Year 2006
Los Lunas Plant Materials Center
Annual Technical Report

United States Department of Agriculture
Los Lunas Plant Materials Center
1036 Miller St. SW
Los Lunas, NM 87031
Telephone: (505) 865-4684/FAX: (505) 865-5163

Table of Contents

Blue Grama Variety Trial

By: Danny Goodson[1]

Study Number: NMPMC-T-0401-RA

High-elevation grazing competition between elk and livestock has become a concern for landowner Carl Smith. Elk have been grazing on his forage pasture during the spring, decreasing the available forage for livestock during the summer-grazing season. The elk herd in the area eats the cool-season grass forage prior to the introduction of livestock in the summer months. Without the cool-season species forage, and because of the low production rate of warm-season, indigenous forage grass species, the livestock end up with an insufficient amount of feed during the summer grazing period.

To attempt to solve this problem, the NRCS Field Office in Espanola, New Mexico and the Los Lunas Plant Materials Center (LLPMC) are establishing a trial planting of improved varieties of blue grama. Blue grama is a component of the warm-season range species indigenous to the ranch. The native blue grama exhibits low forage production and does not contribute much to the total forage production of this rangeland. Improved varieties of blue grama could provide a greater forage potential at this elevation (8200 feet).

On July 27, 2004, the LLPMC installed four varieties of blue grama on Mr. Smith's ranch: Hachita, Lovington, Alma and Bad River Ecotype. Hachita, Alma and Lovington are improved blue grama varieties developed by the LLPMC. Bad River Ecotype is an ecotype release from the Bismarck Plant Materials Center (PMC) in North Dakota. Including the Bad River Ecotype in the trial planting allows the opportunity to evaluate an accession from a northern climate. The new trial planting covers .10 acres in 16 replicated plots. The seed was installed using a plot drill. The seeding was evaluated on 10/01/2004. None of the blue grama seed had germinated. The July 2004 planting may have been too late in the season for germination to occur at this elevation. The 2004 blue grama planting was disked out by Mr. Smith in the spring of 2005. This was done to prepare the area for a new seeding to be completed in 2005. On June 6, 2005 a seeding was completed by staff from the Espanola Field Office and the Los Lunas Plant Materials Center on the same site of the 2004 planting. The seeding installed four varieties of blue grama: Hachita, Lovington, Alma and Bad River Ecotype. The seeding was completed using the same procedures as 2004 except for the earlier planting date.

The seeding was installed at an earlier date in 2005 in order to provide a longer growing season for any seed that may germinate. This longer period for growing compensates for the shorter growing period at this elevation.

2005 Evaluation

On September 28, 2005 germination of the seeding was observed. The replicated plots of the four varieties of blue grama had seedling emergence and the plots as a whole had from 10 to 50 percent germination. All seedlings looked healthy and vigorous and were approximately two inches in height. The plants should have sufficient growth to survive the coming winter dormant period. No disturbance by wildlife or livestock was observed in any of the plots. At this time the

[1] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

plots have not been fenced for protection and damage by livestock and wildlife is a concern. The landowner is aware of this need and has stated he will fence the area as soon as possible.

2006 Evaluation

The Carl Smith blue grama trial was evaluated for survival and growth on September 20, 2006. The seeded plots did not look very healthy and most of the seeded rows looked to be dead. The plots were evaluated visually using a randomly placed one meter square metal frame in each plot. The seeded area did not appear to have had good moisture up to this point and most of the surrounding rangeland looked to be only in fair condition. The evaluation of the plots is contained in the following table.

Carl Smith Blue Grama Variety Trial 2006 Evaluation

Species	Variety	Average Percent Survival	Height (in)
Bouteloua gracilis	Lovington	1.0	1.5
Bouteloua gracilis	Alma	1.0	1.5
Bouteloua gracilis	Hachita	10.25	3.0
Bouteloua gracilis	Bad River Ecotype	1.5	2.0

The blue grama plots were not vigorous and most of the surviving plants were only in fair condition. The surviving plants may not be able to withstand the upcoming winter season. The blue grama plots were fenced by the owner and no animal grazing damage could be seen at the time of evaluation. At the September 2005 evaluation, all replicated blue grama plots had fair to good germination and all plots had appeared to have sufficient growth to survive the winter. If the blue grama plants in the plots do not put on more growth by the first hard frost they may not survive until 2007.

The survival evaluation as of 2006 shows the Bad River ecotype to be significantly better than any of the other three varieties. Unfortunately the Bad River ecotype rating of 26 percent germination found in September of 2005 had decreased by half (10 percent) by the September 2006 evaluation. Even the Bad River plants have not exhibited much growth and could have a hard time surviving until next growing season.

This trial will be evaluated in 2007.

Giant Sacaton (*Sporobolus wrightii*)

By: Danny Goodson[2]

Study Number: NMPMC-P-8401-CP

Giant sacaton is a native, robust, perennial warm-season bunchgrass. It is found throughout the southwestern United States, usually occurring on low alluvial flats and flood plains. It is useful forage for livestock and wildlife. Under irrigation, Giant sacaton may reach heights exceeding 3 m. The mature plants range in height from 1–4 m. Based upon its density and height, it has the potential as a windbreak plant for irrigated cropland.

Seed collections of Giant sacaton were taken from 37 locations throughout New Mexico. These collections were used to establish non-replicated, accession rows that consisted of 520 plants in a field at the Los Lunas Plant Materials Center. Based on a visual evaluation of vigor and height, ten superior plants were selected. Each selected superior plant came from a separate accession to maintain a diverse population. From these ten plants, one super selection was made. A hybrid, cross-planting was established as an attempt to improve the height of the progeny.

