

Tucson Plant Materials Center

Year 2006

Progress Report of Activities

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Who We Are

In 1934, before the establishment of the Soil Conservation Service, and following the Dust Bowl, the first USDA Plant Materials Center was established in Tucson, Arizona. The Tucson Plant Material Center was created to address the need for adapted plant material to revegetate eroded rangelands due to drought in the American southwest. Today drought continues to threaten western rangelands, in addition to a list of other resource concerns including fire, invasive species, and wildland-urban interface issues. As one of 27 Plant Materials Centers across the US, the Tucson PMC continues to address these conservation issues through the use of adapted plant material throughout its service area, which encompasses areas within the Sonoran, Mojave and Chihuahuan Desert regions of California, Arizona, Nevada, and New Mexico. Over the past 70 years the Tucson PMC has developed and evaluated plant materials and technologies for plant establishment that have enhanced conservation efforts throughout the service area.



The Tucson Plant Materials Center in the 1940s, "4 miles northwest of Tucson"

What We Do

The goal of the Tucson PMC is to provide effective, economical vegetative solutions 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 as well as and ease of establishment and persistence in their native plant communities.

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

A brief summary of many of our 2006 accomplishments follows. For more detailed information please contact the address or website listed above.

Released: Alkali Sacaton for Nevada and Whiplash Pappusgrass for Arizona



Pima Pappusgrass with mature seed

Two new releases with different histories: Whiplash (or Pima) pappusgrass (*Pappophorum vaginatum*) was assembled in 1999 to produce a genetically broad-based population for southern Arizona. Sixteen accessions were evaluated and combined to form the Pima germplasm, so titled for its common name in Arizona. It is found along roadsides, valleys and low areas of plains across the southwest US between 2,500 and 4,000 feet. This species is an attractive grass, and should be popular for landscaping uses as well as revegetating Arizona rangelands.

Vegas germplasm Alkali sacaton (*Sporobolus airoides*) was initiated in 2004 for a collaborative project with the Las Vegas Office Bureau of Land Management and the Southern Nevada Restoration Team, represented by all federal agencies managing 90% of land in southern Nevada. Alkali sacaton is a coarse-stemmed perennial bunchgrass forming large clumps. It is an important forage species where few other grasses can survive, found in alkaline bottomlands, flats and sandy washes between 2,500-



Vegas germplasm fields at Tucson PMC

6,500 ft from Washington and South Dakota to Mexico. It is also a key riparian species in much of the southwest US, as well as a suitable species for commercial production by first time native seed growers (see related story, page 3). Collections were made at four locations spanning southern Nevada. The four ecotypes were evaluated at the Tucson

PMC, and the striking differences observed provides the basis for all future initial evaluation plantings at the Tucson PMC: assemblage of genetically diverse collections adapted to the region of intended use.

Five New Initial Evaluation Plantings for Southeast Arizona Established at TPMC

Requested by our field offices as the number one need from the Tucson PMC, species releases, we took this request seriously in 2006, by establishing five new initial evaluation plantings (IEP) at the Center. The five species chosen (Table 1) fit the following conditions: 1) sufficient accessions collected in the Southeastern Arizona MLRA for genetically diverse composite populations, 2) good conservation use or uses, and 3) recognized commercial production potential. None of these species are available commercially except one, Sideoats grama. The Sideoats grama cultivars from New Mexico have been used widely over the years in field trials and rangeland seedings across southern Arizona, and although they established successfully, all have vanished in recent droughts. This example and others have enforced the reasoning behind developing releases with a broad genetic base and regional adaptation, for establishment *and* persistence on the landscape.



The Tucson PMC crew plants the Sideoats grama IEP field in June

Table 1. Composites for IEP populations

Common Name	Scientific Name	Number of Accessions
Desert zinnia	<i>Zinnia acerosa</i>	9
Plains lovegrass	<i>Eragrostis intermedia</i>	29
Bush muhly	<i>Muhlenbergia porteri</i>	16
Sideoats grama	<i>Bouteloua curtipendula</i>	36
Tobosa grass	<i>Pleuraphis mutica</i>	18

Increase Fields of Alkali Sacaton Established in Nevada and Arizona

Vegas germplasm Alkali Sacaton was developed and released in collaboration with the Las Vegas Field Office-BLM and the Southern Nevada Restoration Team (see related story above). This year, the second



Ramona and Megan place plugs into crates for transport to Nevada

phase of this project established Vegas germplasm production fields with local growers in southern Nevada. This goals of this

project were to lower the risk involved for first

time native seed producers, and ensure the availability of the seed for future conservation projects in the area. This phase of the project involved another cooperator, the High Desert RC&D in Nevada, to locate interested growers and assist them in their initial years of production.



