types. This study began in 2000, and will be completed in 2012. Dr. Taliaferro also provided the experimental upland lines.

Growth curve studies for: Switchgrass, indiangrass, and eastern gamagrass:



Dr. Lance Tharel harvesting grass for growth curve studies

The growth curve studies for switchgrass, Indiangrass, and eastern gamagrass was designed to provide information on the growth and dry-matter production of these three grasses throughout the production year. This projected information will assist producers in planning for annual forage availability, dry-matter production, and controlled grazing scenarios. This will also provide producers with information that will increase utilization efficiency of grazed and stored forage.

Fruit and Nut Tree Production on Reclaimed Coal Mined Land:

Coal strip (surface) mining in the 1930s which was reclaimed in the mid 1980s has resulted in large unproductive areas. Since these are "pre-law" mines, there was no topsoil stockpiled for use during reclamation. Fruit and nut tree production is being evaluated on land that was basically characterized as low production. The study consists of four varieties each of apple, peach, pecan, and walnut. The trees were

planted in 1994, and have recorded excellent growth. Drip irrigation is used, and the orchard is mowed twice per year. The apple and peach trees are in full production with only moderate pecan production and slight walnut yield. Diameter at Breast Height (DBH) is recorded annually in the fall. This study will be concluded in 2011. A Technical Note will be developed.

Agroforestry Silvopasture Study:

Silvopasture is the art of combining two enterprises which will produce a practical and economic system and forms a mutually beneficial interaction. Silvopasture systems may provide both economic and conservation benefits consistent with a landowner's goals. The two enterprises of this system include trees and forage. Silvopasture results when trees are deliberately introduced into a forage production system or when forage crops are



PMC staff planting trees for Agroforestry Silvopasture Study

introduced into a timber production system. Trees produce a high-value product that adds increased economic stability and returns while

creating a sustainable production system that has many environmental benefits. Both short and long range benefits may be derived from silvopasture system, these may include reduced wind and soil erosion, improved water quality and wildlife habitat, improved utilization of nutrients, and improved crop production.

There is a lack of information on the production of well managed warm season forages under intensively manager pine trees from the time forages are established until the growth of trees begin impacting production. We have initiated a study examining the growth characteristics of both trees & grass.

The study uses three tree planting configurations consisting of various row widths and tree spacing within the row. These include a 14 x 14, a double row 8 x 8, and a single row 8 x 24 ft. arrangement. The three treatments have similar numbers of trees per acre. The grass species include big bluestem, eastern gamagrass, Indiangrass.

The grass plots will be harvested to determine dry-matter and quality. Another important evaluation will be the percent stand of the various grass species over time. Initially it is expected that production will be quite high but as the trees increase in height, the grass production will decrease. The information gained from this study will aid producers in determining what the dry-matter of the grass species will be during the growth of the pine trees. The grass production will supplement income until the tree stand produces some marketable timber.

Oklahoma Department of Transportation Contract

The Oklahoma Department of Transportation (ODOT) contracted the PMC to develop standards and specifications for establishment of native grasses along ODOT rights of way in Eastern Oklahoma.

The problem originates from moderate to severe erosion along highway rights-of-way that is depositing silt in the drainage systems and impacting the drainage down stream. Three studies have been established in 2007 that are representative of most of the severe slope problems in eastern Oklahoma. The slopes are populated with cool season annuals with very little perennial vegetation present. Several attempts have been made by ODOT in the past to establish vegetation on these areas with little or no success. The PMC conducted a complete site characterization of each of these areas in 2006.

Poteau Site: The Poteau OK site was planted in April 2007. An area of slope (3:1) 600' long and 50' wide was selected to conduct the first study. Half the slope (300' X 50') was prepared as clean firm seedbed, with the remaining slope untouched.



Replications on both tilled and untilled were then staked. Various seeding rates were applied, that included 'Alamo' Switchgrass, 'Cheyenne' indiangrass, and 'Kaw' big bluestem. All materials were applied with a hydroseeder. After seeding, various rates of wood fiber hydromulch were applied. Evaluations were conducted 14 days after planting to collect germination data. Evaluations were conducted on a monthly basis there after.

Heavener Site:

The Heavener site was established identically to the Poteau site. This site was selected by ODOT because of the dramatic difference in soil type.