In 1992, colonel shoots of each selected plant were planted into a hybrid, seed-production block with the super plant as the male pollinator. In 1995, seed was hand-harvested from each female parent. In 1996, this seed was used to establish an evaluation planting that contained both parents and progeny. The progeny were derived from seed, and the parents were vegetatively propagated. Both sets of plants were grown in 6-inch square pots for eight months in an attempt to equalize carbohydrate reserves in the seed derived plants and the clones. The planting design was an 8-replicated, split-plot, randomized block design. Each replication consists of 20 plants spaced on 10-ft. centers. A plot consists of a parent and the progeny plant.

The planting is mowed in the winter to remove plant liter from the previous year. By the end of the third growing season, the leaf blades of most plants had approached 3 m in height. When the plants are flowering they may approach 4 m.

In August 2002, the planting was evaluated for leaf height, basal width, and appearance. A separate, paired, T-test statistical analysis was performed on each replication comparing the height of each parent to its progeny. The progeny and parent plants were not significantly different in height (alpha .05). However, there appears to be a difference in leaf blade width, color, and uprightness between the parents and progeny plants. The cloned parent plants remain identical to their source where the progeny plants seem to have random variation. The planting will be evaluated again in 2005.

[2]Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

2006 Treatment and Harvest

Field maintenance for the parent and parent and progeny test plantings consisted of the following. Weed control was performed throughout the growing season to keep the fields clean and promote vigorous growth of the plantings.

Action	**Date**
Irrigation 3" water applications	4/4, 4/27, 5/23, 6/16, 7/19, 10/26
Fertilizer 80 pounds Nitrogen 40 pounds Phosphorus	 5/23, 7/21 5/23
Harvest completed Field 10	9/12/2006
Swathed	N/A
Baled	N/A

Forage Triticale Planting Trial

By: Danny Goodson[3]

Study Number: NMPMC-T-0001-RA

The Los Lunas Plant Materials Center received a request from the Natural Resources Conservation Field Office in Silver City, New Mexico to conduct a field trial of forage triticale selections on the Jeff Glenn farm near Silver City. Mr. Glenn has been planting triticale as a winter-forage irrigated pasture on his farm for several years. Mr. Glenn approached the field office in 2000 to inquire on improved selections of triticale that might be available commercially. The field office then contacted the LLPMC in 2001 to see if a field trial of triticale varieties could be installed on Mr. Glenn's property.

In the fall of 2001 a trial was installed by the LLPMC of triticale varieties and forage data was taken by the staff of the field office during the winter grazing period. The varieties tested were not found to be any better than the triticale Mr. Glenn had been using previously.
No action of any kind was taken in 2006 on Mr. Glenn's study. This project is no longer active and will be discontinued.

[3] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

New Mexico Department of Transportation 2005 Cooperative Seeding Project Agreement

By: Danny Goodson[4]

Study Number: NMPMC-T-0502-OT

On June 14, 2005 a cooperative agreement was signed between the New Mexico Department of Transportation (NMDOT) and the USDA Natural Resources Conservation Service Los Lunas Plant Materials Center (LLPMC) for the purpose of establishing projects to evaluate, develop and report on seeding specifications for vegetative cover of disturbed roadway sites. The NMDOT will provide funding for these projects and the LLPMC will be responsible for installation, data collection and completing written reports on all work undertaken in the agreement.

In 1992 the LLPMC and the NMDOT produced a Roadside Vegetation Management Handbook as part of a cooperative agreement. This handbook was produced to give the NMDOT a complete guide on the necessary steps needed to complete roadside vegetation projects along with the maintenance of the vegetation following completion of the project. As part of the 2005 agreement this handbook will be updated and revised as needed to include any new species or technology that was not available in 1992.

Region 6 of the NMDOT is located on the west side of New Mexico and contains several climatic zones and soil types that will provide excellent testing of the proposed reseeding evaluations. In 2006, two sites were identified for seeding trial establishment by the LLPMC. Site one is located at mile post 24 on Highway 602 south of Gallup, New Mexico. Site two is located at mile post 30 on Highway 550 northwest of San Ysidro, New Mexico. Site one received replicated trials of warm season, cool season and dormant seed grass mixes. Site one also had a single species replicated plot seeding of various wildflowers, cool and warm season grasses to evaluate their potential for use by the NMDOT to reseed disturbed areas in this part of Region 6. Site two was not ready in time for any installation of treatments in 2007. The 550 site will be completed by the LLPMC in 2007.

On October 12, 2006 a germination evaluation of the single species replicated plots at site one was completed by the LLPMC. The replicated grass mix plots were not evaluated in 2006. See the LLPMC NMDOT 2005 Cooperative Agreement Summary Report and the February 2007 Progress Report for complete details of this study.

[4] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

Field Maintenance at the Los Lunas Plant Materials Center

By: Danny Goodson[5]

Evaluation Production Potential of Alkali Muhly for Release

Study Number: NMPMC-P-9501-RI and NMPMC-9902-RI

Field 11 and 12

This is the 2006 release of Westwater germplasm alkali muhly, accession number 9066232 foundation planting at the LLPMC. Alkali muhly, sometimes known as scratchgrass, is a common riparian grass species found throughout the U.S. except for the Southeast. Alkali muhly is a native, warm-season, perennial sod grass, which has a prostrate or an erect growth form. Alkali muhly is an excellent soil stabilizer because it is strongly rhizomatous and grows in moist-to-wet, sand-to-clay and neutral-to-alkali soils.

