



United States Department of Agriculture

**NRCS Tucson Plant Materials Center**

# 2014 Progress Report of Activities

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This report highlights the major activities at the Tucson Plant Materials Center (PMC) during fiscal year 2014. For more detailed information, contact the PMC at 520-292-2999.

## Studies

### Technology and Pre-Release Development

#### Soil Health and Cover Crops

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 fiscal year, the PMC established a five-year cool-season cover crop trial.

The cool-season cover crop trial compares the soil health benefits of a single species cover crop planting against three multi-species cover crop plantings. The mixes consisted of a 2-species mix of oats and woollypod vetch; a 3-species mix of oats, woollypod vetch, and purple top turnip; and a 6-species mix of oats, triticale, woollypod vetch, Austrian winter peas, purple top turnip, and kale. Prior to planting the cover crops, composite soil samples were sent to a local lab for analysis for plant available nutrient levels, salinity, organic matter content, and exchangeable cations. The mixes were drilled into 0.5 acre plots on November 19, 2013. The single-species oats were drilled into an adjacent 0.5 acre plot the same day.



*Figure 1: 2-species cover crop mix in December 2013*



*Figure 2: 2-species cover crop mix in March 2014*

The cover crops did not emerge until early December, and evaluations were not initiated until late January due to slow growth. The winter season of 2013-2014 was the warmest on record for Tucson with an average temperature of 56.9 °F. There were only two days where daily lows were 32°F or colder. The plots received 2.88 inches of rain and were flood irrigated four times before their termination.

Approximately every 15 days percent canopy cover was determined by the line transect method, and canopy height was measured as the average height of lush canopy growth from random locations within the plots. Average cover crop dry matter yield was determined prior to termination. Plots were terminated with a roller crimper and a half rate of glyphosate. The 6-species mix and 3-species mix were terminated prior to 100% cover, due to seed set in the woollypod vetch and triticale. The 2-species mix reached full cover almost a month prior to termination.

*Table 1: Mixes used in the cool-season cover crop trials at the Tucson PMC, winter season 2013-2014*

2-species mix	oats (35%) + woollypod vetch (65%)
3-species mix	oats (30%)+ woollypod vetch (60%)+ purple top turnip (10%)
6-species mix	oats (15%)+ triticale (15%) + woollypod vetch (30%)+ Austrian winter peas (30%) + purple top turnip (5%) + kale (5%)



*Figure 3: Single-species cover crop planting in March 2014*



*Figure 4: 2-species cover crop planting in March 2014*

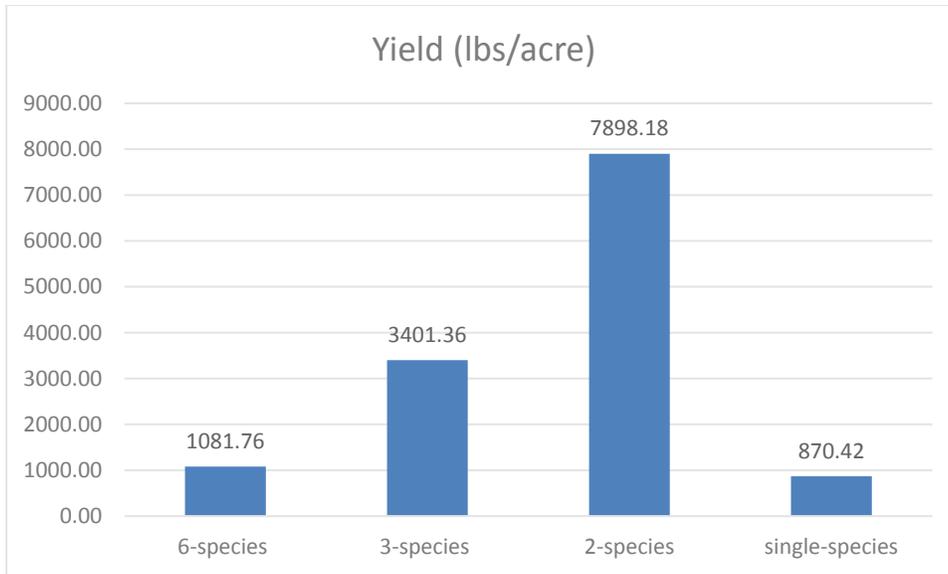


*Figure 5: 3-species cover crop planting in March 2014*



*Figure 6: 6-species cover crop planting in March 2014*

Preliminary results indicate that the 2-species mix resulted in faster ground coverage, better weed suppression and significantly more biomass than the other mixes and the single-species (figure 7). This trial will be repeated again in the winter of 2014/spring of 2015. Results will be used to improve cover crop recommendations in the Tucson PMC service area.



