United States Department of Agriculture

2015 PROGRESS REPORT OF ACTIVITIES

NATURAL RESOURCES CONSERVATION SERVICE BROOKSVILLE PLANT MATERIALS CENTER

THE BROOKSVILLE PLANT MATERIALS CENTER

About the PMC

The national plant materials program is a part of the USDA, Natural Resources Conservations Service (NRCS). The Brooksville 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 technology to meet identified resource needs.

The PMC is located 7 miles north of Brooksville, Florida on US 41, 15 miles inland from the Gulf of Mexico. There are about 53 acres of fields that are utilized for plant research and production and 116 acres of woodland on the property as well as an office building and other facilities. This PMC, along with those in Georgia and Mississippi, serve the states in the southeastern US and the Caribbean Area. We also cooperate closely with the PMC in Hawaii.

The principal resource concern on which the Brooksville PMC is focusing its efforts is to improve soil health on cropland and grazing lands. Other regional concerns that we will continue to address as time and resources permit are plants and technology to improve water quality, provide wildlife habitat, control erosion, and increase forage production. We will also be expanding our plant materials training capabilities to better meet the needs of agency personnel in our service area.

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COVER CROP PLANTING DATE RESEARCH STUDY

Many producers in Florida have asked the question "How late can I plant my fall cover crops and still have adequate biomass production?" Adequate in this sense means enough biomass to meet conservation practice standard requirements and enough residue to control weeds in the following commodity crop.

This study is trying to help answer this question. We used six small grains including three cultivars (varieties) of cereal rye (FL 401, Elbon, and Kelly Grazer); two cultivars of common oat (Horizon 201 and Ram LA99016); and 'Trical 342' triticale. We also tested six legumes: 'Southern Belle' red clover; 'Fixation' balansa clover; 'Merit' hairy vetch; 'Dixie' crimson clover; 'Devine' little burr medic; and 'Bigbee' berseem clover.

The two planting dates were December 2, 2014 and January 14, 2015. All plots received potassium and phosphorus per university soil test results; the small grain plots were fertilized with 70 pound per acre of nitrogen. The legume plots received no nitrogen but were inoculated with the appropriate strain of rhizobium prior to planting.

The photo above right was taken on March 20, 2015. The greatest dry matter (DM) production was 2,752 lb/ac for FL 401 cereal rye plots planted in December (orange arrow). Yield of this same cultivar was only 1,576 lb/ac for the second planting (red arrow). Biomass produced by the other cereal rye cultivars (1,943 lb/ac average) and triticale (2,427 lb/ac) planted in December was consistently higher (average reduction of 24% for the two cereal ryes and 58% for triticale for the January planting). However, the amount of biomass produced by any of these small grain cultivars would not provide enough residue to prevent weed emergence in a commodity crop, which requires a minimum of 4,000 (lb/ac DM).

Dry matter production of the two oat cultivars was higher for the January planting (average of both cultivars was 1,456 lb/ac) than the December planting (844 lb/ac average). But this was due to a lower initial stand. After we planted in December, a flock of turkeys (below) preferentially scratched up and ate much of the oat seed. The birds did not come back for the January planting.

Planting date had an inconsistent effect on the legumes. The highest yielding legume was hairy vetch planted in December (1,932 lb/ac). The second highest yielding was the December planting of little burr medic (1,787 lb/ac). Biomass production of these cultivars was only slightly reduced (by 12% and 8%, respectively) in the January plots. Growth of balansa clover was very poor at both planting dates. Yield of the other clovers was higher for the January planting.

We believe the lower December DM production for most of the legumes was due to competition from volunteer black medic that was not present in the January planting. All of these legumes should have been fairly competitive with weeds, but the sandy soils in our plots are not ideal for optimum growth and may have limited their ability to compete with the black medic. However, the presence of this weed may help explain why the yields reported above for Devine were relatively high. Black medic and little burr medic are closely related and utilize the same

rhizobia strain for nitrogen fixation, so there was an ample population present in the soil to ensure nodulation. The highest yielding among the clovers was the January planting of crimson clover (1,528 lb/ac). Crimson is known to be the best adapted of these clovers for our growing conditions.

NATIONAL SOIL HEALTH STUDY – THIRD YEAR

The Brooksville PMC continued collecting data on a research project testing the effect of various cover crop mixes and seeding rates of these mixes on soil health and fertility. Six other PMCs are cooperating with us on this study and each site is following a similar data collection protocol, although species grown vary due to different environments at each PMC.

The cover crop mixes planted at Brooksville were a two-species mix of cereal rye and crimson clover; a four-species mix of cereal rye, crimson clover, hairy vetch, and daikon radish; and a six-species mix, which included the four species listed previously plus common oat and rapeseed. Each of these mixes were planted at seeding rates of 20, 40, and 60 seeds per square foot. The top center photo shows the six-species mix planted at 40 seeds per square foot prior to harvesting biomass samples and termination of the cover crops. A corn commodity crop was planted in all plots after the cover crops were terminated, using the 4-row planter shown behind the tractor (right).

Each year prior to planting the cover crops, we have taken several types of soil samples to allow us to track the effect of the cover crop treatments on soil quality. We are also using a penetrometer and measuring bulk density to determine the amount and location of a compacted layer in the soil, which was created by a past history of regular tillage.

