



## 2012 Annual Progress Report of Activities



Red admiral butterfly visits a Stern's medlar (*Mespilus canescences*) flower at the Booneville PMC (Photo by Deborah Orick)

### 2012 Booneville PMC Current Study Summaries and Highlighted Activities

#### Technology Transfer: Outreach & Training

Booneville Plant Materials (BPMC) staff gave over a dozen tours of the facility and hosted various groups for specialized training courses. The following are some examples of the outreach and training events held at the BPMC farm or organized by BPMC staff.

#### Annual Plant Materials Training for NRCS Field Office Personnel

Thirty-five NRCS field office employees from Arkansas and Oklahoma participated in the annual plant materials training course held from June 12-13. The training, held every summer, introduces new staff to the mission of the plant materials program and highlights relevant vegetative aspects of conservation planning.

BPMC staff presented a variety of topics to familiarize field staff with agronomic establishment and maintenance procedures. Technicians Eddie Pratt and Dale Goff led an introduction to basic farm equipment.



Figure 1: Randy King and Bill Kuenstler explain how tillage equipment affects soil quality.

Employees participated in calibrating a no-till native grass seed drill, choosing basic farm equipment to prepare a firm seedbed, and learning how soil quality is affected by various tillage practices. Field staff will use this knowledge when explaining practice requirements to landowners.

BPMC manager Randy King gave a presentation about establishing and managing native warm season grasses for forage production, while BPMC assistant manager Alayna Jacobs gave presentations about calculating proper seeding rates and using different planning tools to select the right cover crop species for landowner goals. BPMC staff organized guest speaker presentations to help attendees apply what they learned to cost-sharing programs for landowners. Special thanks to all guest speakers! They included NRCS grassland specialist Claire Whiteside, who discussed prescribed grazing systems for vigorous forage growth, NRCS AR

state forester George Rheinhardt, who presented conservation practices for implementing agroforestry systems, and NRCS regional agronomist Bill Kuentler, who led a mini-workshop teaching participants how to design effective filter and buffer strips for better water quality. University of Arkansas extension specialist Dr. John Jennings also discussed strategies for grazing native warm season grasses.

### Farmer Education for Drought Program

A group of ten livestock producers from Sebastian and Crawford counties met at the Booneville BPMC on December 5 to learn how to plant and manage native warm season grasses for livestock forage. These farmers are receiving cost-sharing assistance through emergency drought funding from the Environmental Quality Incentive Program (EQIP).

BPMC staff collaborated with the NRCS Fort Smith Field Service Center to offer a comprehensive workshop showing producers how to integrate native warm season grasses into their existing grazing

rotations. BPMC staff taught landowners how to buy native warm season grass seed, calculate seeding rates, calibrate a seed drill, and demonstrated how to prepare a firm seedbed using conventional farm equipment. Farmers also toured the BPMC farm fields to gain insight about the characteristics of different grasses.



Figure 2: Farmers learn how to calibrate a native grass seed drill in the BPMC seed barn.

### Soil Health Training Offered

The Booneville PMC teamed up with the University of Arkansas at Pine Bluff (UAPB) and the NRCS National Soil Health and Sustainability Team to offer two free soil health workshops for landowners and NRCS staff. Course instructors David Lamm and Steve Woodruff held one session on Tuesday October 30 at UAPB in Lonoke and one session Wednesday October 31 at the NRCS Field Service Center in Conway. Instructors emphasized the importance of good soil health for productive agricultural lands, shared methods of assessing soil health, and described management strategies to achieve healthier, more productive soils. Course attendees participated in demonstrations comparing soil from conventional and minimum tillage systems in Arkansas. Thanks to David and Steve for making this such a successful training!

BPMC staff is also working with UAPB, Eastern Arkansas Enterprise Community, NRCS state agronomist John Lee, and Heifer International on a joint Conservation Innovation Grant demonstrating soil health improvements using cover crops to historically underserved and limited resource farmers in the Mississippi Delta region of eastern Arkansas.