Graph 1: Average dry matter yield (lbs/acre) of winter cover crops at the Tucson PMC, March 2014

## Evaluation of sprucetop grama for turfgrass development

The PMC is working with researchers from the University of Arizona’s Department of Plant Sciences and School of Natural Resources and the Environment to evaluate the ability of native perennial grass species to be used as turf species. Field trials conducted for over two years at the University of Arizona have shown that collections of sprucetop grama from long-term grazed rangeland environments are capable of producing turf-type plants that are well adapted to mowing. In June, a 0.5 acre seed production field of sprucetop grama (*Bouteloua chondrosioides*) was established on the PMC farm.



Figure 7: Establishment of the sprucetop grama seed production field at the Tucson PMC, June 2014



Figure 8: The spruce-top grama seed production field at the Tucson PMC, August 2014

The field was harvested three times in 2014. Various pieces of seed conditioning equipment are being used to develop a practical seed cleaning protocol that would be acceptable by producers of native seeds in the Southwest. The cleaned seed will be used to establish additional plots in the future to evaluate seeding types and rates. The technology developed during this study will be used to enhance seeding rate recommendations for those in the PMC service area.

### Development of Indian ricegrass populations for Southern Nevada

In January, 13 populations of Indian ricegrass (*Achnatherum hymenoides*) collected from southern Nevada were transplanted into a field on the PMC. The Bureau of Land Management (BLM) Southern Nevada District, and other land managers are in need of locally adapted native plant materials for rehabilitation and restoration projects. Limited availability, coupled with the need for large quantities of seed, has forced the BLM to rely on non-native species seed from outside of the Mojave Desert, or do nothing at all. The objectives of the Tucson PMC planting are to determine the genetic variability of the populations and to potentially develop a release of Indian ricegrass adapted to the Mojave Desert. Data on growth parameters such as flowering date, plant height, seed yield, and seed maturity date will be collected from individual populations within the crossing block.



Figure 9: Transplanting Indian ricegrass, January 2014



Figure 10: Indian ricegrass accession, May 2014

## Technology Transfer

### Technical Documents

During 2014, PMC personnel updated the release brochures: 'Seco' barley (*Hordeum vulgare*), Pima Germplasm Pima pappusgrass (*Pappophorum vaginatum*), and 'Stevan' plains bristlegrass (*Setaria leucopila*). Additionally, a plant guide for black oat (*Avena strigosa*) was written and plant guides for cane bluestem (*Bothriochloa barbinodis*) and desert zinnia (*Zinnia acerosa*) were updated.

### 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 Native Seeds/SEARCH Seed School, University of Arizona's College of Architecture and Landscape Architecture, and students from the University of Arizona studying rangeland management.



Figure 11: Farm fields tour with Native Seeds/SEARCH Seed School participants

### Outreach Activities

In celebration of Earth Day, the city of Tucson has an Earth Day festival each year. This year, PMC personnel had a trivia game for festival participants to play. Trivia topics covered the importance of native plants and pollinators.



Figure 12: PMC booth on Earth Day

In March, PMC personnel worked with Tucson Field Office staff during the annual Tohono O'odam Youth Range day to present information about native plants to students. Students were shown various ethnobotanical uses of specific native plants, how to transplant native desert willows (*Chilopsis linearis*), and how to press plants.



Figure 13: Students at the Tohono O'odam Youth Range Day watch a transplanting demonstration

### Personnel

In August, the PMC Manager, Manuel Rosales, retired from the Plant Materials Program.

## The Tucson PMC: Who We Are

In 1934, one of the first USDA Plant Materials Centers 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 14: 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
- 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

Manager: Manuel Rosales

Assistant Manager: Heather Dial

Farm Foreman: Blase Evancho

Secretary/NPM Webmaster: Leslie Glass

Student Intern: Jonathan Walther

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