

Tucson Plant Materials Center

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This report highlights the major activities at the Tucson Plant Materials Center (PMC) during fiscal year 2013. For more detailed information, contact the PMC at 520-292-2999.

Studies

Technology and Pre-Release Development

Soil Health and Cover Crops

There is a need to determine which cover crops currently available in the market will work best in common crop rotations used in the PMC service area. Cover crops help improve soil health by reducing erosion; increasing soil organic matter content; improving air and water movement through soil; reducing soil compaction; capturing and recycling nutrients in the soil profile; managing soil moisture and in the case of leguminous cover crop species, promoting biological nitrogen fixation. This year PMC personnel established a five year warm season cover crop trial.

Prior to planting the cover crops, soil scientists from the Tucson Soil Survey office tested the chemical, physical and biological properties of the soil. PMC personnel also tested the following properties: soil respiration, infiltration, bulk density, electrical conductivity, soil pH, and soil nitrate. Soil samples were also sent to a local lab for analysis for plant available nutrient levels, salinity, organic matter content and exchangeable cations. The three separate measurement methods will be compared to determine the accuracy of field tools available to NRCS field staff when gauging soil health. All three measurement methods will be repeated at the conclusion of the trial to determine what effect, if any, each cover crop had on soil quality.

In July, the trial was established with ‘Iron and Clay’ cowpeas, ‘Stonewall’ soybeans, ‘OK2000’ mungbeans and ‘Sordan 79 headless’ sorghum-sudan grass. Parameters measured over the summer were water use, incidence of pests and disease, biomass production, and weed pressure. All four cover crops germinated well. However, the soybean never reached a full stand.



Figure 1: cowpeas on August 9th



Figure 2: cowpeas on September 12th

The leguminous cover crops were not cut and were terminated with an eight foot I & J cover crop roller during the pod set stage. The sorghum-sudan grass was cut once during the growing season to encourage deeper root growth and then terminated with the cover crop roller. As termination dates were based on each species seed production dates, they varied. The use of the cover crop roller did not result in a 100% kill of the cover crops but did provide a thick mat of biomass suppressing weed growth.



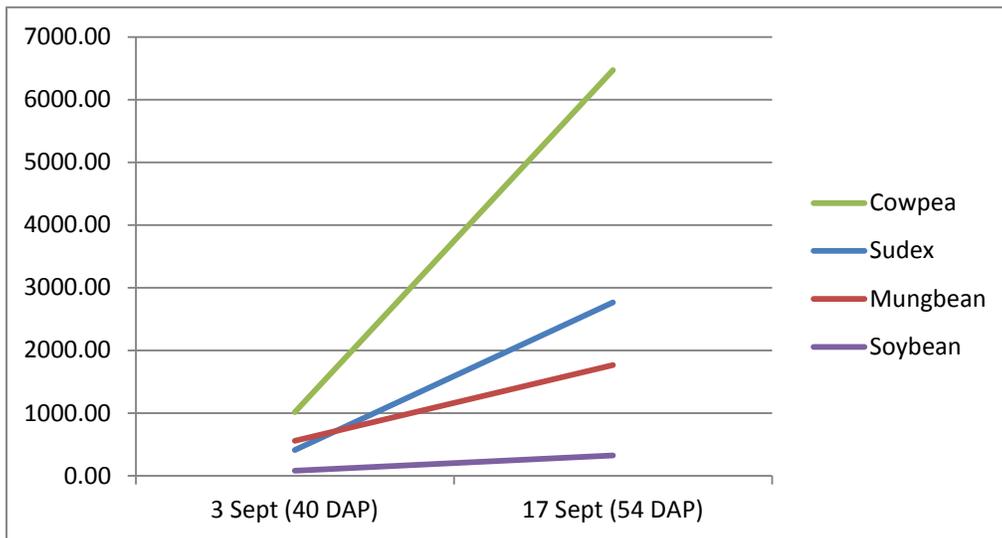
Figure 3: I & J Cover Crop Roller



Figure 4: cow pea being rolled for termination

The cowpeas consistently produced substantially more biomass and had less weed pressure than the other species used in the trial. Biomass measurements taken 40 and 54 days after planting illustrate the differences between species (figure 5). All species received two 3.5 inch irrigations and no precipitation at the time of these measurements.

Figure 5: Average dry biomass production of summer cover crop species in pounds/acre



A small grain will be planted into the rolled cover crops in late January. The small grains will be harvested in May/June. Seed yields will be compared between the cover crop species fields to evaluate any differences the addition of cover crop may have created.

