Plant Release

Coastal Plains Germplasm little bluestem, *Schizachyrium scoparium*, was released in 2016 for use in the Western Coastal Plains in conservation practices such as field border (386), upland wildlife habitat management (645), conservation cover (327), and restoration and management of declining habitat (643) with application for longleaf pine understory restoration.

Coastal Plains Germplasm consists of 77 native stands of little bluestem in east Texas and Louisiana and exhibits broad genetic diversity with few disease or insect problems (Fig.1). Its area of adaptation includes MLRA 85, 86A, B, 87A, 131A, B, C, D, 133B, 134, 150A, B, and 152B (Fig. 2). Testing to determine its adaptation to Land Resource Region P, the South Atlantic Gulf Slope Cash Crops, Forest, and Livestock Region, is underway to broaden its area of use in NRCS conservation programs. For more information contact the East Texas Plant Materials Center.

Study Update

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

A cooperative study with Dr. Sheryl Jerez, Stephen F. Austin State University, evaluated 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. Results from the completed study indicated all six species had tolerance to poultry house emissions (Fig. 3). Survival rates for all species were greater than 80% excluding arborvitae, 32%, and Arizona cypress, 63%. Yaupon had the highest survival rate at 96% followed by roughleaf dogwood at 92%. The low survival rates of arborvitae was attributed to excessive soil moisture at the site and not poultry house emissions.

Eastern red cedar assimilated ammonia better than the other species in the study. This result was also confirmed in controlled laboratory experiments. Ammonia assimilation significantly reduced photosynthetic activity in eastern red cedar, Arizona Cypress, and American holly, but the photosynthetic values remained within the acceptable range for conifers and evergreen species. Yaupon and arborvitae proved to be more efficient at trapping large particles, up to 20 microns; while Arizona cypress, American holly, and eastern red cedar were more efficient at trapping particles between 5 and 10 microns. The results suggests that a multi-tiered planting of yaupon, American holly, eastern red cedar, arborvitae, and Arizona cypress is effective at reducing air borne particles and ammonia from poultry house exhaust.

Adaptation and Persistence of Five Native Perennial Cool Season Grass Species for Vegetating Woodland Roads and Landings in East Texas and the Western Coastal Plain

Current NRCS Forest Practice Standards encourage planting native species for wildlife habitat and green fire breaks when revegetating forest trails and landings. Shade tolerance of the species selected for planting is important to ensure they persist in wooded areas often associated with varying degrees of light intensities. To meet these needs the ETPMC is evaluating the adaptation of commercially available, perennial, native, cool season grass species adapted to the Western Coastal Plain.

Seed of five native, cool season grass species were seeded at a rate of 30 PLS seed/ft² and irrigated to encourage germination. To evaluate plant density, seedling counts are made 30 and 60 days after planting (DAP). Canada and Virginia wildrye entries produced more seedlings per ft² than the other cool season grass entries at 30 and 60 DAP (Fig.4.). ‘Mandan’ Canada wildrye exhibited the greatest emergence of 11.4 seedlings/ft² at 60 DAP. However, persistence in our region is critical because it originated in the Northern Great Plains and may not persist in the humid, hot summers of eastern Texas.
Table 1. Mean number of emerged seedlings per ft² at 30 and 60 days after planting. USDA-NRCS East Texas Plant Materials Center, Nacogdoches, Texas.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Species</th>
<th>Ecotype origin or cultivar</th>
<th>Mean number of seedlings/ft² (30 DAP)</th>
<th>Mean number of seedlings/ft² (60 DAP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada wildrye</td>
<td><em>Elymus canadensis</em></td>
<td>‘Mandan’</td>
<td>7.9</td>
<td>11.4</td>
</tr>
<tr>
<td>Canada wildrye</td>
<td><em>E. canadensis</em></td>
<td>‘Mandan’</td>
<td>7.2</td>
<td>7.2</td>
</tr>
<tr>
<td>Canada wildrye</td>
<td><em>E. canadensis</em></td>
<td>Lavaca germplasm</td>
<td>3.5</td>
<td>4.1</td>
</tr>
<tr>
<td>Canada wildrye</td>
<td><em>E. canadensis</em></td>
<td>‘Mandan’</td>
<td>8.7</td>
<td>8</td>
</tr>
<tr>
<td>Virginia wildrye</td>
<td><em>Elymus virginicus</em></td>
<td>VNS (^1)</td>
<td>3.5</td>
<td>4.7</td>
</tr>
<tr>
<td>Virginia wildrye</td>
<td><em>E. virginicus</em></td>
<td>VNS</td>
<td>10.3</td>
<td>9.8</td>
</tr>
<tr>
<td>Virginia wildrye</td>
<td><em>E. virginicus</em></td>
<td>Georgia ecotype</td>
<td>2.6</td>
<td>2.1</td>
</tr>
<tr>
<td>Virginia wildrye</td>
<td><em>E. virginicus</em></td>
<td>Cuivre River germplasm</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Inland sea oats</td>
<td><em>Chasmanthium latifolium</em></td>
<td>VNS</td>
<td>0.2</td>
<td>0</td>
</tr>
<tr>
<td>Inland sea oats</td>
<td><em>C. latifolium</em></td>
<td>VNS</td>
<td>0.1</td>
<td>0</td>
</tr>
<tr>
<td>Inland sea oats</td>
<td><em>C. latifolium</em></td>
<td>VNS</td>
<td>0.1</td>
<td>0</td>
</tr>
<tr>
<td>Inland sea oats</td>
<td><em>C. latifolium</em></td>
<td>South Carolina ecotype</td>
<td>0.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Longleaf wood oats</td>
<td><em>Chasmanthium sessiliflorum</em></td>
<td>VNS</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Prairie junegrass</td>
<td><em>Koeleria macrantha</em></td>
<td>‘Blue Mountain’</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Prairie junegrass</td>
<td><em>K. macrantha</em></td>
<td>VNS</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Prairie junegrass</td>
<td><em>K. macrantha</em></td>
<td>VNS</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

