



United State Department of Agriculture
Natural Resource Conservation Service

Year 2008

Issued June 2009

Progress Report of Activities Los Lunas Plant Materials Center

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Who We Are

The Los Lunas Plant Materials Center is one of 27 Plant Materials Centers operated by the USDA Natural Resources Conservation Service (NRCS). Areas served by the LLPMC include New Mexico, Northeast Arizona, Southeast Colorado, Southwest Texas (the area adjacent to the southern New Mexico border) and Southeast Utah. The LLPMC is located twenty-five miles south of Albuquerque in Los Lunas, New Mexico. It is operated in conjunction with New Mexico State University's Agricultural Science Center. The facility is located in the Middle Rio Grande Valley and includes 200+ acres of irrigated land.



Los Lunas Plant Materials Center at Los Lunas, New Mexico

What We Do

It is our mission to develop, test and transfer effective, state-of-the-art plant science technology to meet customer and resource needs. The LLPMC targets these major land resource areas (ecozones):

- New Mexico and Arizona mountains
- San Juan River Valley plateaus and mesas
- Southern desert basin, plains and mountains
- Southern Rocky Mountains

- High intermountain valleys
- Pecos–Canadian plains and valleys

The LLPMC emphasizes using native plant materials to solve conservation problems. Environmental conditions including low precipitation, high intensity rainfall, high winds, extreme topography, and varied land uses combine to produce a variety of problems needing plant material solutions.

The LLPMC collects native species for testing, for selection, and for distribution to commercial growers. The development of seed and plant production technology is another primary activity of the LLPMC. In addition, plant establishment technologies are developed or refined that require minimal or no irrigation in the arid southwest.

The following highlights are featured in this report:

- Publications from the LLPMC
- Plant Production for Riparian and Revegetation Projects
- Developing Planting Technologies
- Conservation Concerns
- National Park Assistance
- Plant Materials Distribution for 2008

The articles on the following pages provide a brief summary of the Year 2008 accomplishments. For more detailed technical information, request the *2008 Annual Technical Report*.

Publications Available from the LLPMC

The Los Lunas Plant Materials Center (LLPMC) has developed several new publications in 2008 related to the seeding of native grasses and riparian restoration:

- *Basic Guidelines for Seeding Native Grasses in Arid and Semi-Arid Regions* (concise pamphlet with limited details)
- *Seeding Native Grasses in the Arid Southwest* (brochure with more explanation for non-professionals)
- *Revegetating Riparian Areas in the Southwest "Lessons Learned"* (developed in 2008 to describe the obstacles that must be considered when planning restoration projects in riparian areas)

The following publications about riparian planting technologies were developed by the LLPMC in previous years:

- *Guidelines for Planning Riparian Restoration in the Southwest*
- *Guidelines for Planting Dormant Whip Cuttings to Revegetate and Stabilize Streambanks*
- *Guidelines for Planting Longstem Transplants for Riparian Restoration in the Southwest*
- *The Pole Cutting Solution*

The technologies described in the above riparian restoration publications have been summarized in a *Journal of Soil and Water Conservation July/August 2008 Vol. 63(4):129A-133A*, article “*Deep-planting methods that require minimal or no irrigation to establish riparian trees and shrubs in the Southwest*”

The LLPMC publications are available on the NRCS New Mexico website, and in addition to these publications, our annual reports, release information, fact sheets, published proceedings, and other informational documents also are available and can be downloaded from the following website:

<http://www.nm.nrcs.usda.gov/programs/pmc/publications.html>

USDA Forest Service Projects

Cibola National Forest - Production of Riparian Plant Materials for Watershed and Ecosystem Restoration Projects

The Los Lunas Plant Materials Center will establish a plant materials source for native riparian trees and for the Cibola National Forest. These plant materials are ecotypes indigenous to areas undergoing watershed and ecosystem restoration within the Cibola National Forest, including the Canadian River Salt Cedar Eradication Project (Kiowa National Grasslands) and the Tajique Watershed Restoration Project. The LLPMC is producing containerized plant materials of tree, shrub and wetland species from seed collected by US Forest Service personnel. Some of the seedlings that have been produced have been installed in pole production blocks to provide a long-term source of dormant pole cuttings

Gila National Forest - Development of Legume Dalea for Use in Burn Rehab Seed Mixtures in Southwestern Piñon/Juniper Communities

Seed production feasibility will be determined of different species of *Dalea* that could be used as burn rehab species in the piñon/juniper vegetation types in the Southwest. The LLPMC is evaluating the candidate species for the Gila National Forest for agronomic characteristics that would make them promising for commercial-scale production, and is producing sufficient quantities of seed for testing as a component in burn rehab seed mixtures. The palatability and forage value of the species also will be assessed to determine their potential use for wildlife habitat improvement. The two species currently being tested are *Dalea albiflora* and *Dalea leporina*.