Westwater germplasm alkali muhly was first collected in 1993 near Westwater Spring in San Juan County located in northwestern New Mexico. This site is 5,200 feet in elevation, receives about 7 inches of annual precipitation, and is in the USDA plant hardiness zone 6. The Westwater germplasm release will be beneficial in the restoration of riparian sites along drainages located in the LLPMC service area. Alkali muhly will be one of the plant materials used to control the introduction or reintroduction of invasive species along riparian corridors.

Note: Please refer to study number NMPMC-S-0402-RI Westwater Germplasm Alkali Muhly Seed Increase for all current information on this release.

National Arboretum American Elm Selections

Study Number: NMPMC-F-0201-OT

Field 26S

Two varieties of American elm were obtained from the National Arboretum in the spring of 2002. The National Arboretum shipped three rooted plants of two varieties, Valley Forge and New Harmony to the LLPMC for evaluation in our hardiness zone. On August 15, 2002, the six trees were transplanted into Field 26S on the LLPMC.

The elm selections have a 100 % survival rate, and the amount of growth is fair, but appears to be limited by our climate. The New Harmony selection averaged 139 inches and the Valley Forge plants averaged 149 inches in total height. Both elm selections had good foliage color, but very few new branches were produced in 2006. It is too early in the growth of both selections to make a judgment on how this species will perform here in Los Lunas.
The planting will be evaluated for growth and survival in 2007.

[5] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Action	2006 Date
Fertilizer	
50 pounds nitrogen	2/27, 10/31
40 pounds phosphorus	2/27
Irrigation 3" application	3/3, 4/4, 4/27, 5/19, 6/9, 7/13, 11/1

Autumn Amber

Study Number: NMPMC-P-9803-UR

Field 26S

Evaluation of propagation techniques will be performed in 2006 as required.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Action	2006 Date
Irrigation 3" application	2/9, 4/7, 4/24, 5/24, 6/21, 9/7

Hope Desert Willow Stock Plant Production

Study Number: NMPMC-P-0102-UR

Field 26S

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Seed was not harvested in 2006 from this planting.

Action	2006 Date
Fertilizer	
35 pounds nitrogen	1/27, 8/10
40 pounds phosphorous	1/27
Irrigation 3" application	2/6, 3/21, 4/6, 5/5, 5/18, 6/9, 6/22, 7/13, 8/17, 9/21
Herbicide	
pre-emergent	3/11

Regal Desert Willow Stock Plant Production

Study Number: NMPMC-P-0101-UR

Field 26S

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Seed was not harvested in 2006 from this planting.

Action	2006 Date
Fertilizer	
35 pounds nitrogen	1/27, 8/10
40 pounds phosphorous	1/27
Irrigation 3" application	2/6, 3/21, 4/6, 5/5, 5/18, 6/9, 6/22, 7/13, 8/17, 9/21

Species from Four Corners Region

Study Number: NMPMC-P-9505-CR

Field 35N

The plantings of different species collected in the Four Corners region of New Mexico were not evaluated in 2006.

No evaluations were completed in 2006.
Evaluations will be completed in 2007 to work towards a possible release of selected species.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the fields clean and promote vigorous growth of the plantings.

Action	2006 Date
Shrub collections	
Irrigations 3" water application	5/19
Desert needlegrass and Slender wheatgrass	
Fertilizer	
70 pounds nitrogen	1/11, 3/14, 4/21
40 pounds phosphorus	1/11
Irrigations 3" water application	2/17, 3/20, 4/7, 4/24, 5/18, 6/7, 6/23, 7/25, 9/19, 10/19
Herbicide	
2,4-D	3/15, 6/27, 7/7
Mexican whitesage, Buckwheat and White prairieclover	
Irrigation 3" water application	4/24, 5/23, 6/22, 7/25

Little Bluestem Initial Evaluation Planting

Study Number: NMPMC-P-9101-RA

Field 8

In 2005, evaluations were completed in preparation for a possible release of this species. Five accessions were selected from the planting and culms were used to start transplants for placement in a polycross environment in 2006. Seed from this polycross will be used to start a production field and the resulting plants will be evaluated against the LLPMC release 'Pastura'.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

There was no seed harvested in 2006.

Action	2006 Date
Irrigation 3" application	2/9, 5/16, 6/20, 7/24, 11/21
Fertilizer 30 pounds nitrogen	4/21
Herbicide 2,4-D	6/26, 8/30
Mow	7/19, 9/5

Mexican Whitesage

Study Number: NMPMC-9801-WL

Field 26N

This Mexican whitesage collection is being evaluated for its potential as a variety release.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

No seed was harvested in 2006. Seed harvest will be attempted in 2007.

Action	2006 Date
Irrigation (3" application)	2/9, 3/21, 6/9

Sandhill Muhly

Study Number: NMPMC-P-9601

Field 26N

This collection of Sandhill muhly is being evaluated for its potential as a variety release. This field of sandhill muhly was taken out of production in 2006. Seed of this accession is currently on inventory and may be used to plant a new production field in the future.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Action	2006 Date
Burn	1/27
Fertilizer 40 pounds phosphorous	2/10
Herbicide pre-emergent	3/3
Irrigation (3" applications)	4/6, 5/9, 6/9
Disc	10/2

Single Leaf Ash and Fragrant Ash

Study Number: NMPMC-P-9804-UR

Field 26S

Evaluation of these accessions of ash will continue in 2007 for possible release.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Action	2006 Date
Fertilizer 35 pounds nitrogen	1/27, 8/10
Irrigation 3" application	2/6, 3/21, 4/6, 5/5, 5/18, 6/5, 6/22, 7/13, 8/17, 9/21