\(^1\) Variety not stated

Conversion of Introduced Bermudagrass and Bahiagrass Pastures to Native Warm Season Grasses Demonstration

As part of its outreach and support of field office operations, the ETPMC conducted a demonstration converting monoculture introduced pastures of bahiagrass (*Paspalum notatum*) and bermudagrass (*Cynodon dactylon*) to native, warm season, perennial grasses. Monoculture pastures of introduced, turf forming grasses provide excellent forage for cattle, but extremely low quality habitat for wildlife. In contrast, well-managed stands of warm season native grasses may provide suitable forage for cattle and excellent wildlife habitat. The objective of this demonstration is to evaluate various best management treatments for converting introduced grass stands to native warm season species.

Two sites in Houston County, which represented typical monoculture pastures of introduced grasses, served as the demonstration sites. Site A consisted primarily of bahiagrass and Site B was composed predominately of bermudagrass. Four, 1/2 acre plots were established at each site and treatments were applied in accordance with a literature review of methods to control each introduced grass.
Plot treatments began in June 2015, almost a year before planting, and are detailed in Table 2. Treatments 1, 2, and 3 were applied to both sites. Treatment 1 was left fallow in 2015 for conventional tillage and planting in spring 2016. Treatment 2 consisted of mowing and one glyphosate application in fall 2015 and two applications in spring 2016. Treatment 3 included glyphosate applications in July and September 2015, a fall cover crop planting of cool season grasses and legumes, and a glyphosate application in spring 2016. Treatment 4 varied by location. At site A, the bahiagrass sod was mowed and imazapyr applied in July 2015 followed by a glyphosate application in spring 2016. At site B, the bermudagrass sod was mowed and imazapic + glyphosate applied in September 2015 followed by a glyphosate application in spring 2016 just before planting. A native warm season seed mix of ‘Cimarron’ little bluestem, ‘Kaw’ big bluestem, ‘Cheyenne’ Indiangrass, ‘Sabine’ Illinois bundleflower, ‘Kaneb’ purple prairie clover, and black-eyed Susan was planted in the second week of May 2016 with a no till drill. Imazapic was applied to all plots for pre-emergent control of non-desired species immediately after planting.
Stand counts were made at 30 and 65 days after planting (DAP). In September 2016 at 126 DAP, the plots were evaluated for native warm season species establishment. In this evaluation, the native grasses dominated the stand at site A (bahiagrass) (Fig. 6). The grasses varied from seedlings to established plants four feet tall. The native plants were able to emerge and establish with light competition from weeds and bahiagrass. In contrast, the seedlings at site B (bermudagrass) obtained a maximum height of 12 inches and had much less foliage. These plants were overtopped by bermudagrass and weeds and subject to severe competition (Fig. 8). 2016 results showed chemical and tillage treatments were more effective at controlling bahiagrass at Site A than the bermudagrass at Site B. At 65 days after planting the bahiagrass exhibited very little regrowth or competition to the native warm season seedlings. Whereas, the bermudagrass recovered and began to vigorously compete with the native warm season species. Results suggest establishment of natives into bermudagrass sod will require additional site preparation, herbicide applications, and more intense management compared to establishment into bahiagrass sod to be successful.