Apache-Sitgreaves National Forests - Seed Production and Source-Identified Germplasm Release of Upland Grass Species

New, native plant materials will be developed for use in Southwestern site restoration and rehabilitation; especially following wildfire, prescribed fire, and watershed restoration. Grass seed sources are being developed from wildland collections ranging in elevation from 6,100 to 10,500 feet and representing piñon/juniper woodland, ponderosa pine forest, and mixed conifer forest types. The intent is for the LLPMC to develop source-identified, germplasm releases that will be made available to commercial seed growers in the Southwest. The goal is to eventually produce a sufficient amount of seed for large-scale rehabilitation and restoration projects. The species under production include blue grama (*Bouteloua gracilis*), galleta (*Pleuraphis jamesii*), spike muhly (*Muhlenbergia wrightii*), mountain muhly (*Muhlenbergia montana*), deergrass (*Muhlenbergia rigens*), bristly wolfstail (*Lycurus setosus*), Arizona fescue (*Festuca arizonica*), Thurber's fescue (*Festuca thurberi*), and weeping brome (*Bromus frondosus*).

Mesa and Spike Dropseed Seed Production for US Army Garrison, Fort Bliss, Texas

In managing military training lands, enhancing these assets for current training missions, and conserving them for future training, Fort Bliss has a need to preserve the native plant resources and revegetate these assets for training requirements. Fort Bliss requires that the restoration of native plants will be accomplished using germplasm from populations as closely related genetically and ecologically as possible to the populations on the military training lands. This is being accomplished through the Army's Integrated Training Area Management (ITAM) program, and through the Land Rehabilitation and Maintenance (LRAM) portion of the ITAM program.

The intent of this project is for the Los Lunas Plant Materials Center to develop source-identified, germplasm releases that will be made available to commercial seed growers in the Southwest. The goal is to eventually produce a sufficient amount of seed for large-scale rehabilitation and restoration projects.

LRAM staff developed a list of preferred grass species for revegetation purposes on Fort Bliss with an initial emphasis on mesa dropseed (*Sporobolus flexuosus*) and spike dropseed (*Sporobolus contractus*). LRAM personnel collected seed at Fort Bliss during the middle of October 2007. Cleaned seed yields of these wildland collections were 152 grams of mesa dropseed and 25 grams of spike dropseed.

In late May 2008, 45 plug flats (15,000 plugs) of mesa dropseed were sown at a rate of 3 cc of seed per flat and in late April 2008, 20 plug flats (6,800 plugs) of spike dropseed were sown at a rate of 1 cc of seed per flat. Several weeks before planting the seedlings into seed production fields, they were placed in the nursery to harden off. In early July 2008, mesa dropseed plugs were planted

in 49 rows with a total acreage of 0.95 acre. In late June 2008, spike dropseed plugs were planted in 14 rows with a total acreage of 0.30 acre.

Assistance–Conservation Concerns

The Los Lunas Plant Materials Center (LLPMC) has been working directly with USDA-NRCS Field Offices, Resource Conservation and Development Offices, and Soil and Water Conservation Districts to provide assistance with many conservation concerns including wind erosion. Installation of field windstrip trials and grass variety trials as well as demonstration of revegetation techniques are being used to develop solutions to wind erosion problems. By providing assistance to these organizations, it gives the LLPMC opportunities to test new plant materials and demonstrate new planting techniques.

The LLPMC continues to provide giant sacaton transplants for trial plantings throughout the LLPMC service area. These trial plantings help to evaluate the effectiveness of giant sacaton as field and farmstead windstrips that aid in the prevention of wind erosion and determine the range of adaptation. The first of the trial windstrip plantings was established in 1999 in Columbus, New Mexico.

Since 1999, fourteen locations including the Columbus site have seen giant sacaton windstrip trials established. These include trials located in or near Jal, Milan, Deming, Espanola, Estancia, Tucumcari, Los Lunas, Lovington, Taos, Clayton, Hobbs, and Tatum, New Mexico. We also installed a trial planting at The Gap, Arizona to protect non-irrigated cropland on the Navajo Reservation.

New Giant Sacaton Plantings

In 2008, new plantings of Giant sacaton were established at four different locations in and around Taos, New Mexico. These sites will help identify the adaptation of the sacaton for the climate found in Taos. The plantings will be evaluated in 2009 for survival rates and forage production.



Giant Sacaton Transplanting, Taos, New Mexico, July 2008.

National Park Service Assistance

The LLPMC has agreements with Carlsbad Caverns National Park, Capulin Volcano National Monument, Grand Canyon National Park, Wupatki National Monument, Pipe Spring National Monument, and Zion National Park of the Department of the Interior's National Park Service (NPS). These agreements allow the LLPMC to assist the NPS to revegetate disturbed areas in the parks, such as roadsides, trails, campgrounds, and other construction areas. The LLPMC provides the NPS with plant materials of the parks' local native ecotypes by producing both seed and containerized transplants for revegetation purposes.