## Technology Development: Existing Studies

### Shortleaf Pine and Switchgrass Agroforestry

Agroforestry, the process of combining forage and timber production on the same land management unit, may provide landowners in Arkansas with an alternative production system. The BPMC has been collecting data from an agroforestry study that combines 'Alamo' switchgrass (*Panicum virgatum* [L.]) production with shortleaf pine tree production (*Pinus echinata* [Mill.]).

Switchgrass biomass was harvested and tree height and diameter were measured in 2010, 2011, and 2012. Last year, the pine trees grown with



Figure 3: George Rheinhardt examines a tree grown without switchgrass in alleyways.



Figure 4: A shortleaf pine tree grown with switchgrass in alleyways.

switchgrass in alleyways grew an average of 2.5 inches less than trees grown without switchgrass. This year, there were no differences in tree height; however, trees grown with switchgrass had smaller diameters. Overall diameter growth slowed due to historic drought conditions this year. Trees grown with switchgrass grew 54% less in diameter than last year. Conversely, trees grown without switchgrass grew 24% less in diameter than last year. One new measurement, height to lowest limb, was collected this year because it appears that shading from switchgrass canopy is naturally pruning lower tree branches. On average, the lowest limb was almost 1 foot higher on trees grown with switchgrass. Full results will be available in the 2013 Annual Technical Report. Special thanks to regional forester Ray Stoner and AR state forester George Rheinhardt for sharing their time and expertise.

### Growth Curve for Revised Universal Soil Loss Equation (RUSLE2)

Monthly forage harvests taken to determine growth patterns of 'Alamo' switchgrass (*Panicum virgatum* [L.]), 'Bumpers' eastern gamagrass (*Tripsacum dactyloides* [L.]), and Hampton germplasm big bluestem (*Andropogon gerardii* [Vitman]) were completed this year. Data from 2010-2012 will be incorporated into the national NRCS Revised Universal Soil Loss Equation (RUSLE2) to better calibrate soil loss predictions on pastureland.

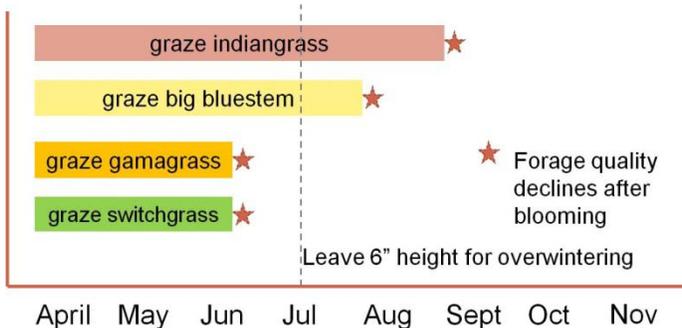


Figure 5: Grazing windows for native grasses.

Grazing native species at the boot stage before seed set ensures optimum forage quality for grazing animals. PMC staff has shared information gained from this study with tour groups and NRCS grazing staff through several presentations. BPMC staff is currently working with Arkansas NRCS grazing staff to publish a technical note about integrating native warm season grass pastures into existing rotational grazing systems.

## Technology Development: New Studies

### Soil Quality in Switchgrass Fields for Biofuel Production

Four years of data has been collected on the biomass yield implications of different management treatments on 'Alamo' and 'Cave-in-Rock' switchgrass at the BPMC. Forage yield was measured among treatment regimes evaluating commercial vs. poultry litter fertilization, irrigation vs. no irrigation, and a one or two cut per year harvest regime. 'Alamo' yielded more biomass than 'Cave-in-Rock' in all treatment combinations, and no statistical differences were observed with fertilization source or irrigation. Plots harvested twice per year yielded an average of 50% more biomass than plots harvested once per year. Full results of this study are available in the BPMC 2012 Annual Technical Report.



Figure 6: Eddie Pratt uses soil probe to measure soil bulk density.



Figure 7: Soil is collected in plastic core chambers.