Table 2. Estimated number of native warm season seeded plants per m² by treatment at 30 and 65 days after planting at sites A and B in Houston County, Texas. USDA-NRCS East Texas Plant Materials Center, Nacogdoches, Texas.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Seeded</th>
<th>Site A</th>
<th>Site B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of plants</td>
<td>30 DAP</td>
<td>65 DAP</td>
</tr>
<tr>
<td>1 Conventional tillage 4/</td>
<td>NWSG 1/</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>2 No-till 5/</td>
<td>NWSG</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>3 Cover crop 6/</td>
<td>NWSG</td>
<td>0⁰</td>
<td>0⁰</td>
</tr>
<tr>
<td>4 Imazapyr 7/</td>
<td>NWSG</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>4 Imazapic + glyphosate 8/</td>
<td>NWSG</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>1 Conventional tillage IBF + PPC 2/</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2 No-till IBF + PPC 1/</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>3 Cover crop IBF + PPC</td>
<td>0⁰</td>
<td>0⁰</td>
<td>6</td>
</tr>
<tr>
<td>4 Imazapyr IBF + PPC 1/</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4 Imazapic + glyphosate IBF + PPC</td>
<td>8</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>1 Conventional tillage BES 3/</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2 No-till BES</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3 Cover crop BES</td>
<td>0⁰</td>
<td>0⁰</td>
<td>0</td>
</tr>
<tr>
<td>4 Imazapyr BES</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4 Imazapic + glyphosate BES 9/</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

1/ NWSG = native warm season grass. 2/ IBF + PPC = Illinois bundleflower + purple prairie clover. 3/ BES = black eyed Susan. 4/ = March 2016 glyphosate application and conventional spring tillage. 5=/=Mowing and glyphosate applications (5 qt./ac) in October 2015, January 2016 and March 2016. 6=/=Mowing and glyphosate applications (5 pt./ac) in July and September 2015, fall cover crop seeded October 2015, and March 2016 glyphosate application. 7=/= One mowing and imazapyr application (5 pt./ac) in July 2015 and March 2016 glyphosate application. 8=/= One mowing and imazapic + glyphosate application (8 oz./ac.) in September 2015 and March 2016 glyphosate application. 9/ = Site A-the cover crop in treatment 3 was lost to feral hogs in December 2015.
Cover Crop Variety Adaptation Trial

To meet NRCS agency goals for soil health improvement with cover crops, the ETPMC is participating in a nationwide cover crop adaptation study with 24 other PMCs. This study evaluates 54 varieties of cover crops to determine which ones commonly available for soil health improvement are best adapted to the western coastal plain states. Information gained from this study provides NRCS with information to assist landowners with selecting the best variety to meet their specific goals. Species in the study include varieties of crimson clover, red clover, balansa clover, radish, black oats, cereal rye, hairy vetch, and winter pea.

Challenges arose during the early stages of the study with severe herbivory damage from white-tailed deer to the initial demonstration planted in 2015. A double tiered electric fence was built around the study area in 2016, and was effective at eliminating most of the deer from the study area. The 2016 study was successful, and healthy stands of most species and varieties were established (Fig 9). All of the balansa clover and most red clover plots produced weaker stands compared to crimson clover. A strong cold front hit east Texas in December 2016, and temperatures fell into the teens for a brief period. These temperatures are not common for the area. The hard freeze killed 100% of the radish varieties, and severely burned several of the cereal rye, black oats, and winter pea varieties (Fig. 10). Other differences recorded include early maturing cereal rye. FL 401 and Merced rye varieties did not go dormant during the winter and had maturing seed heads in February 2017 (Fig. 11).

This study is planned for planting next fall to gain additional information to support varietal selection. Study summary reports will be written at the end of each growing season. Final study reports will be performed at the end of the study and regional Plant Materials Specialists will help develop technical documents for distribution.
Plant Materials Staff
Alan Shadow – Center Manager
Melinda Brakie – Soil Conservationist
Joseph Neasbitt – Biological Technician
Ethan Lott – Biological Aide
Max McCormack – Biological Aide

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.

Contact Information
Address: 6598 FM 2782, Nacogdoches, Texas 75964
Phone: (936) 564-4873
Web Address: http://plant-materials.nrcs.usda.gov/ETPMC

Helping People Help the Land
USDA IS AN EQUAL OPPORTUNITY PROVIDER AND EMPLOYER