

Tucson Plant Materials Center Year 2005 Progress Report of Activities

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Who We Are

In 1935 the USDA-Natural Resources Conservation Service recognized the need for adapted plant material for use in their conservation programs. This need was addressed by the establishment of plant materials nurseries in critical areas throughout the United States. The Tucson Plant Materials Center (Tucson PMC) was one of the initial centers established to provide adapted plant material for conservation programs in the southwest United States. The Plant Materials program has grown into a network of 27 centers throughout the United States. Over the past 70 years the Tucson PMC has developed and evaluated plant materials and technologies for their establishment that have enhanced conservation efforts throughout its service area.

The Tucson PMC service area encompasses areas within the Sonoran, Mohave and Chihuahuan desert regions. Plant Material support is provided to areas within the states of Arizona, California, Nevada,

Utah, and New Mexico.



The Tucson Plant Materials Center borders I-10, Prince Rd. and Romero Rd.

What We Do

The goal of the Tucson PMC is to provide effective, cost-efficient vegetative solutions for conservation problems. The conservation potential of native grasses, shrubs, forbs and trees is evaluated at the federally owned 45-acre farm. Selected plant materials become part of advanced trials designed to develop cultural and management practices that enhance seed production and ease of establishment in their native plant communities (or environments). These practices, along with efficiency and adaptability, are assessed using field plantings at selected test sites throughout the PMC service area.

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 our 2005 accomplishments follows. For more detailed information please contact the address or website listed above.

Cochise Germplasm Spike Dropseed Released



Spike dropseed (*Sporobolus contractus*), a native warm season bunch grass, is commonly found on dry, sandy or gravelly soils in southeastern Arizona, Colorado, Texas, and southeastern California. Cochise germplasm is a composite of 44 collections of spike dropseed from southeastern Arizona, southern Nevada and western New Mexico. It was

developed through the Convergent Divergent Plant Improvement Strategy (CDI). This strategy brings an assemblage of plant material to a common location (the PMC) where equal numbers of plants are planted into a polycross block (CONVERGENCE). Equal quantities of seed are harvested from each plant within the convergence planting and propagated. These plants are planted in diverse environments in the region of anticipated use to allow for a natural selection of adapted plants (DIVERGENCE). Three divergence sites were selected for southern Arizona that represent low, medium and high rainfall. Each site was infested with equivalent levels of Lehmann lovegrass (*Eragrostis lehmanniana*), an exotic invasive grass. After one year seed were collected from individuals exhibiting the highest performance at each site. Seed from the divergent sites were used to establish a seed increase field at the PMC. The objective of this project was to develop a genetically diverse population of spike dropseed that can be used as a native replacement for Lehmann lovegrass. Based on the origin of the collections used to develop the germplasm, Cochise spike dropseed is adapted for use in southern Arizona.



Cochise spike dropseed increase planting at the Tucson PMC (spring).

Collections from Southern Arizona

Efforts to assemble seed collections of various native species within the service area were emphasized in 2005. NRCS field offices, NRCS specialists and various cooperators assisted the PMC staff with the effort producing approximately 300 new collections, which will provide the parent material for the development of new germplasm (Table 1). The 2005 efforts were focused primarily in southern Arizona; however assemblages are planned for other parts of the service area in the coming year.

This material will be used to establish initial evaluation plantings at the PMC. Our



Tobosa collection site on the border of Arizona and New Mexico.

goal is to develop genetically diverse composite populations with specific areas of adaptation. The assemblies from southern Arizona will be used to develop germplasm that becomes commercially available for use in NRCS conservation projects in southern Arizona.

Table 1. Assemblies from 2005.

Common Name	Scientific Name	Number of Accessions
Desert zinnia	<i>Zinnia acerosa</i>	13
Plains lovegrass	<i>Eragrostis intermedia</i>	21
Tanglehead	<i>Heteropogon contortus</i>	12
Vine mesquite	<i>Panicum obtusum</i>	13
Bush muhly	<i>Muhlenbergia porteri</i>	19
Sideoats grama	<i>Bouteloua curtipendula</i>	38
Tobosa grass	<i>Pleuraphis mutica</i>	16
Rothrock grama	<i>Bouteloua rothrockii</i>	10
Hairy grama	<i>Bouteloua hirsuta</i>	6
Black grama	<i>Bouteloua eriopoda</i>	7
Fluffgrass	<i>Dasyochloa pulchella</i>	6
Green sprangletop	<i>Leptochloa dubia</i>	12

