United States Department of Agriculture

NRCS Natural Resources Conservation Service

Plant Materials Program

Center's Geographical Region of Focus

THE BOONEVILLE PLANT MATERIALS CENTER

About the PMC

The plant materials program operates under the USDA, Natural Resources Conservation Service (NRCS). The Booneville Plant Materials Center (PMC) is one of 25 PMCs, strategically located throughout the nation, that are working to deliver state-of-the-art plant science technologies to meet identified conservation needs. The Booneville Plant Materials Center (ARPMC) is co-located with the Agricultural Research Service at the Dale Bumpers Small Farms Research Center 6 miles south of Booneville Arkansas on state highway 23. The ARPMC develops plants and plant science technologies to address conservation issues in areas from the rugged Ozarks to the western coastal plain. The Center serves portions of Arkansas, Missouri, and Oklahoma. The area is characterized by small family farms. Forage, poultry, and timber production are the major land uses. The soils are most often shallow, stony, and erosive. The Booneville Plant Materials Center has developed improved conservation plants, including Hampton Germplasm big bluestem, 'Bumpers' eastern gamagrass, and Wynia Germplasm Indiangrass.

PMC Staff

Stephen Haller, Manager
Rajesh Chintala, Study Leader/Agronomist
Benjamin Holleman, Farm Manager
Eddie Pratt, Biological Technician (CTS)
Christine Mezzaline, Program assistant (CTS)

Mike Sullivan, Arkansas State Conservationist
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2022 PROGRESS REPORT OF ACTIVITIES

STAFF

From Left to Right: Eddie Pratt, Biological Science Technician (Contract); Kalen Forst, WAE; Ben Holleman, Farm Manager; Christine Mezzaline, Admin Assistant; Steve Haller, PMC Manager; and Rajesh Chintala, Study Leader/Agronomist.

All current vacancies at the center have been filled. Rajesh Chintala came on board in August as our Study Leader. Rajesh graduated from West Virginia University with a doctorate degree in soil science and agriculture. Coming from a small family farm, he is passionate about advancing sustainability in agriculture by promoting soil health and conservation practices. Prior to coming to the PMC, he worked for the State of Maryland's Department of Agriculture providing technical assistance to farmers in the Chesapeake Bay watershed.

Kalen Forst started work at the center this summer as a WAE. He is a senior at Arkansas Tech University pursuing a bachelor's degree in agriculture. In Kalen's spare time, he also works at the Logan County Conservation District office in Paris.

COMPLETED RESEARCH PROJECTS

COVER CROP BIOMASS STUDY

Incorporating cover crops into a cropping system improves cash-crop performance and productivity by enhancing multiple soil health benefits which include carbon sequestration, weed suppression, nutrient cycling, reduces pest incidence, increases water availability and infiltration, and reduces nutrient losses. While cover crops provide numerous agronomic and environmental benefits, these benefits are not fully achieved unless cover crop cultivars are planted that meet the objective of the cover crop planting and the producer's expectations. Biomass production by cover crop is the key factor for achieving many of the cover crop benefits.

Therefore, a field study was conducted at Plant Materials Center (Booneville, AR) to evaluate the biomass production of Austrian winter pea, berseem clover, cereal rye, crimson clover, daikon radish, hairy vetch, and red clover. This field trail demonstrated crimson clover varieties performed better and produced higher dry biomass yields (≈3222 lb/acre) followed by daikon radish (≈2879 lb/acre) and hairy vetch crops (≈2686 lb/acre). Red clover crop varieties were recorded with least biomass production (≈1799 lb/acre) and plant height (≈11 inches). A technical report of this field study was published with complete details on plant materials center's website (https://www.nrcs.usda.gov/plantmaterials/arpmcsr13934.pdf).

Planting plots

Crimson Clover plots

COVER CROP SEEDING RATE STUDY

Fall planted annual cool season cover crops can reduce fertilizer costs to landowners by enhancing nitrogen cycling in soil through biological fixation and suppress the growth of weeds. But the delivery of these soil health and crop benefits depends on choice of crop species and agronomic management strategies such as seeding rate, planting with grass species and termination times. A two-year field study was conducted at USDA-NRCS Booneville Plant Materials Center with an objective to evaluate five commonly used leguminous cover crops at four different seeding rates, mixed with and without a cereal rye (as provided in table below), and two different termination times for their biomass productivity and ability to suppress weeds.