The photo (right) shows PMC staff collecting samples from the 0-6-inch soil depth for analysis using the Soil Health Tool or Haney Test. This test determines the amount of organic and inorganic nutrients that are available to plants. Although the Haney Test has shown a slight improvement in the health of our soils since the study began, biomass production of the cover crops and growth of the corn commodity crop in our plots has been limited by soil infertility and the persistence of the compacted plow layer in the soil. Annual reports for the first two years of this study are available on the PMC website.

WARM-SEASON COVER CROP ADAPTATION STUDY

Some major Florida crops, such as vegetables, are grown in the winter months to enable producers to fill specific marketing niches. Growers of these crops have little need for cool-season cover crops such as the small grains and legumes utilized in the previous research studies because they are using their fields for their cash crops when these cover crops would be grown. However, cover crops that can be grown during the summer to increase organic matter, improve soil permeability and water holding capacity, and in the case of legumes, provide nitrogen for their crops, are much more valuable. This is especially true for organic producers.

In 2015, the Brooksville PMC began a cooperative study with the PMCs in Georgia and Mississippi to test several named cultivars or seed sources of legumes and grasses that can be grown as summer cover crops. At Brooksville, we planted sixteen cultivars of ten species of legumes. We also planted ten cultivars of seven grasses, including common browntop millet (top center) that is a summer cover crop recommended under the Florida Cover Crop Practice Standard 340.

We planted our plots on June 11, 2015. We evaluated seedling emergence for three weeks, until

growth of the plants in the plots made it difficult to find newly emerged seedlings. Coverage of the cover crop canopy and a rating of plant vigor and notes of disease or insect problems were noted regularly.

A sample was harvested from each plot when the grasses were in the boot stage (before the flowers emerge) and when the legumes were at 50% flower, except for 'Rongai' lablab (hyacinthbean) that did not produce flowers during the study period.

The top yielding legume was 'Tropic Sun' sunn hemp, released by the PMC in Hawaii, which produced 74.2 tons of dry matter per acre. An unnamed type sold by Hancock Seed Company produced 48.9 tons (above right), and 'AU Golden' which was bred for earlier seed set by Auburn University, yielded 34.7 tons. We also planted a related species, red hemp. It is shorter and bushier than sunn hemp and it yielded 64.9 tons per acre. These yields are higher than a producer might expect, because the plants were not harvested until flowering. By that time the plants were six to ten feet tall and the stems were becoming woody. Most producers would have terminated prior to the plants reaching this growth stage.

Other high yielding legumes were 'Iron & Clay' cowpea at 40.5 tons per acre. 'Red Ripper' and 'Chinese Red' cowpea were somewhat less productive at 31 and 25.2 tons per acre. Lablab, which, like cowpea, is a vigorous vining bean, yielded 35.8 tons.

'Chapingo' teosinte, released by the Brooksville PMC, was the highest yielding among the grasses, producing 57.6 tons per acre. Other high yielding grasses were sterile sorghum (50.9 ton/ac) and 'Honey Graze BMR' sorghum-sudan (39.8 ton/ac). However, these grasses have large stems and were not as effective at covering the soil surface as 'Leafy

22' pearl millet (34 ton/ac) or browntop millet (26.7 ton/ac). 'Chiwapa' Japanese millet, released by the Jamie L. Whitten PMC in Mississippi, was also a top biomass producer (48.7 ton/ac) that also provided good ground coverage.

White (common) proso millet was poorly adapted at our site; it flowered and set seed a few weeks after planting and provided little coverage or biomass. 'Dove' proso millet, released by the Jimmy Carter Plant Materials Center in Georgia, was somewhat better adapted, but was not a top yielder (11.4 ton/ac).

BROOKSVILLE PMC TECHNOLOGY TRANSFER

Publications

Grabowski, J. 2015. Promoting a Florida Seed Source of Splitbeard Bluestem for Use in Longleaf Pine Plantings in the Deep South. (poster and abstract) 10th Biennial Longleaf Conf. and 9th Eastern Native Grass Symposium, 21-24 October 2014, Mobile AL.. 1 p.

Grabowski, J.M. 2015. 2014 Brooksville Plant Materials Center Progress Report of Activities. Brooksville PMC, Brooksville, FL., January 2015. 4 p.

Grabowski, J. 2015. Dicot or Monocot? How to Tell the Difference. Florida ECS Quick Tips, Gainesville, FL, January 2015. 2 p.

Grabowski, J. 2015. Legume Nitrogen Fixation and Inoculants. Florida ECS Quick Tips, Gainesville, FL, September 2015. 2 p.

Grabowski, J. 2015. Best Practices to Follow When Taking Photos for Plant Identification. Florida ECS Quick Tips, Gainesville, FL, September 2015. 3p.

Presentations

Grabowski, J. 2015. PMC Cover Crops Information and Tour for Hillsborough County Master Gardeners, Brooksville PMC. 2 April 2015. Brooksville, FL.

SPRING COVER CROP FIELD DAY

On March 13, the PMC hosted a field day during which we provided a tour and presented results from our cover crop research plots. The 24 attendees included fellow NRCS employees, individuals who work at various state agencies, and producers. Some individuals traveled all

the way from north Florida to Brooksville to attend the field day. The willingness of these individuals to drive three or more hours shows that producers, and the agency staff who support them, have an appetite for new information about cover crops.

PMC Information is Available Online at:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/fl/home/ or
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/plantsanimals/plants/