IE Tobosa Planting

Study Number: NMPMC-P-8301-RA

Field 6

In 2006, culms of the six selected accessions were put into transplant containers. The transplants grown in 2006 were placed into a polycross block at the LLPMC. Seed produced from this block will then be used to complete the planting of a production field at the LLPMC. Work will progress on releasing tobosa as a conservation plant during the next few years.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Action – Field 6	2006 Date
Irrigation 3" application	2/28, 5/4, 6/13, 7/24
Mow	6/30

Advanced Planting of Needleandthread Grass

Study Number: NMPMC-S-9503-RA

Field 12

These accessions of needleandthread grass are being evaluated for a possible variety release by the LLPMC.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Action – Field 12	2006 Date
Fertilizer	
45 pounds nitrogen	1/9, 6/19
80 pounds phosphorous	1/9, 6/20
Irrigation 3" application	3/1, 4/11, 5/18, 6/21, 7/21, 10/2
Herbicide	
pre-emergent	3/29

Initial Evaluation Planting of Blowout Grass

Study Number: NMPMC-P-8501-RA

Field 20N

These accessions of blowout grass are being evaluated for a possible variety release by the LLPMC. No evaluations were made in 2006.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Action – Field 20N	2006 Date
Herbicide	
2,4-D	1/25, 8/19
pre-emergent	3/22
Irrigation 3" application	3/15, 4/24, 5/24, 6/7, 7/12, 8/17, 9/7, 11/21
Fertilizer	
70 pounds nitrogen	5/23, 6/19
45 pounds phosphorus	6/20

Inter-Center Strain Trials with Kingsville, TX

Study Number: NMPMC-P-0601-PA

Field 10

In 2006, the Kingsville, Texas Plant Materials Center (PMC) requested assistance in establishing inter-center strain trials of two species: windmillgrass (*chloris* spp.) and bristlegrass (*setaria* spp.). The LLPMC received seed and grew transplants of each species. The transplants were used

to establish small, survival evaluation plots. Unfortunately the bristlegrass seed was contaminated with a weedy species.

On September 8, 2006, four accessions of windmill grass were transplanted into a replicated plot in Field 10 at the LLPMC.

Windmill grass ICST				38" Row Center		10 Plants/Row			2' Spacing in Row		
283	301	313	260	313	260	283	301	260	301	283	313

2006 Treatments

Action – Field10	**2006 Date**
Transplant	9/8
Fertilizer	
40 pounds nitrogen	10/24
40 pounds phosphorus	10/24

Survival and growth will be evaluated in 2007.

Little Bluestem Polycross Increase Block

Study Number: NMPMC-P-0604-RA

Field 28S

In 2006, five accessions (9052954, 9062462, 9052963, 9052908, and 9061657) from the little bluestem IEP had culms dug from individual plants for producing containerized transplants. The culms produced plants that were used to install a polycross planting in Field 28S at the LLPMC. Seed from the polycross block will be used to start a seed increase production field at the LLPMC. The purpose of this study is to produce a conservation plant release of little bluestem.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Action – Field 28S	**2006 Date**
Transplant culms	3/8
Transplant polycross block	8/2
Irrigation 3" application	8/2, 8/10, 8/31, 9/11, 9/28, 11/1
Fertilizer	
40 pounds nitrogen	10/31

Tabosa Polycross Increase Block

Study Number: NMPMC-P-0602-RA

Field 28S

In 2006, six accessions (9009424, 9009413, 9009414, 9009419, 9009418, and 9009420) from the tabosa IEP had culms transplanted into containers. These culms produced plants that were used to install a polycross planting in G28S on the LLPMC. Seed from the polycross blocks will be used to start a seed increase productions field at the LLPMC. The purpose of this study is to produce a conservation plant release of tobosa grass.

2006 Treatment and Harvest

Weed control was performed throughout the growing season to keep the field clean and promote vigorous growth of the planting.

Action – Field 28S	**2006 Date**
Transplant culms	3/9
Transplant polycross block	8/2
Irrigation 3” application	8/2, 8/10, 8/31, 9/11, 9/28, 11/1
Fertilizer 40 pounds nitrogen	 10/31

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

By: David R. Dreesen[6]

Study Number: NMPMC-T-0601-WO

The purpose of this project is to establish a source of plant materials at the NRCS Plant Materials Center (PMC) at Los Lunas, New Mexico for the Cibola National Forest. These plant materials will consist of native riparian trees and shrubs as well as wetland plants that are ecotypes indigenous to areas undergoing watershed and ecosystem restoration within the Cibola National Forest including the Canadian River Salt Cedar Eradication Project and the Tajique Watershed Restoration Project. The types of containerized plant materials being produced at the PMC are tree, shrub, and wetland species from seed collected by US Forest Service personnel at these locations. Some of the seedlings produced have been installed in pole production blocks at the PMC to provide a long-term source of dormant pole cuttings.

Seedling Production

Seed was collected by US Forest Service personnel from the Canadian River watershed (Perico Creek, Seneca Creek, and Mills Canyon) and shipped to the PMC in late June of 2005. These seed included cottonwood, peachleaf willow, and coyote willow. By the end of the summer of 2005, 1750 cottonwood (see Figure CNF-1), 1800 peachleaf willow (see Figure CNF-2), and 300 coyote willow had been propagated in 10 cubic inch Super Cells. These materials were over-wintered (November 2005 through March 2006) in the cold-frame at the PMC.