Cover Crop	SARE recommended Drilled lb/acre	Lowest ¼ x	Low ½ x	SARE Full	High 1.5 x
'AU Merit' hairy vetch	15-20	5	10	20	30
common vetch	15-20	5	10	20	30
'Frosty' berseem clover	8-12	3	6	12	18
'Dixie' crimson clover	15-20	5	10	20	30
'Wyo' winter pea	50-80	20	40	80	120
'Wren's Abruzzi' cereal rye	60 – 120 (1/2 for mix)		30		

Experimental Plots Layout

Biomass Harvest

The results of this two-year field study demonstrated no impact of seeding rate levels of cover crops on dry crop biomass yield and percentage of weed by total dry biomass weight in most of the crops except hairy vetch.

From a practical perspective, growers may not be guaranteed higher dry cover crop biomass yield and weed suppression simply by sowing of cover crops at higher seeding rates. Farmers could plant leguminous cover crops mix with grasses like cereal rye if there is a need to attain more above ground biomass for benefitting soil health and scavenging soil nutrients for mitigating nutrient-runoff losses. A comprehensive study report is available for this field experiment at https://www.nrcs.usda.gov/plantmaterials/arpmcsr13963.pdf

ON-GOING RESEARCH PROJECTS

ADAPTATION STUDY

Germinating seedlings in the greenhouse

Transplanting the seedlings to the field

In early spring we started a study looking at the adaptability of 30 native germplasms. Plants were started from seed in the greenhouse and later transplanted to the field. Germplasms of switchgrass, big bluestem, little bluestem, gamagrass, sunflower, Indiangrass, gayfeather, mimosa, and wildrye were represented. This is a multiple PMC study with evaluation data being collected for 5 years. The purpose of this study is to determine the potential area of adaptation of conservation plant releases and potential releases from other PMCs and compare performance to commercially available cultivars.

SUNN HEMP STUDY

Research plots established

Flowering stage of Sunn hemp and Pearl millet

Another study started this year looking at warm season cover crops. Crop producers in Arkansas commonly face challenging spring weather. There are many instances where a crop does not get planted in time for full production and the best management strategy becomes prevented panting. When that field is designated to go into corn or rice in the coming year, good use of that prevented planting is to use a legume to enhance the soil nitrogen. Although there are many good options for N producing winter legume cover crops, there are very few options for N producing summer legumes. Sunn hemp is one of the few summer legume cover crops and farmers need this cover crop option in their toolkit. Sunn hemp is a good weed suppresser and has shown to produce in excess of 150 lb/acre N. This project will provide data on N supply potential of sunn hemp as well as its other farm benefits. We are also looking at sunn hemp flowering and its potential to set viable seed in this region.

2022 TRAINING, PUBLICATIONS, AND INFORMATION

On-going Studies:

- Sunn Hemp/warm season cover crop study
    - Sunn hemp as a summer cover crop option for Arkansas

- Adaptation study
    - Observational plantings of PMC germplasm
- Pollinator habitat study
    - Methods for planting pollinator/wildlife seed mixes in the Southern Ozarks

Publications:

- S. Haller, K. Scoggins, R. Chintala. 2022. Yield of Cool Season Annual Grasses and Legumes in the Southern Ozarks (ID#13934). https://www.nrcs.usda.gov/plantmaterials/arpmcsr13934.pdf
- R. Chintala, S. Haller, A. Pettit, B. Holleman. 2022. Impacts of Seeding Rate, Cereal Rye Mixture, and Termination time on Biomass Yield of Leguminous Cover Crops and Weed Suppression (ID#13963). https://www.nrcs.usda.gov/plantmaterials/arpmcsr13963.pdf

Posters:

- Yield of Cool Season Annual Grasses and Legumes in the Southern Ozarks (Available at https://www.nrcs.usda.gov/plantmaterials/arpmcpo13962.pdf)
- Impacts of Seeding Rate, Cereal Rye Mixture, and Termination time on Biomass Yield of Leguminous Cover Crops and Weed Suppression (Available at https://www.nrcs.usda.gov/plantmaterials/arpmcpo13964.pdf)

Training Videos:

- Conducting a controlled burn on native warm season grasses
- Establishing bermudagrass no-till vs conventional till

PMC Information is available online at:
http://www.plant-materials.nrcs.usda.gov/arpmc/
Booneville Plant Materials Center | NRCS Arkansas (usda.gov)