Santa Rita Experimental Range Planting

Chemical control of a significant population of buffelgrass (*Pennisetum ciliare*) has taken place within the 13 acre PMC enclosure at the Santa Rita Experimental Range, as well as associated satellite infestations, since 2006. The majority of the infestation has been controlled since 2009. Spot spraying has been used in subsequent years to maintain control of buffelgrass. There is a need to determine appropriate methods of preventing re-infestation of sites where chemical control of buffelgrass has been successfully accomplished.

Three PMC releases, 'Loetta' Arizona cottontop (*Digitaria californica*), Cochise Germplasm spike dropseed (*Sporobolus contractus*) and Pima Germplasm Pima pappusgrass (*Pappophorum vaginatum*), are being tested in a 0.10 acre area of the PMC enclosure for their ability to emerge, persist and suppress buffelgrass seedlings in an area known to have supported buffelgrass plants in the recent past. As soil disturbance has been found to be key for buffelgrass establishment, traditional seedbed preparation methods (tilling, harrowing, etc.) were not used. The entire 0.10 acre area was mowed with a hand held weed eater and sprayed with a 5% solution of glyphosate prior to establishing the study on the 23rd of August.

The three releases were drill seeded into five, 50 ft x 10 ft plots. Again, in an effort to minimize soil disturbance, a Truax No-Till Grass Drill was used. This equipment prepares the planting bed and ensures high seed to soil contact without the need for traditional seed bed preparation.



Figure 6: The location of the current study plots in August 2006; buffelgrass is predominant plant in landscape



Figure 7: The location of the study plots in August 2013

The plots were evaluated on September 18th after approximately 2.5 inches of precipitation fell on the area. 'Loetta' Arizona cottontop had excellent emergence while the other two releases did not. The fifteen plots will be monitored for up to three years.



Figure 8: One of the 'Loetta' Arizona cottontop plots, September 18



Figure 9: 'Loetta' Arizona cottontop seedlings

Seeding Technology for the Mojave Desert

Blackbrush (*Coleogyne ramosissima*), creosote (*Larrea tridentata*), and white bursage (*Ambrosia dumosa*) are species that occupy large areas of the Mojave Desert. Disturbance of Mojave Desert areas where these are the primary vegetative species comes from a variety of sources including fire, off highway vehicle traffic and pipeline construction. All three of these species are difficult to introduce into agronomic production due to their slow growth. Therefore, these trials primarily deal with the development of seeding technology to successfully establish these species from wildland seed collections.

Seeding trials were designed to test planting depths and pre-treatment seeding methodologies. Two planting depths were used in these trials: 1/8" and 1". Seed was either coated with a mix of minerals and nutrients or non-coated. Each planting depth and coat or no-coat treatment was replicated four times. Additionally, all treatments were seeded into either an irrigated or non-irrigated trial. Trial installation dates were staggered throughout the year to coincide with literature recommendations for successful seeding.



Figure 10: Establishment of the blackbrush seeding trial in February

All seeding trials were evaluated for emergence and persistence during the year. Average height and width measurements of surviving plants were evaluated monthly. At the end of 2013, seedlings had emerged in all of the irrigated trials but there was no germination found in any of the unirrigated trials. Precipitation events after the establishment of the trials was scattered and with less than 0.5 inches per event which likely prevented successful germination in the unirrigated plots. All plots will continue to be monitored in 2014.

Herbaceous Wind Barrier Demonstration Planting



Figure 10: 'Windbreaker' big sacaton demonstration planting

The PMC established a herbaceous wind barrier this summer as a demonstration for NRCS Field Office personnel and their customers. Herbaceous wind barriers can be applied for a variety of conservation purposes including reduction of wind erosion, reduction of soil particulate emissions to the air, and protection of growing crops from wind and/or wind born soil particles. The PMC used the Los Lunas PMC release 'Windbreaker' big sacaton (*Sporobolus wrightii*) to establish the demonstration planting. In addition to the establishment of the planting, the Tucson PMC distributed 1500 containerized plants of 'Windbreaker' to four field offices. The plants are being used in trials to determine the potential 'Windbreaker' big sacaton has in different crop production fields in Arizona.

Pollinator Seeding Mix Trials

In support of the Plant Materials Program National Action Plan for Pollinator Conservation, the PMC established a pollinator seeding trial in collaboration with the The Xerces Society for Invertebrate Conservation. Native pollinators provide pollination services estimated to be worth about \$3 billion dollars/year. However, many agricultural areas today lack sufficient habitat to support native pollinators. The need for this habitat is well documented as are the ways to increase it: increase foraging habitat, create nesting sites, and reducing risk to pollinators from the use of insecticides and herbicides. The knowledge that is

lacking is which commercially available native plants are conducive to providing year-round pollinator habitat in agricultural areas of the desert southwest. The established seeding trial is providing vital information that will help to fill that knowledge gap.