[6] Agronomist/Horticulturist, Los Lunas Plant Materials Center, david.dreesen@nm.usda.gov

Figure CNF-1: Mills Canyon cottonwood seedlings growing in Super Cells, summer 2005

Figure CNF- 2: Mills Canyon peachleaf willow seedlings growing in Super Cells, summer 2005

In late July 2005, the seed from wetland plants species was collected within the Kiowa National Grasslands along the Canadian River and delivered to the PMC:

- 3 *Scirpus* (*pallidus, pungens*, and *validus*)
- 2 *Juncus* (*torreyi* and *interior*)
- *Eleocharis palustris*
- *Rumex altissimus*
- Chokecherry (*Prunus virginiana*)
- Western five-leaved ivy (*Parthenocissus inserta*)

The chokecherry (*Prunus virginiana*) seed was cold stratified for four months and brought into the greenhouse for germination; a total of about 900 seedlings were propagated in the spring of 2006 in 16-cubic-inch Deepots (see Figure CNF-3).

In late August 2005, the *Parthenocissus inserta* seed was wet-tumbled to remove dried fruit pulp and then warm stratified in anticipation of a following cold stratification treatment. The seed germinated immediately and was transplanted into Deepot 16's. Because of the late germination period, the seedlings were very small going into winter storage in the cold-frame and did not survive the winter.

Additional cottonwood and willow seed was collected around June 1, 2006. This seed was received at the PMC on June 28, 2006. By this time all of the willow seed had lost its viability, and most of the cottonwood seed was non-viable. Sufficient seed was obtained of Mills Canyon cottonwood (including a collection labeled "short raceme variety") to propagate approximately 500 seedlings in Super Cells.

Seed of waxflower (*Jamesia americana*) was collected from Red Canyon in the Manzano Mountains in the fall of 2005. The seed was cleaned and cold stratified. Approximately 200 Super Cells were propagated in the spring of 2006.

Germination tests of the wetland species investigated 6- and 12-week cold stratification periods; the *Rumex* did not require cold treatment for germination. Very poor germination was noted for all the wetland species except *Juncus* species which germinated fairly well in the 6 week cold treatment and *Scirpus pallidus* which germinated well after 12 weeks of cold treatment. This poor germination prompted scarification trials of the seed prior to stratification. The seed was wet tumbled with grit and pea gravel for six days prior to sowing; the scarified seed was subjected to 12 weeks of cold. Reasonable germination of *Scirpus pallidus* and *pungens* was observed with meager germination of *Scirpus validus* and *Eleocharis*. Based on the total seed availability, it should be possible to produce large numbers of *Scirpus pallidus* and *pungens*, but only small quantities of *Scirpus validus*, both species of *Juncus*, and *Eleocharis*.

Figure CNF- 3: Mills Canyon chokecherry seedlings growing in Deepot-16 containers late August 2006

Transplant Production

During the early spring of 2006, the peachleaf willow seedlings were infested with wooly root aphids which caused considerable loss of vigor for several hundred peachleaf willow seedlings. An effective insecticide drench (Orthene) was eventually found, but many of the most damaged plants succumbed. Enough seedlings remained with reasonable vigor to plant six rows of pole production (900 seedlings) as well as 160 one-gallon treepot transplants.

In the summer of 2006, Super Cell and Deepot 16 seedlings were transplanted into one-gallon treepots (4" x 4" x 14"). A total of 450 chokecherry (see Figure CNF-4), 400 cottonwood, 160 peachleaf willow, 200 coyote willow (see Figure CNF-5), and 160 waxflower seedlings were transplanted. These transplants were fertilized with 15 g of 17-6-12 controlled release fertilizer having a release period of three to four months. These transplants will require daily watering until their root systems become established; thereafter, every other day irrigation will be sufficient.

Most of these species will be ready for outplanting based on root ball integrity by the spring of 2008. Production of long-stem stock (4 – 7 feet) for deep planting into the capillary fringe above the water table might require one additional growing season.

Figure CNF-4: Mills Canyon chokecherry transplanted into one-gallon treepots, late August 2006.

Figure CNF-5: Mills Canyon cottonwood (left front row), peachleaf willow and coyote willow (right front row) transplanted into one-gallon treepots, late August 2006.

Installation of Pole Production Blocks

In mid-July, Super Cell seedlings were transplanted into flood irrigated production blocks for eventual production of dormant pole cuttings. A total of 14 rows were planted. Each row was 300 feet long with approximately 150 plants per row. The pole production blocks were prepared by:

- Discing
- Laser-leveling
- Ripping with a single shank ripper to breakup any hardpan in the planting row
- Installing 3-foot wide ground cover fabric to serve as a weed barrier
- Irrigating one day before planting
- Auguring planting holes at least 12" deep
- Applying 5 g of 17-6-12 controlled release fertilizer in each hole
- Inserting the seedling
- Backfilling with sufficient soil to fill all voids
- Irrigating a second time

These production blocks (see Figures CNF-6 and CNF-7) will be flood irrigated weekly as well as cultivated and hand weeded throughout the 2006 growing season.

Figure CNF-6: Pole production block of Mills Canyon cottonwood planted in July of 2006.

Figure CNF-7: Pole production block of Mills Canyon peachleaf willow planted in July of 2006.

These plants should approach 5- to 7-feet in height by late summer 2007, and small poles (~12 to 14 feet) of cottonwood and peachleaf willow should be available by the winter of 2008-2009. Coyote willow dormant whip cuttings (~6 to 9 feet) could be available by winter 2007-2008.