Near-surface soil quality will be assessed in each of the treatment plots as part of a new study. Bulk density, soil nutrients, infiltration, soil organic matter, and root density will be collected from the various treatment blocks to evaluate treatment combination impact soil quality and soil health. Information gained from this study may be useful to landowners who are

interested in converting large tracts of marginal land to long-term production of switchgrass for the Conservation Reserve Program (CRP) or for emerging biofuels markets.

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

In March, three low-cost pollinator species seed mixes from commercial seed companies were planted in replicated blocks as part of a new study. NRCS and USDA have recently increased cost-sharing opportunities to encourage landowners to support pollinator populations by installing pollinator habitat. For landowners interested in setting aside production acres for pollinator habitat, the most common program used by NRCS customers in the BPMC's service area is the Conservation Reserve Program (CRP), administered by the Farm Service Agency (FSA).

Seed mixes were planted according to CRP CP42 Pollinator Habitat conservation practice specifications. To satisfy practice requirements, at least three plant species must be blooming in the spring, summer, and fall months. Blooming dates and species frequency have been recorded for plots this year. This will be a long-term study, since the CP42 practice has a ten-year lifespan. In year three, landowners are required to perform a mid-contract management activity. This is a disturbance to re-invigorate plant species that are annual or that have been crowded out by more dominant species. Some plots will be burned and others will be lightly disked in year three. The effect of these treatments will be monitored for ten years. Preliminary observations from this year show that one mix displayed superior diversity and successful establishment. According to CP42 specifications, no fertilizer or irrigation was applied to plots, leading to widespread plant dormancy during this summer's drought. Species composition, frequency, and blooming dates will be included in the BPMC's 2013 Technical Report.

Despite the drought, the Xerces Society for Invertebrate Conservation identified pollinators in the plots this summer during their Pollinator Short Course. Jennifer Hopwood led the training, which was hosted by the BPMC.



Figure 11: A hay meadow in Franklin County shows the difference between dormant bermudagrass and green, actively growing switchgrass in July drought.

To familiarize landowners with production characteristics of different forage species, NRCS grassland specialist Claire Whiteside, NRCS conservation agronomist Greg Watkins, NRCS conservation agronomist Ralph Harris, and NRCS AR state grazing land specialist Jeremy Huff collaborated with BPMC staff to implement a study and demonstration area for landowners and NRCS professionals. This study will evaluate six species of warm and cool season grasses by measuring forage production and forage quality. Species such as bermudagrass and fescue will be harvested every 30 days during active growth periods to simulate a prescribed grazing system.



Figure 8: Seed mixes growing in the greenhouse aid in plant identification.



Figure 9: Participants identify pollinators during the Xerces Society Pollinator Course.



Figure 10: Pollinator seed mixes planted in March.

### Grazing Management Study

BPMC staff met with Arkansas NRCS grazing and grassland specialists in an effort to help landowners and land managers diversify their forage sources to increase resistance to drought. Last year, the BPMC service area sustained the worst droughts in decades. Many landowners are now interested in planting native warm season grasses as a low-input forage source, but lack firsthand knowledge of native warm season grass species and are unfamiliar with their performance compared to traditional forage grasses.

Native warm season grass species will be harvested every 45 days during active growth periods. Plots will be planted in the spring of 2012.

### New Cultivar Development Indiangrass

Indiangrass (*Sorghastrum nutans* [L.] Nash) 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 2012 and a seed production field will be established in the spring of 2013.

### Virginia Wildrye



Figure 12: Superior accessions of wildrye are selected and moved to polycross nursery.

Virginia wildrye (*Elymus virginicus* [L.]), a native cool season perennial, may be used as a forage for livestock and wildlife species. Collections were made in western Arkansas in 2009. An assembly of 123 accessions was planted the BPMC for initial evaluation in May 2009.

Superior accessions were selected and moved into a polycross nursery in the winter of 2012. Seed from that nursery was harvested this fall and will be used to establish a seed increase nursery in 2013.

### 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.



Figure 13: BPMC service area.

### 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

From left to right:  
Randy King, Manager  
Alayna Jacobs, Assistant Manager  
Deborah Orick, Secretary  
Dale Goff, Biological Science Technician  
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