State Highway 128 Site:

State highway 128 poses a unique challenge from both an agronomic and mechanical prospective. The site was originally a sheer rock wall. Engineers with ODOT discovered the stone was underlain with shalestone which would weather over time allowing the rock (sandstone) above to tilt toward the highway, creating a potentially dangerous situation. They decided to lay the slope back to a 2:1 ratio. Seedbed and planting equipment can't operate on such a steep slope. The entire slope was 2.1 acres of rock mixed with some fines, and soil. In early March 2008, the center staff will seed the slope with a hydroseeder at various seeding rates, and various rates of wood fiber hydromulch.



Ft. Chaffee Maneuvers Training Center (MTC):

This study was designed to track economics of rehabilitating areas that have been disturbed by tracked vehicles, and establishing warm season perennial native grasses. A heavy off-set disk was used to work down ruts left by tanks and other tracked vehicles. Cost per acre was established for the disking, and then the number of trips that it took to achieve a suitable seedbed was recorded. The area was planted with 'Kaw' big bluestem, 'Alamo' switchgrass, 'Cheyenne' indiagrass, and 'Pete' eastern gamagrass. Half of the area was mulched with 1.5 tons of grass hay mulch. The site was harvested during summer 2006. Dry-matter yield and quality were recorded. Ft. Chaffee will use the technology developed from these studies to write rehabilitation specifications for large tracts of disturbed land. After rehabilitation, these tracts will be offered for lease to the public for hay production. Evaluations of these sites will be conducted until 2011.



Demonstrations/Field Planting Summary



The Plant Materials Center maintains eight demonstration sites. A two-acre plot of 'Pete' eastern gamagrass was established for demonstration on the Center in 1997. A four-acre plot of 'Pete' was established for the Idabel Oklahoma Conservation District on their Demonstration Farm in 1999. 'Pete' was established for demonstration at Elm Park in Altus, Arkansas in 2000. Native grasses 'Pete' eastern gamagrass, 'Alamo' switchgrass, 'Kaw' big bluestem, and 'Lometa' Indiagrass were established on the University of Arkansas at Pine Bluff research farm near Lonoke, Arkansas in 1999. 'Alamo' switchgrass was established to demonstrate erosion control on a sand fill in Morrilton, Arkansas for the Arkansas Power Corporation in 1998. 'Alamo' has also been planted for demonstration in Altus, Arkansas and on Center in 2003. The off center plots are managed by the cooperator and evaluated by the District Conservationist in that county. The PMC staff makes annual visits to each site. A native grasses demo plot was planted for the USFS near Cass, Arkansas on the Mulberry River in the spring of 2005.

2007 FFA Field Day 03-03-2007

Eight hundred and sixty students from forty-four schools in Arkansas attended the 17th Annual FFA Field Day in Booneville, Arkansas on March 3, 2007. The event was held at the Logan County Fairgrounds, with events also occurring at the Dale Bumpers Small Farm Research Center and the Rogers Scout Reservation.



Judging activities included: Land, Forestry, Crops, Dairy Products, Poultry, Floriculture, Livestock, and Nursery/Landscape.

The field day activities provide competitive training and it also gives FFA members the opportunity to put into practice the information and skills that they have gained through high school classroom instructions. This activity also prepares them for up-coming district and state events.

Tours, Presentations & Workshops

<u>Date</u>	<u>Event</u>
12/13/2006	Mission & Objectives of the PMC/Little Rock
1/19/2007	PMC Mission & Studies/51 st Annual Rural Life Conference
3/6/2007	Biomass as a BioFuel/University of Arkansas, Fayetteville Campus
3/6/2007	Switchgrass as a BioFuel/Decatur, Arkansas
3/8/2007	Studies & Objectives of the PMC/20 th Ann. Ozarks Grassland Conf.
3/17/2007	Grass Species for Grazing/Ann, Stone Co. AG. Day
6/22/2007	UAPB Intern Student Tour/Booneville PMC
8/1/2007	Missouri Cattleman's Association/ DBSFRC
8/17/2007	Switchgrass as a BioFuel Feedstock/Clinton Library in Little Rock
8/17/2007	Switchgrass as feedstock for Biofuels Production/Clinton Library
9/6/2007	Wildlife Grasses & BioFuels Workshop/Booneville PMC
12/11/2007	PMC Mission & Objectives/AACD State Mtg

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