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

By: David R. Dreesen[7]

Study Number: NMPMC-T-0602-WO

The *purpose* of this project is to test *Dalea* species that establish naturally after burns to determine which species have potential for commercial seed production and are valuable as burn rehab species in the pinyon/juniper vegetation type in the Southwest. The USDA-NRCS Plant Materials Center (PMC) at Los Lunas will:

1. Test the candidate species for agronomic characteristics that would make them promising for commercial-scale production.
2. Produce sufficient quantities of seed for testing as a component in burn rehab seed mixtures.

The palatability and forage value of the species will be assessed to determine potential wildlife use. The *goal* of the PMC is to develop legume releases that will be requested by land managers and can be produced economically by commercial growers. This report covers the following topics:

- Seed germination and scarification treatments
- Field trials using plug seedlings
- Direct seeding into flats
- Optimizing vegetative growth
- Potential seed production and future plans
- Billing

Seed Germination

Dalea leporina seed was collected by Ralph Pope on October 7, 2005 from the edge of the ball fields behind the US Forest Service Office in Silver City, NM. The seed was cleaned by the PMC and yielded:

- 41.8 g of seed greater than 1/18" sieve
- 3.6 g smaller than 1/18" and larger than 1/25"

Many of the seeds were damaged by miniature weevil infestation. To kill any weevils that might emerge, the cleaned seed was treated with Sevin powder.

[7] Agronomist/Horticulturist, Los Lunas Plant Materials Center, david.dreesen@nm.usda.gov

Scarification Treatments
Scarification treatments were tested to determine methods to provide a complete and rapid germination of seed in greenhouse or seed production field plantings. To disrupt the hard seed coat of this legume species, the two types of treatments tested were hot water and percussion.

- Hot water treatments–The hot water treatments involved heating water in a beaker to the desired temperature, immersing a known quantity of seed, removing the beaker from the hot plate, letting the water cool several hours before separating the seed, and then sowing in a pot containing soil-less mix.
- Percussion treatments–Duplicate percussion treatments (A and B) both involved shaking a known small quantity of seed vigorously in a plastic bottle for approximately one (1) minute.

The number of plants that emerged was evaluated periodically for 3½ months to determine germination percentages. Hot water at 80º to 85º C resulted in rapid and almost complete germination. The maximum germination of about 60% probably resulted from weevil damage to approximately 40% of the seed. The control and 25º C water treatments allowed only about 10 to 15% of the viable seed to germinate rapidly. The boiling water treatment killed the seed while the 90º C water reduced germination somewhat relative to the best hot water treatments. The percussion treatments eventually yielded almost complete germination after 2 months; germination was delayed appreciably with only about 50% of the viable seed germinating after 2 to 3 weeks. These data are summarized in Table GNF-1.

Table GNF-1. **Germination of *Dalea leporina* seed from the Gila National Forest after various scarification treatments.**

Treatment	% germinated after 4 days	% germinated after 19 days	% germinated after 64 days	% germinated after 102 days
None "Control"	7	9	12	14
25º C water	9	10	14	14
75º C water	33	38	38	39
80º C water	54	57	57	59
85º C water	54	56	56	56
90º C water	43	49	49	49
boiling water	0	0	0	0
percussion A	12	36	50	52
percussion B	5	33	47	56

Field Trial Established with Plug Seedlings
Plug seedlings of *Dalea leporina* were produced in two types of deep plug trays:

- Plantel plug tray with 341 cells each 0.75" x 0.75" x 2.5"
- Beaver Plastics Styroblock #1 with 448 cells each 0.7" x 0.7" x 2.8".

We tested the Styroblock tray because its insulation properties might reduce root temperatures while the plug seedlings were hardened in the nursery in late May and early June. On April 27, 2006, two batches of seed (one containing approximately 1100 seed and the other 900 seed [viable seed of about 700 and 550 seed, respectively]) were hot water treated at 85º C. After the water had cooled, the moist seed was dispersed in a soil-less medium of peat moss and perlite, and the same medium was used to fill the plug cells. The seed and medium mixture was

uniformly spread over each plug tray; the larger batch over the Styroblock tray and the smaller batch over the Plantel tray. The seed was then covered with a thin layer of medium (~⅛") and then micro-sprinkler irrigated daily. Emergence occurred within two to three days. The seedlings were grown in the greenhouse until early June and then hardened off in the nursery until the field planting date of June 14, 2006.

Two rows were formed in Field 35N in sandy-loam soil. Each row, approximately 350 feet long, had a 36-inch-wide kraft paper (40 lb type) mulch applied as a weed barrier. On June 14, 2006, the paper was perforated with a sharpened soil corer to create a one-inch hole and then a dibble the size of root plug was inserted into the soil. The plug seedlings were about 3- to 4-inches tall and very slender with minimal leaf area; many plugs contained more than one seedling (see Figures GNF-1a and GNF-1b). After all of the plugs were planted, the field was flood irrigated twice a week for three weeks, and then weekly thereafter except during periods of high rainfall.

Figure GNF-1a: Styroblock plug tray with residual *Dalea leporina* seedlings, 70 days after field planting date.

On August 23, 2006, a final stand count was conducted. The west row had 65 plant units, and the east row had 116 plant units; in many instances there was more than one plant per unit. Approximately 300 plugs were planted in each row. The poor survival rate may be partially due to moisture stress. The survival rate was higher for the plants located closer to the irrigation riser (88 plant units) than at the far end (48 plant units).