Development of Alkali Muhly and Alkali Sacaton Populations for Southern Nevada

In 2004 the Tucson PMC began working with the Bureau of Land Management and the Southern Nevada Restoration Team, representing federal agencies managing 90% of the regions lands, to assist in the development of seed resources for conservation projects in southern Nevada. Because of the large



area managed in southern Nevada there is a need for plant material with increased genetic variability, adapted to the region. The preliminary phase of the project

involved the collection of seed from a variety of areas in southern Nevada and the establishment of alkali muhly (*Muhlenbergia asperfolia*) and alkali sacaton (*Sporobolus airoides*) increase blocks at the PMC. The alkali sacaton accessions were established in replicated polycross blocks to maximize crossing of the accessions. Data were collected from plants within the assembly to document differences and/or similarities between the accessions. Seed was harvested from the assemblage in 2005. The alkali muhly accessions collected did not contain sufficient seed to plant into a polycross block. The plants produced from these accessions were randomized and planted in the fall of 2005.



Comparison of two accessions

For the second phase of this project, the PMC will work in cooperation with the High Desert RC&D in Nevada to assist landowners in southern Nevada with the establishment and production of seed from these populations.

Pima Pappusgrass Increase

Pima pappusgrass or whiplash pappusgrass (*Pappophorum vaginatum*) is a perennial bunchgrass found on roadsides, in valleys, and in low places on plains in the southwestern United States. In Arizona, it is found primarily in Pima and Cochise counties at elevations ranging from 2,500 to 4,000 feet.



The goal of Pima pappusgrass population development is to provide a genetically broad-based population that is adapted

throughout the area of the original collections. The Tucson PMC evaluated 16 accessions of Pima pappusgrass from southern Arizona. These accessions expressed no phenotypic differences. The accessions were combined to produce a composite population for use in southern Arizona. As Pima pappusgrass is not available through commercial sources, this product is scheduled to be released for commercial production in 2006.

Audubon Research Ranch Seed Harvest

The National Audubon Societies' Appleton-Whittell Research ranch in Elgin, Arizona is a living laboratory that formulates, tests, and demonstrates methods to restore and safeguard the native ecosystem. The research plans of the Ranch and the PMC required a diversity of native seed from the area.



Good summer rains and a fire in 2002 provided much of the ranch's grasslands with abundant seed and optimal conditions for a native seed harvest in 2005. The flail vac was used to harvest seed from large tracts. The harvested material contained a variety of species of grasses, forbs and shrubs. A rough examination of seed revealed at least 20 species. Seed from this harvest

will be used in various projects, including a cooperative project on the Research Ranch to evaluate the use of unprocessed material for seeding into areas invaded by exotic Boer lovegrass and Lehmann lovegrass (*Eragrostis curvula* and *E. lehmanniana*). Fields will be established at the PMC to provide seed and hay bales for future projects.

Taking Another Look at ‘Sonora’ Black Grama and ‘Stevan’ Plains Bristle Grass

‘Sonora’ black grama



‘Sonora’ black grama (*Bouteloua eriopoda*) was released from the Tucson PMC in 1965. This was the first named release of black grama. The cultivar traces to 11 vegetative and 47 seed accessions collected in Arizona and New Mexico in 1957. From the source nursery 79 superior plants were

selected and re-evaluated in a polycross nursery. Based on polycross progeny performance, 12 superior plants were selected and recombined for production of ‘Sonora’. Production of ‘Sonora’ was suspended because of poor seed yield due to lack of fill. Black grama production may be effected by infestation with thrips and various other insects. ‘Sonora’ was re-established this year to determine if a pesticide protocol could be developed that would result in increased seed yield. Black grama is an extremely desirable grass species in Southwest rangelands.

‘Stevan’ plains bristlegrass

‘Stevan’ plains Bristlegrass was released from the Tucson PMC in 1994. It is a population of 13 accessions selected from the 1975 Critical Area and Range Improvement Grass Initial Evaluation Planting. ‘Stevan’ produces large quantities of seed; however standard germination tests are low, which resulted in it being removed from production. Agronomic evaluations will be conducted to determine if cultural practices may be developed to increase germination. It has been suggested that a TZ

(tetrazolium) test of metabolic activity may be more representative of the potential of plains bristlegrass to establish than a standard germination test. Plains bristlegrass is an important component of the Sonoran desert, and reintroduction of ‘Stevan’ would increase the species diversity of restoration plantings.



Bush Muhly Evaluation

In June 2005 collection efforts from years past were used to establish a bush muhly (*Muhlenbergia porteri*) evaluation field. Fifty-one collections made throughout southern Arizona in varying years (dating as far back as 1984) were planted into flats to compare germination. Seedlings were transplanted into plugs, regardless of germination rate. Age of the accession or season of collection may contribute to the germination rate of the seed.

The bush muhly plugs were randomized and planted at the PMC in the fall, and will be used to evaluate production practices prior to the initial release planting of a second bush muhly field scheduled for this year.



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