Figure 11: Pollinator seeding trial in July

Technology Transfer

Technical Documents

During 2013, PMC personnel updated four release brochures: 'Loetta' Arizona cottontop, Saltillo Origin Germplasm cane bluestem (*Bothriochloa barbinodis*), Vegas Germplasm alkali sacaton (*Sporobolus airoides*), and Moapa Germplasm scratchgrass (*Muhlenbergia asperifolia*). Additionally, a plant guide for sorghum (*Sorghum bicolor*) was written.

Tours, Presentations, and Trainings

Several tours were given to PMC visitors over the course of the year. Some of the tour participants included members of the Tucson Native Plant Society, University of Arizona collaborators participating in a native turf grass study, potential southern Arizona native seed producers and students from the University of Arizona studying rangeland management.

Outreach Activities

In celebration of Earth Day, the city of Tucson has an Earth Day festival each year. This year, PMC personnel manned a booth to discuss with festival participants the importance of native plants and pollinators.



Figure 12: PMC personnel speak with visitors to the PMC booth on Earth Day

In July, PMC personnel worked with Arizona NRCS public affairs staff during the annual Arizona Cattle Growers' Association Convention to provide information about NRCS programs and the Plant Materials Program.



Figure 13: The PMC Farm manager and Arizona NRCS public affairs specialist at the NRCS booth during the Arizona Cattle Growers' Association Convention

Special Note

The Tucson Plant Materials Center staff would like to say farewell to Bruce Munda, Plant Materials Specialist and State Agronomist for Arizona. Bruce retired on January 3, 2014, after 39 years of service with the Natural Resources Conservation Service. Bruce, we wish you the very best on your retirement and we would like to extend a special thank you, for all your contributions to the Plant Materials Program, as well as your contributions to the conservation efforts of NRCS.

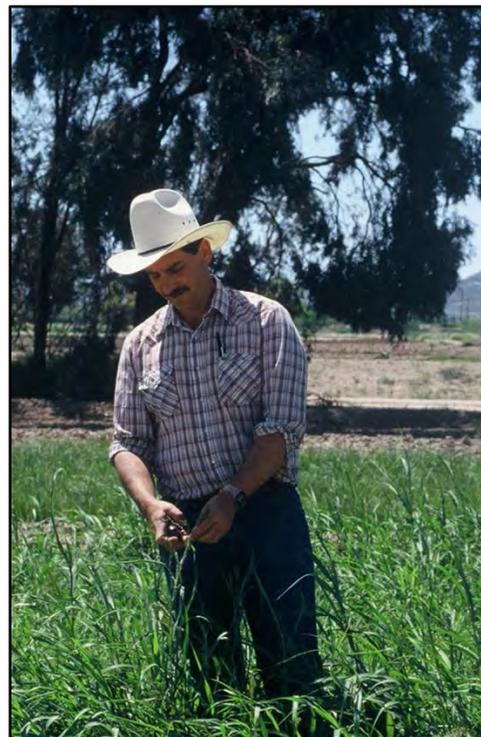


Figure 14: Bruce Munda

The Tucson PMC: Who We Are

In 1934, the first USDA Plant Materials Center was established in Tucson, Arizona. The Tucson Plant Materials Center was created to address the need for adapted plant material to revegetate eroded rangelands in the southwest. Today, erosion continues to threaten western rangelands in addition to other resource concerns including: drought, fire, invasive species, threatened and endangered species, and wildland-urban interface issues. As one of 27 Plant Materials Centers across the United States, the Tucson PMC continues to address these conservation issues within its service area, which encompasses areas within the Sonoran, Mojave, and Chihuahuan Desert regions.



Figure 15: The Tucson PMC continues to work out of the original adobe buildings built in the 1930s.

...And What We Do

The goal of the Tucson PMC is to provide effective economical vegetative solutions and technology development for conservation problems. The conservation potential of native grasses, shrubs, forbs, and trees is evaluated at the federally owned 45-acre farm, as well as test locations throughout the service area. Plant materials become part of advanced trials designed to develop cultural and management practices that enhance seed production under agronomic conditions. The ease of establishment and persistence of plant materials in their native plant communities is also evaluated. The PMC conducts studies and plantings to address resource issues in the following areas:

- Rangelands
- Mined lands
- Urban and urban-interface areas
- Croplands
- Riparian areas

The PMC works in partnership with the Natural Resources Conservation Service (NRCS) field offices, resource conservation and development groups, conservation districts, federal and state agencies, non-profit groups and private landowners. Cooperation with agencies other than the NRCS provides opportunities for the joint development of plant materials and management practices as well as for exchange of information, seed, and planting stock.

PMC Staff

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