The east row was planted with plug seedlings primarily from the Plantel tray while the west row seedlings were grown in the Styroblock tray. One possible reason for the difference in survival between the two rows might involve more damage occurring to the Styroblock plug roots as they were extracted from the tray. The paper mulch was somewhat effective in restricting weed growth. The mulch lost some integrity after the first few waterings. The degradation rate seemed to slow down after the first few weeks; the mulch was still fairly well intact as of late August.

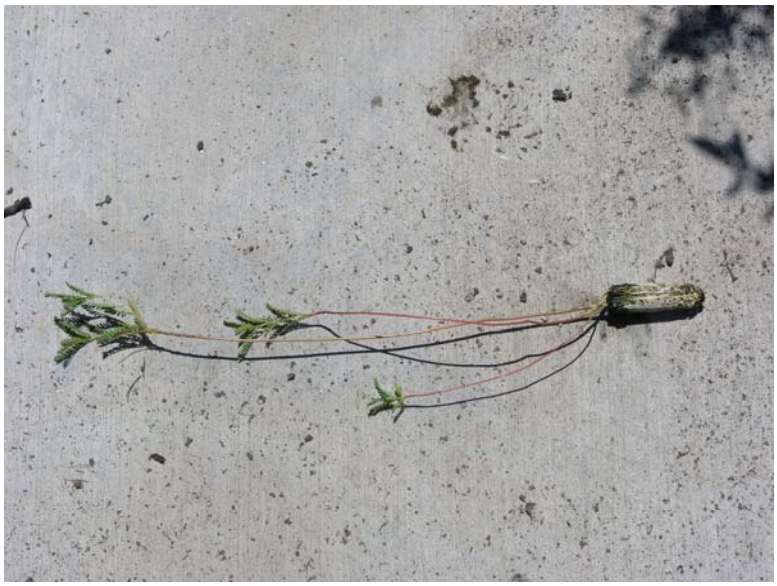

***Figure GNF-1b*:** Residual plug seedling of *Dalea leporina*, 70 days after field planting date.

Figure GNF-2 shows plant density and plant size in late August for *Dalea leporina* in the moister end of the field.

Figure GNF-2: *Dalea leporina* rows in the field, 70 days after planting plug seedlings.

Three plants (Samples A, B, and C) were dug up at random from the rows and measured and dried for dry matter production (see Figure GNF-3). Root crowns were harvested (see Figure GNF-4) for dry weight measurements and to examine for nitrogen-fixing nodule presence. These data are presented in Table GNF-2. The large discrepancies in shoot-to-root ratios reflects the root crown containing variable but significant amounts of soil as well as the inconsistent harvest of roots among samples. All of the root samples had substantial numbers of small nitrogen-fixing nodules on the fine (tertiary) roots. The shoot samples will be submitted for forage analysis.

Figure GNF-3: Shoot measurement of *Dalea leporina* plant, 70 days after planting plug seedlings (36" ruler underneath plant).

***Figure GNF-4*:** Root sample of *Dalea leporina* plant, 70 days after planting plug seedlings.

Table GNF-2. **Height, width, caliper and dry matter production of *Dalea leporina* samples 70 days after planting plug seedlings in the field.**

	Sample A	**Sample B**	**Sample C**
Height (cm)	68	74	69
Width (cm)	67	59	71
Caliper (cm)	1.73	1.07 and 1.27	1.42
Shoot Fresh Weight (g)	370	270	270
Dry Matter Shoots (g)	110	74	71

Table GNF-2. **Height, width, caliper and dry matter production of *Dalea leporina* samples 70 days after planting plug seedlings in the field.**			
	Sample A	**Sample B**	**Sample C**
Dry Matter Roots (g)	20	37	42
Shoot/Root Ratio	5.5	2.0	1.7

Direct Seeding Into Flats

Because of the poor survival rate in the field planting of plug seedlings, some small-scale tests of direct seeding were carried out in flats (16" x 16" x 5") containing a 3-inch layer of sandy-loam field soil. At the time this study was started, it was assumed that direct sowing would have to involve imbibed seed following hot water treatment. Sowing imbibed seed would require the seed to be mixed with a moist soil-less mix to prevent the seed from desiccating, to protect the swollen seed from mechanical damage, and to provide optimum aeration and moisture. This method would be similar to plug-mix planters used in the vegetable industry to sow a mix of seed and soil-less mix.

The amount of soil-less mix was varied in this study by forming miniature furrows of three different depths in three individual soil-filled flats: 0.25", 0.5" and 0.8" deep. The furrows were filled with a moist plug-mix (sieved-composted-bark nursery medium) incorporating hot water scarified seed. The control flat with a 0.25" furrow was sown with seed that had been vigorously shaken in a glass test tube for one minute; the seed furrow was then covered with field soil. The flats were evaluated 12 and 28 days after sowing the seed. By setting the 0.25" plug-mix furrow emergence at 100%, the 0.5" plug mix, 0.8" plug-mix, and 0.25" soil-only treatments had relative emergence values of 80%, 71%, and 85%. As expected, the deeper furrows buried some seed too deep to emerge. The vigor of the plants varied drastically among the treatments with the deeper plug-mix treatments having the most vigorous plants (see Figure GNF-5).

***Figure GNF-5*:** Soil furrow treatments for direct-sown *Dalea leporina* seed, 50 days after sowing. Treatments left to right: plug-mix 0.8-inches deep, plug-mix 0.5 inches deep, plug mix 0.25 inches deep, and soil furrow 0.25 inches deep.

The percussion treated seed had a much higher, early germination rate than the earlier germination tests of percussion. It is assumed that the hard-glass test tube imparted more force on the seed coat than the plastic bottle in the earlier tests. This outcome indicates that through manipulation of percussive forces, germination rates and percentages could be altered. This technique might have application in wild-land seeding to manipulate the timing of germination.