In 2008, the LLPMC had in production 14 native grass species on a total of 14.45 acres. In 2008, the LLPMC produced 714 pounds of grass seed to be used for NPS revegetation efforts.



Pipe Springs Galleta – Field 16 – August 8, 2008



Grand Canyon Plant Delivery – September 8, 2008

Partnering with the New Mexico Department of Transportation to Improve Dry-Land Seeding Technology

In 2005, a cooperative agreement was developed between the New Mexico Department of Transportation (NMDOT) and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC). The new agreement begins a three-year project between the two agencies to evaluate the revegetation technology currently being used by the NMDOT. The NMDOT has had difficulty meeting the national vegetation requirements following the completion of road construction projects. The proposed work in the 2005 agreement will study the current revegetation technology and determine its effectiveness.

A trial planting in Gallup, New Mexico (located on Highway 602) was evaluated in 2007 and 2008 for percent establishment and forage production. A second trial planting was installed on a disturbed construction site near San Ysidro, New Mexico in 2007 (located on Highway 550).

Both sites were monitored in 2008 for germination and forage production. The results from these evaluations and the reports generated from this cooperative agreement will provide useful revegetation technology for both the NMDOT and the LLPMC.

Youth Water Awareness Day

On May 7-8, 2008, Danny Goodson, Agronomist at the Los Lunas Plant Materials Center, attended the McKinley County Youth Water Awareness Day in Gallup, New Mexico. Danny was invited to present water conservation techniques and technologies through the use of native plants. Children from elementary through high school age attended the two-day event. An exhibit with photographs and live plants from the LLPMC were on display to emphasize the need for using native species of plants to help reduce the use of water in our daily lives.



2008 Gallup Water Awareness Day

Integrated Water Management Workshop

In July of 2008, a tour of irrigation systems was held at the Los Lunas Plant Materials Center (LLPMC) for an NRCS-sponsored Integrated Water Management (IWM) Workshop. The tour gave participants an opportunity to examine different types of irrigation techniques and technologies that are currently being used at the LLPMC and the New Mexico State University (NMSU) Agricultural Science Center. (ASC)

Dr. Ron Walser, NMSU Extension Small Urban Farm Specialist, presented information on irrigation technologies being used for vegetable and orchard crops. The efficiency and economics of using these technologies was highlighted by Dr. Walser.



NRCS-Sponsored IWM Workshop

Riparian Restoration Workshops

During the winter of 2008, the Los Lunas Plant Materials Center joined forces with the New Mexico NRCS State Office and the New Mexico Soil and Water Conservation Districts to provide five Riparian Restoration Workshops on location with each consisting of 2½ days of training. We provided three presentations at each workshop:

- Riparian planting methods with limited or no irrigation
- How to successfully seed in the Southwest,
- Success stories

For each workshop we also presented an onsite, three-hour, hands-on, riparian restoration field training session using specialized tools at a local river location. Training included using electric hammer drills to establish willow whip cuttings, a motorized auger with extensions to install a groundwater monitoring well, and the longstem planting technique that involves placing transplants in capillary soil water with some planted as deep as 6 feet.



Workshop participants planting willows using electric rotary hammer drills.

A Guide for Planning Riparian Treatments in New Mexico is a 2008 publication that was developed as a cooperative effort among the USDA-NRCS Los Lunas Plant Materials Center, the USDA-NRCS Technical Services, and the New Mexico Association of Conservation Districts. This guide provides both planning and design assistance in treating riparian areas, and it served as the foundation for the five workshops with copies provided to each participant. An overview of the guide was presented at the 2008 Soil and Water Conservation Society Annual Conference in Tucson, Arizona. Information from the guide was also presented at the International Society for Range Management Meeting in Albuquerque, New Mexico in February 2009.

Free copies of the guide may be downloaded from the USDA-NRCS New Mexico website:
<http://www.nm.nrcs.usda.gov/technical/tech-notes/bio/riparian.pdf>

Longstem Transplants Tolerate Bare Sand on the Rio Grande

More than 470 longstem, transplants in treepots (14-inch container length) were installed along the Rio Grande in Bernalillo, New Mexico in December 2007 and January 2008. The transplants were installed on the east-side of the Bernalillo Bridge about ½-mile south of New Mexico State Highway 550. These transplants were placed into deep holes where the root system could reach the capillary fringe of the water table. They were planted in sand on the river bank where no other vegetation was present. Other vegetation could have reduced both the sunlight and the desiccating winds of the arid southwest. Additionally, the transplants did not receive any follow-up irrigation after planting, and even though the planting area receives only an average of 8-inches of annual precipitation, the survival rate was at 95 percent as of June 2008. Summer temperatures in this area occasionally exceeded 100°F.

