



United States Department of Agriculture

## Booneville Plant Materials Center 2014 Annual Report of Activities



Figure 1. Switchgrass Fertility study. June 2014 harvest.

### 2014 Booneville PMC Current Study Summaries and Highlighted Activities

#### Technology Transfer: Training, Publications, and Demonstration Plantings

The Booneville Plant Materials Center (BPMC) uses training courses, written publications, and demonstration plantings to further the effective planning of vegetative conservation practices. The following activities describe BPMC activities in 2014.

#### Maidencane Irrigation Reservoir Demonstration Planting to Limit Wave-Action Erosion



Figure 1. Reggie Cunningham (NRCS) inspecting 1 year old 'Halifax' maidencane planting.

Wave-action erosion on irrigation reservoirs has become a severe resource concern for some row-crop producers. Establishing permanent vegetation on the inside banks of the reservoirs is difficult because water levels fluctuate during the growing season when irrigation is applied to crops. 'Halifax' maidencane (*Panicum hemitomom*) is a perennial aquatic grass that has been used to limit wave-action erosion around catfish ponds in Mississippi. In the spring of 2013, BPMC staff planted 'Halifax' rhizomes around a new reservoir's high water line near Lonoke, Arkansas. Evaluations in May 2014 revealed gaps in the planting. A tree planter was used to establish the

planting and some rhizomes were planted too deep and perished. Areas with no live plants eroded at an alarming rate, while areas of healthy plants show little wave action erosion. The PMC, in cooperation with Reggie Cunningham, District Conservationist at the Lonoke Field Office, and his NRCS Team will hand plant the gaps in the original planting in the spring of 2015. Jamie L. Whitten PMC has again agreed to furnish rhizomes for the planting.

### **‘Bumpers’ Eastern gamagrass Demonstration Planting near Clarksville, AR**

Eastern gamagrass (*Tripsacum dactyloides*) is a perennial native warm season bunch grass, utilized for grazing, hay, haylage, and biomass feedstock. Booneville PMC staff planted a 1 acre demonstration planting near Clarksville, AR November 18, 2014. The planting is to demonstrate dormant seeding in the fall to allow the seed to naturally stratify during winter months. Germination is expected around April 1, 2015 when soil temperatures warm to 68-70°. This demonstration will be available for field office staff to tour area landowners who are interested in planting ‘Bumpers’ in the future.



Figure 2. ‘Bumpers’ eastern gamagrass

### **Poultry House Odor Break Demonstration**

Air quality around poultry house ventilation fans is a resource concern because of the odor and dust emissions. The Booneville PMC staff planted a vegetative wind/odor break around local poultry houses to evaluate their effectiveness for improving air quality. The windbreak consists of one row of ‘Alamo’ switchgrass, one row of black gum trees, and one row of shortleaf pine trees. Most trees survived the dry summer, but the switchgrass had limited survival after germination due to lack of precipitation. Switchgrass will be replanted in April 2015.

## **Technology Development: Existing Studies**

### **Shortleaf Pine and Switchgrass Agroforestry**

Shortleaf pine trees, planted in January 2006, without switchgrass growing in the alley ways have shown increased growth rates of 6% in both tree height and tree diameter, when compared to trees grown with switchgrass in the alley ways. In addition, trees grown with switchgrass had a pruning effect on lower limbs, but natural pruning had little effect on tree growth. Results from 2010-2014 suggest that reduced growth rates of trees grown with switchgrass in alley ways is due primarily to competition for available soil moisture.

### **Soil Quality in Switchgrass Fields for Biofuel Production**

a large number of production acres are required to supply facilities that convert switchgrass to renewable fuels, vast of switchgrass production have often been established. The effects of differing irrigation, harvest, fertilizer, and cultivar management strategies on soil quality over time are lacking. year soil bulk density was evaluated in a switchgrass study different management histories.

Results yielded differing best management practices for switchgrass producers, including: Switchgrass that is not irrigated and received poultry litter fertilization



Figure 3. Soil physical properties are influenced by management treatments.

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exhibited significantly lower bulk density than all other treatments in the 0-4 in depth interval, and switchgrass that is irrigated and harvested twice per year exhibited significantly greater bulk density than all other treatments.

### Conservation Reserve Program (CRP) CP42 Pollinator Habitat

Three commercial pollinator mixes met the CRP CP42 pollinator habitat conservation practice standard in 2013 in Arkansas. All three mixes contained plant species that bloomed in the spring, summer, and early fall. Two of the mixes had over 6 species blooming throughout the three seasons. Some plots are being invaded by bermudagrass and/or woody species. Mid-contract management, which consisted of burning and light disking, were performed on selected plots in 2014, but had minimal effect on the current weed population.