Mary explain how the planter works at Moapa School

In the summer of 2006 plugs were sewn with the G0 generation of Vegas germplasm for increase fields at 2 locations in southern Nevada as

well increase fields at the Tucson PMC.

In September the

plugs were transported to Nevada and planted at two sites, a farm in Pahrump and a school in Moapa. This project has been a great learning experience for all, notably the fact that first time native seed growers need a lot of help!

Planting Vegas germplasm at a farm in Pahrump



Development of Alkali Muhly Production Protocol for First-time Growers in Nevada

Alkali muhly (*Muhlenbergia asperifolia*) is a second population development produced in collaboration with the Las Vegas Field Office- BLM and the High Desert RC&D. This composite of three sites in southern Nevada was planted in September 2005 at the Tucson PMC. Seed matured at the end of the growing season a year later, and will be used to establish local growers in southern Nevada this summer. Its salt-tolerance, ability to establish from rhizomes, stolons and seed, and matting growth form make this species a great conservation plant and hopefully will help prevent invasive Salt Cedar (*Tamarix ramossisoma*) from continuing to establish



in southern Nevada's riparian areas. It may also be a great low-water use turf grass!

Alkali muhly prior to harvest, October 2006

Commercial Seed Production Protocols for 4 Additional Species at the Tucson PMC

A small border of Tanglehead (*Heteropogon contortus*) was planted on the Center in November 2006, to experiment with seed harvest and cleaning. We anticipate this species to have great conservation potential, and we continue to keep it on our collection lists, but we need to develop some production protocols before putting it into a population development study. 'Stevan' Plains Bristlegrass (*Setaria leucopila*) was released several years ago but with poor germination test results. By paying more attention to this species' growth schedule, by including it in field trials, and through greenhouse experiments we hope to learn more about its true germination potential. What we call the "heritage" bush muhly (*Muhlenbergia porteri*) field, made up of collections from years past, was planted in 2005 to experiment with seed harvesting and cleaning, and will be useful for the upcoming IEP field. Due to problems with the well, the 'Sonora' black grama (*Bouteloua eriopoda*) increase field was sacrificed all summer, so it didn't flourish but it held its own.

Testing TPMC releases in Field Plantings on Southern Arizona Rangelands



Jace seeds into long abandoned cropland in Cochise County

Tucson PMC's five grass species releases for use in southern Arizona were field tested following the beginning of summer monsoons in July and August (Table 2). Each species was planted with the Truax seed drill using two seeding rates at three sites throughout southern Arizona. A fourth site did not compare seeding rates, but success of establishment following fire.

The true evaluation of success of these plantings may take several years, and we will continue to monitor the sites along with our collaborators.

Table 2. Arizona TPMC Releases Tested

Common name	Scientific Name
'Loetta' Arizona cottontop	<i>Digitaria californica</i>
Saltillo germplasm Cane beardgrass	<i>Bothriochloa barbinodis</i>
Pima germplasm Whiplash pappusgrass	<i>Pappophorum vaginatum</i>
'Stevan' Plains bristlegrass	<i>Setaria leucopila</i>
Cochise germplasm spike dropseed	<i>Sporobolus crypandrus</i>

Thirty-seven species of Containerized Plant Species for Saguaro National Park



A variety of species grow under partial shade and balloons at the Tucson PMC

1600 plants, 37 species of grasses, forbs, shrubs and trees (Table 3), were grown at the Tucson PMC to revegetate the new Cactus Loop Drive at Saguaro National Park. In November the plants were transplanted along the new road.