The main stem of a longstem transplant may be up to 12-feet long, and when planting, the root-crown may be buried up to seven feet deep. Some portion of the shoot system (typically more than two feet) is always exposed

above the soil surface. These plants show no negative response from this type of treatment. In fact, new growth will shoot up in the spring possibly because the plants have complete access to water.

Plant species included in this planting included New Mexico olive (*Forestiera neomexicana*), desert false indigo (*Amorpha fruticosa*), and willow (*Baccharis emoryii*). This planting method has been successful for all Emory's species planted up to this point including:

- skunkbush sumac (*Rhus trilobata*)
- golden currant (*Ribes aureum*)
- wolfberry (*Lycium torreyi*)
- screwbean mesquite (*Prosopis pubescens*)
- netleaf hackberry (*Celtis reticulata*)
- box elder (*Acer negundo*).

Using this planting method, we have planted more than 12,000 plants in the past six years with an average survival rate near 85 percent. Most of these plantings never receive any follow-up irrigation treatments.



Planting longstem transplants in 6-ft. holes on the Rio Grande in Bernalillo, New Mexico in December 2007.



Same location in June 2008. Longstem transplants have a 95% survival rate at this location.

Tall-Pot Transplants Coupled with Hydrogel – A Planting System for the Arid Southwest

During the fall-winter period of November–December and January–February of 2000, 2001, 2002, we planted 2,085 tallpot transplants in the median on New Mexico State Highway 285 in the Eldorado-Lamy area of Santa Fe, New Mexico. The survival rate after 7-9 years (as of February of 2009) is at 89 percent. Using tall-pot transplants coupled with the application of a superabsorbent hydrogel (sodium carboxymethyl cellulose) for irrigation is a successful planting system that has minimal follow-up maintenance. This is particularly useful on upland sites in the arid southwest.

These tall-pot transplants were grown in containers constructed from PVC sewer pipe and were 30-inches long and 4-inches in diameter. Depending on species type, it typically takes three years to produce a mature root ball from seed. We selected local ecotypes of species that could tolerate the average rainfall of 12-inch per year at the planting site.

The planting holes were dug with a Beltec auger measuring 40-inches long and 9-inches in diameter, and powered by a 50-horsepower farm tractor. Irrigation tubes were constructed from a PVC sewer pipe, 3-inches in diameter and 40 inches long. The pipe was imbedded with the rootball before backfilling around the planting hole. The plants were then irrigated with the hydrogel only once in the spring for the first two growing seasons. Afterwards, the plants survived only on the natural precipitation. However, plants were often strategically located on the median where they would receive runoff (rainfall harvesting) during storms.

This planting system was also used in the fall of 1999 on New Mexico State Highway 599 in Santa Fe at the Ridge Crest Interchange (550 plants), and on New Mexico State Highway 122 in Milan (150 plants). The survival results are similar with a nearly 90 percent of the plants surviving. For more information, please contact the Los Lunas Plant Materials Center at 505-865-4684.



New Mexico Highway 285 median shown 7-9 years after installing tall-pot transplants with hydrogel.

Distribution of Plant Materials in 2008

Seventeen USDA-NRCS Field and Area Offices and three Soil and Water Conservation Districts received plant materials as well as a number of federal, state, local, and tribal agencies and non-profit organizations. Many of the plant materials distributed by the LLPMC have been used to revegetate riparian areas treated for saltcedar removal. The following table lists the plant materials that were distributed by the LLPMC in 2008.

2008 Plant and Seed Distribution

Distributed To	Poles	Cuttings and whips	Large Containers 1-gallon >	Small Containers < 1-gal	PLS Seed (pounds)
NRCS Field and Area Offices (17)	385	300	477	1,069	27.6
Soil and Water Conservations Districts (3)	420	100	1,438	6,358	0
PMC's (6)	0	0	0	0	11.1
Bureau of Reclamation	150	0	573	0	0
National Forests (2)	20	250	59	25	18
National Parks (4)	0	0	0	16,626	195
Bureau of Land Management (2)	300	0	404	0	0
US Army Corp of Engineers	265	1,600	1,290	0	0
Other Federal Agencies (4)	0	4,000	123	725	7
State Government (4)	337	5,200	50	0	1
Local Government (4)	15	465	682	0	0
Native American Tribes (2)	330	0	7	0	0

2008 Plant and Seed Distribution

Distributed To	Poles	Cuttings and whips	Large Containers 1-gallon >	Small Containers < 1-gal	PLS Seed (pounds)
Non-Profit Organizations (5)	2,160	0	683	256	0
Seed Producers and Nurseries (2)	0	0	0	0	10.1
Ranchers (1)	125	0	0	0	0
Total	3,827	11,915	5,786	25,059	269.8