Figure 4. Flowering species attract bees and other insects.

### Grazing Management During Drought

Ongoing concerns about forage production for livestock grazing during droughty conditions have led to the development of a study to evaluate production of local forage species under differing harvest regimes during drought conditions. In 2013, 9 forage species (tall fescue, bermudagrass, indiagrass, switchgrass, orchardgrass, eastern gamagrass, old world bluestem, reed canarygrass, and bahiagrass) were planted and became well established during the first summer. Plans were to measure production during the summer of 2014, but unlike the last 4 years, western Arkansas received abundant rainfall throughout the season. Production and forage quality will be measured beginning in the spring of 2015. Data from this study will be used to develop a technical note identifying forage species best suited for drought conditions in the southern Ozarks.

### Bottomland Hardwood Restoration Study using Wetland Reserve program (WRP) Specifications



Figure 6. Tree seedling survival was determined one year after planting. From left, NRCS foresters George Rheinhardt, Ray Stoner, and BPMC technician Eddie Pratt.

Differing spatial arrangements and different hardwood tree species are being evaluated at the BPMC. George Rheinhardt, Arkansas state forester, and a team of NRCS staff members planted over 2,800 native hardwood trees in the winter of 2012. Overall survival was excellent and stand data will be evaluated in three years. The survival was 94% in the spring of 2014.

### New Indiangrass Germplasm Development

Indiangrass (*Sorghastrum nutans*) accessions were collected in western Arkansas and eastern Oklahoma in the fall of 2006. The assembly of 45 accessions from the southern Ozarks was made to identify plants with superior drought tolerance. Nine of these accessions were selected and planted in a polycross nursery. These plants flowered later than usual due to dry summer conditions. Seed was collected in the fall of 2013 and an initial seed increase field was established in 2014. A germplasm release is planned for 2016.

## Technology Development: New Studies

### Cover Crops to Improve Soil Quality after Irrigation Land Leveling

Precision leveling of crop fields may provide many benefits, including increased irrigation water use efficiency.

However, disturbing the soil profile often results in decreased soil microbial communities and subsequent plant nutrient availability for crop plants. Producers typically apply poultry manure to build soil organic matter and soil microbial communities following land leveling, especially in areas where soil depths greater than 12 inches are disturbed. In October of 2014, BPMC staff planted cover crop mixes (cereal rye, wheat, daikon radish, and crimson clover) on a precision-leveled field at the PMC in an effort to build soil organic levels. Soil samples were collected prior to planting, and soil samples will be analyzed at cover crop termination, and canopy cover measurements will be taken on a monthly basis until cover crop termination.



Figure 7 Canadian Geese stop for a meal of our cover crop.



Figure 8 Cover crop on a 1.5' cut at the PMC. November 2014

### Switchgrass Soil Fertility and Production

Nutrient requirements for many forage crops, such as bermudagrass and tall fescue, are well established in Arkansas. Soil testing recommendations from the University of Arkansas soil testing lab currently use the same recommendations for all native warm season grasses. Soil fertility recommendations need to be customized for producers interested in growing switchgrass. The BPMC has partnered with Dr. Philip Moore and Dr. Dan Pote from USDA-Agricultural Research Service (ARS) and the NRCS Central National Technology Center to correlate dry matter production to nutrient uptake for N, P, and K. The study was established in the spring of 2013 and the first dry matter measurements were taken in the spring of 2014. Results of the study will be used to develop a Technical note on fertilizer requirements for 'Alamo' switchgrass (See Fig. 1).

#### Who We Are

The Booneville Plant Materials Center was established in 1987 in Booneville, Arkansas to help solve resource concerns in the southern Ozarks, Arkansas River Valley, and Boston and Ouachita Mountains. The service area is approximately 54 million acres and includes portions of Arkansas, Oklahoma, and Missouri. The Booneville PMC farm encompasses 291 acres and is co-located with the Agricultural Research Service's Dale Bumpers Small Research Farm. The center is one of 27 NRCS Plant Materials Centers in the nation and focuses on solving water quality resource concerns and providing vegetative tools to protect and enhance pasturelands, critical areas, woodlands, croplands, and wildlife areas.

**What We Do**The mission of the Natural Resources Conservation Service Plant Materials Programs is to develop, test, and transfer effective plant science technology to meet customer and resource needs by cooperating with partners and other agencies, NRCS field office staff, landowners, and agricultural producers. NRCS PMC activities help accomplish the objectives of the current United States Department of Agriculture (USDA) and NRCS Strategic Plan in providing timely and effective vegetative solutions for identified resource needs

## PMC Staff

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