Table 3. Containerized plants grown at TPMC for revegetation project at Saguaro National Park

Common Name	Scientific Name	Number of Plants
Twinberry	<i>Menodora scabra</i>	44
Desert tobacco	<i>Nicotiana trigonophylla</i>	4
Ocotillo	<i>Fouquieria splendens</i>	58
Paper flower	<i>Psilostrophe cooperi</i>	40
Trixis	<i>Trixis californica</i>	51
Creosote bush	<i>Larrea tridentata</i>	36
Fairy duster	<i>Calliandra eriophylla</i>	25
Burroweed	<i>Isocoma tenuisecta</i>	100
Desert senna	<i>Senna covesii</i>	29
Desert cotton	<i>Gossypium thurberi</i>	16
Brittlebush	<i>Encelia farinosa</i>	85
Jojoba	<i>Simmondsia chinensis</i>	50
Desert zinnia	<i>Zinnia acerosa</i>	193
Foothills palo verde	<i>Cercidium microphyllum</i>	136
Velvet mesquite	<i>Prosopis velutina</i>	177
White thorn acacia	<i>Acacia constricta</i>	55
Catclaw acacia	<i>Acacia greggii</i>	32
Purple threeawn	<i>Aristida purpurea</i>	32
Bush muhly	<i>Muhlenbergia porteri</i>	32
Cane beardgrass	<i>Bothriochloa barbinodis</i>	48
Tanglehead	<i>Heteropogon contortus</i>	48
Arizona cottontop	<i>Digitaria californica</i>	32
Plains bristlegrass	<i>Setaria leucopila</i>	32
Slender grama	<i>Bouteloua repens</i>	32
Sideoats grama	<i>Bouteloua curtipendula</i>	48
Mormon tea	<i>Ephedra trifurca</i>	14
Globemallow	<i>Sphaeralea ambigua</i>	11
Desert hackberry	<i>Celtis pallida</i>	32
Turpentine bush	<i>Ericameria laricifolia</i>	8
Santa Catalina Prairie Clover	<i>Dalea pulchra</i>	16
Pringle's Prairie Clover	<i>Dalea pringlei</i>	16

Fighting the tide of lovegrass invasions on the Audubon Research Ranch

In fall 2005, the Tucson PMC harvested seed from the abundant grasslands of the Audubon Societies' Appleton-Whittell Research Ranch in Elgin, Arizona, a living laboratory that formulates, tests, and demonstrates methods to restore and safeguard the native ecosystem. Seed from that harvest has been fruitful for several current projects and many potential projects.

Two replicated studies initiated this year on the Ranch investigate the potential for patch establishment of native species into invasive-dominated sites of Lehmann lovegrass (*Eragrostis lehmanianna*) and Boer lovegrass (*E. curvula*), that established following a catastrophic fire in 2002. One project was conducted in collaboration with the University of Arizona and the Ranch, to test different patch sizes for native species establishment in Lehmann lovegrass with spraying and seeding. In a second project the TPMC tested several control treatments followed by seeding into Boer lovegrass:

- mow & seed
- mow & herbicide & seed
- mow & growth suppressant (hormone) & seed
- seed only
- control



Jace and Megan seed natives into one of the Boer lovegrass treatments

A surprising finding in the drill rows was Lehmann (not Boer), which established along with the natives seeded. We will continue to monitor these sites for native plant establishment, but worry any disturbance, however slight, encourages the establishment of these invasive species.

A third

application of this seed was the establishment of mixed species fields at the PMC, for seed and hay bales. We wonder if hay bales containing native seed may be the answer to reestablishment of natives on the Ranch.

Buffelgrass Removal from SRER

This August the University of Arizona and the Tucson PMC decided it was time to remove the test plot at the Santa Rita Experimental Range (SRER) used between the 1930s and 1980s to test plant materials, now overgrown with Buffelgrass (*Cenchrus ciliaris*), a South African grass invasive in southern Arizona. The SRER, near the city of Sahuarita, AZ

is a research facility established in 1903 to study the effects of grazing and livestock production on semidesert



Ramona sprays a remaining strip of Buffelgrass at the Santa Rita Experimental Range

rangelands, currently administered and managed

by the UA's College of Agriculture. Following the TPMC's successful treatment of buffelgrass in the 13 ac plot, the UA has set up a committee to locate and eradicate all buffelgrass from the SRER, with technical assistance on spraying provided by the TPMC.

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