



2015 Progress Report of Activities East Texas Plant Materials Center Nacogdoches, Texas

Study Update

Native Warm Season Grass Evaluation

The East Texas Plant Materials Center (ETPMC) initiated a study in 2013 to evaluate the performance and adaptation of native, warm season, perennial grasses for conservation use. The evaluation focuses on commercially available cultivars of big bluestem, little bluestem, switchgrass, and Indiangrass released through the USDA NRCS Plant Materials Centers in the southeastern United States. Data for plant height, seed maturity date, disease susceptibility rankings, percent stand, and forage yields are currently being compiled and analyzed for formal comparisons.



Forage harvester preparing to cut forage samples from study plots at the ETPMC

All plots have persisted since planting and showed little sign of disease. The information gathered from this work will be used to update the Texas NRCS Planting Guidelines and Seeding Tables for conservation practices while providing conservationists with information on the expected performance of each release to the east Texas eco-region.

Shelter Belts for Controlling Particulate Matter, Ammonia, and Odor from Poultry Buildings

This cooperative study with Dr. Sheryl Jerez, Stephen F. Austin State University, began in 2012 to evaluate the effectiveness of arborvitae, Arizona cypress, roughleaf dogwood, eastern red cedar, American holly, and yaupon for reducing particulate matter, ammonia, and odor from exhaust areas of poultry production houses. There were four sampling events during 2015 that occurred during February, May, July, and November. Treatments were measured for plant growth parameters, aerial and ammonia particle concentration, foliage damage, and foliar adsorption of ammonia. Eastern red cedar and Arizona cypress were the only species that did not exhibit foliar damage from the poultry house exhaust. Eastern red cedar was the most effective at trapping dust particles in its small, needle-like foliage. Field sampling and a separate laboratory experiment conducted in 2015 showed all six species were effective at adsorbing

significant amounts ammonia through their foliage. Arborvitae had the highest level of foliar absorption of ammonia in the field while eastern red cedar had the highest level of adsorption in the lab; followed closely by American holly, Arizona cypress, and arborvitae.



Examples of foliar disease and damage seen on tissues samples taken outside exhaust fans L-R: Arborvitae, Roughleaf Dogwood, Yaupon, American Holly, and Eastern Red Cedar

Quality and Yield of Seven Forages Grown Under Partial Shading of a Simulated Silvopastoral System in East Texas

This study began in 2012 to determine the effects of shade on the growth and production of seven forage grasses: ‘Tifton 85’ bermudagrass, ‘Tifton 9’ bahiagrass, ‘Americus’ Indiangrass, ‘Kaw’ big bluestem, ‘Alamo’ switchgrass, ‘Nacogdoches’ eastern gamagrass, and Harrison Germplasm Florida paspalum. Treatments consisted of zero and 50% shade created by wooden slats suspended from PVC frames. Plots were harvested when they reached 24 inches in height. Native grass species were clipped to an 8 inch height while bermudagrass and bahiagrass were clipped to 4 inches. Forages were harvested and analyzed for dry matter yield, plant height, crude protein, neutral detergent fiber, acid detergent fiber, *in vitro* true digestibility (NIRS only), and elemental composition.



Jodi Hill measuring light quantity and quality with a spectroradiometer in an unshaded plot

Final evaluation of data is in progress, but to date the study has shown that 50% shade slightly reduces dry matter yields of all species, but improves their forage quality. Though there was a decrease in forage production for shaded plots, projected beef gains were better for treatments under 50% shade than for treatments receiving full sun. It is important to note that stocking rates are reduced in silvopasture compared to open pastures due to tree production and less biomass production of the grasses. Increased gains and forage quality in silvopasture could potentially be offset by increased stocking rates in open pastures.

‘Tifton 9’ bahiagrass had the best overall performance in both treatments. Harrison Germplasm Florida paspalum and ‘Nacogdoches’ eastern gamagrass performed very well in forage production and quality, but decreased throughout the study due to harvest frequency. Plots were clipped when forages reached 2 feet in height regardless if they had met the designated resting period as outlined by NRCS grazing standards. ‘Alamo’ switchgrass also performed well and did not decrease with harvest frequency compared to some of the other native species. Native grasses are showing great potential for silvopasture. Further work should be done on native grasses using clipping frequencies that maximize their performance as outlined by NRCS grazing recommendations for these species.

Herbaceous Mimosa Performance Review for use as a Warm Season Legume in Pasture Systems

Four small pastures totaling 12 acres have been planted to Crockett Germplasm herbaceous mimosa (CGHM) over the past four years at the Louisiana State University AgCenter’s Red River Research Station in Bossier City, Louisiana. The initial pastures planted in 2012 and 2013 were irrigated during extended dry summer periods with improved establishment noted for irrigated areas compared to portions of the pastures not receiving irrigation. Efforts to quantify this observation were conducted in 2014 and 2015 by the establishment of small test plots to experimentally assess response of



Seed production fields of Crockett Germplasm herbaceous mimosa in bloom at the ETPMC in 2015

CGHM to irrigation during establishment. Results indicate that early spring plantings did not benefit from irrigation, while later plantings with hot, dry summer conditions during seedling establishment benefitted from additional water. Both irrigated and non-irrigated stands required two growing seasons to fully establish. During this establishment period, periodic grazing was used to control competing vegetation and to prevent overgrazing until CGHM was well established for long-term grazing trials.

Pastures with established stands of CGHM are currently being used in two grazing evaluations. The first evaluation is meant to assess effects of grazing periods on herbaceous mimosa stands. Early grazing, during May and June, followed by deferment of grazing in July and August resulted in enhanced flowering; potentially contributing to the soil seed bank through increased seed production. Deferment from grazing in September and October allowed top growth to accumulate which contributes to stored energy in the root system for winter survival and spring regrowth. Additional years of treatment will be required to verify benefits of these grazing treatments to long-term stand maintenance of this legume.

The second grazing evaluation compares responses of young grazing cattle at light stocking rates on pastures of herbaceous mimosa versus similar stocking on bermudagrass to

quantify the benefits of the higher forage quality, particularly protein, of the legume. Because of small pasture size and resulting low animal numbers, several years will be required for reliable animal response data. The acceptability of herbaceous mimosa to young grazing cattle and the persistence of the legume, even when grazed to within two inches of the soil surface through much of the growing season, have been documented for this low-growing, widely adapted native legume.

Conversion of Introduced Bermudagrass and Bahiagrass Pastures to Native Warm Season Grasses, Forb, and Legumes in the Western Coastal Plain

The objective of this five year project is to demonstrate the best recommended chemical and mechanical tillage methods from previous studies for converting introduced grass stands to native, warm season, perennial grasses, perennial legumes and annual forbs. Two sites in Houston County, Texas were chosen for this project. Site 1 is dominated by bahiagrass and site 2 is dominated by bermudagrass. Four treatment plots were established at each site, and preliminary treatments were applied to prepare for planting a native, warm season, grass mixture in 2016. Treatments and application schedule are found in Table 1.



Site 1. Control of bahiagrass sod, seen left, was treated with imazapyr, the right side is untreated.

Glyphosate applications appeared to effectively control bermudagrass and bahiagrass vegetation on both sites. The glyphosate application exhibited 90% control of bahiagrass in treatment 2 at site 1. The imazapyr application, treatment 4, at site 1 was slower responding, but continued to negatively affect the growth of the bahiagrass sod during the summer and into fall, eventually resulting in a 90%+ control rate. The imazapic + glyphosate application, treatment 4, on site 2 resulted in 88% control of the mixed bermudagrass vegetation.



Hog damage seen at site 1 showing the extensive damage done by foraging feral hogs.

Cover crop treatments were added by zone 4 range specialist, Jason Hohlt, to determine if direct competition and shading from the cover crop weakens existing stands of introduced grasses while contributing to soil health. The cover crop treatment at site 1 was completely destroyed by rooting from feral hogs. The cover crop planted on site 2 was undisturbed as of late January 2016.

Table 1. Converting introduced bermudagrass and bahiagrass to native warm season species project. Demonstration plot treatments by month for 2015 and 2016. USDA/NRCS East Texas Plant Materials Center, Nacogdoches, Texas.

Year/Month	Treatment 1 Sites 1 and 2	Treatment 2 Sites 1 and 2	Treatment 3 Sites 1 and 2	Treatment 4 Site 1 only	Treatment 4 Site 2 only
June 2015			Mow plots	Mow plot	
July			Glyphosate application (5 qt./ac. rate)	Imazapyr application (5 pt./ac. rate)	
August		Mow plots	Mow plots		Mow plot
September		Glyphosate application (5 qt./ac. rate)	Glyphosate application (5 qt./ac. rate)		Imazapic+glyphosate application (16 oz./ac. rate)
October			Conventionally seeded cover crop mix 1/*		
January 2016		Glyphosate application (1 qt./ac. rate)			
February	Glyphosate application (2 qt./ac. rate)	Glyphosate application (2 qt./ac. rate)	Glyphosate application (2 qt./ac. rate)	Glyphosate application (2 qt./ac. rate)	Glyphosate application (2 qt./ac. rate)
March	Conventional tillage and seeding 2/, imazapic application (4 oz./ac. rate preemerge)	No till seeding 2/, imazapic application (4 oz./ac. rate preemerge)	No till seeding 2/, imazapic application (4 oz./ac. rate preemerge)	No till seeding 2/, imazapic application (4 oz./ac. rate preemerge)	No till seeding 2/, imazapic application (4 oz./ac. rate preemerge)

1/* = Cover crop mix included ‘Elbon’ cereal rye, ‘Rockford’ spring oats, Iron & clay cowpeas, ‘Dixie’ crimson clover, ‘Shoshone’ sainfoin, and nitro radish. 2/= Both sites will be seeded to a mixture of little bluestem (*Schizachryium scoparium*), indiagrass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), Illinois bundleflower (*Desmanthus illinoensis*), purple prairie clover (*Dalea purpurea*), and black eyed Susan (*Rudbeckia hirta*).

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Who We Are

The East Texas Plant Materials Center (ETPMC) is one of 25 centers operated by the Natural Resources Conservation Service (NRCS), United States Department of Agriculture. The ETPMC services 42 million acres and covers portions of Texas, Louisiana, Arkansas, and Oklahoma. The center was established in 1982 and is a joint venture between Soil and Water Conservation

Districts in east Texas and northwestern Louisiana, NRCS, Stephen F. Austin State University (SFASU), and US Forest Service.

What We Do

The mission of the NRCS Plant Materials Program is to develop and transfer effective plant technology for the conservation of natural resources. In working with a broad range of plant species, including grasses, forbs, trees, and shrubs, the program seeks to address priority needs of NRCS field offices and land managers in both public and private sectors. Emphasis is focused on using native plants to solve conservation problems and to protect and restore ecosystems. Center personnel develop research projects and technical reports for use in developing technical guides for agency personnel and landowners on the use of plant materials in various conservation practices.

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