The poor survival rate of plug seedlings in the field planting prompted a test of an alternative seed production method. The use of beds filled with a nursery mix (composted bark-pumice-peat moss medium) possibly could enhance growth and might result in sufficient seed production per unit area to justify such an intensive cultural practice. On July 13, 2006, a nursery bed 80 inches long and 32 inches wide was filled with about 10 inches of nursery mix and sown with approximately 550 hot water treated viable seed incorporated into moist nursery mix. The seed mix layer was covered with a thin covering (~3/16") of additional mix to assure seed burial. Although the emergence percentage was low, sufficient seedlings developed to produce a dense stand (see Figure GNF-6). The seed production from this bed will determine whether such an intensive culture is justified.

Figure GNF-6: Direct-sown *Dalea leporina* in nursery bed 46 days after seeding (wood side panel measures 11-inches tall).

Optimizing Vegetative Growth

The PMC has never grown an annual *Dalea* for seed production, so it was necessary to determine what cultural factors might be optimized to promote vegetative growth and enhanced seed production. The two factors that could be tested on a small scale were soil influences and fertilizer treatments.

Soil Influences

Two extremes of soil types were evaluated: a sandy-loam field soil versus a soil-less mix of composted bark, pumice, and peat moss. Some of the plug seedlings from the field planting were planted into Styroblocks with one-gallon cells. Two blocks were filled with field soil, and one block was filled with nursery mix (composted bark, pumice, peat moss).

Fertilizer Treatments
The 16 soil-filled cells received four fertilizer treatments: control, 2 g, 5 g, and 15 g of 17-6-12 controlled release fertilizer with 3- to 4-month release period (see Figure GNF-7). Each treatment was applied randomly to four cells. The eight cavities containing the nursery mix had fertilizer treatments of 2 g, 5 g, 10 g, and 15 g.

Three of the four plants in each fertilizer treatment of the soil-filled blocks were harvested 55 days (replicates #1 and #2) and 63 days (replicate #3) after planting. These samples will be submitted for relative feed value analysis. The dimensions and dry matter of the plants are presented in Table GNF-3. The roots were also harvested to determine dry matter and assess the presence of nitrogen-fixing nodules (e.g. *Rhizobium*). The lack of effect of nutrient additions on vegetative growth may result from the variable quantities of nitrogen-fixing nodules being present that overwhelmed the effect of any fertilizer. Observations of nodules indicate their presence on all but one of the root samples, but no sample had a large mass of nodules.

The plants grown in the nursery canning mix and in the remaining replicate of the soil filled block will be grown to maturity to determine nutrient level effects on seed production.

Table GNF- 3. **Caliper, height, fresh weight, and dry matter production of *Dalea leporine* grown at four fertilizer levels in sandy loam soil.**

Treatment	Caliper (cm)	Height (cm)	Fresh Weight (g)	Above-ground Dry Matter (g)	Below-ground Dry Matter (g)	Shoot/ Root Ratio
Control #1	0.59	56	32.06	8.60	1.21	7.1
Control #2	0.81	52	62.14	16.27	na	
Control #3	0.83	60	56.52	19.14	3.26	5.9
2 g CRF #1	0.61	52	29.55	8.63	1.84	4.7
2 g CRF #2	0.77	58	47.87	12.58	na	
2 g CRF #3	0.77	62	48.42	16.85	3.46	4.9
5 g CRF #1	0.65	54	30.34	7.87	1.27	6.2
5 g CRF #2	0.75	58	46.44	12.04	na	
5 g CRF #3	0.80	61	57.78	18.85	4.05	4.7
15 g CRF #1	0.75	59	50.02	13.28	2.22	6.0
15 g CRF #2	0.78	56	50.17	13.31	na	
15 g CRF #3	0.76	53	45.93	15.15	3.73	4.1

Potential Seed Production and Future Plans
It appears that flowering will occur in September for the field and nursery bed planting; viable seed may not be produced until late October. The large, vegetative size of the field grown plants with numerous branches is an indication that there is a high potential for many seedheads to be produced per plant.

After seed yields are determined and the success of direct seedling trials are known, it will be possible to determine whether future field production of *Dalea leporina* should be accomplished by direct seeding or by transplanting plug seedlings.

Grand Canyon National Park

By: Danny Goodson[8]

Study Numbers: NMPMC-S-9101-OT

Background

In July 1990, an agreement among the US Department of Interior (DOI), the National Park Service (NPS), the Grand Canyon National Park (GCNP), and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) was made for the collection, propagation, and increase of native grasses, forbs, shrubs, and trees.

The agreement states that the LLPMC will produce the plant materials for the GCNP for the purpose of revegetating disturbed areas and native landscaping projects in the park. The agreement includes both the north and south rim areas of the park. Amendment No. 1 of 1999 and Amendment No. 2 of 2001 states that the LLPMC will produce seed of two native species (blue grama and muttongrass), and will grow transplants started from native tree and shrub seed collected at the park. In 2006, the LLPMC agreed to add bottlebrush squirreltail to the list of grass species that are to grown for seed production.

Accessions Involved

Table GCNP-1 lists the accessions involved in the GCNP project.

Table GCNP-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number	Vegetation Association
Apache plume	*Fallugia paradoxa*	FAPA	9062865	122.3233
Big sagebrush	*Artemisia tridentata*	ARTR	9066056	122.3233
Blue grama	*Bouteloua gracilis*	BOGR	9062875	122.4149
Bottlebrush squirreltail	*Elymus elymoides*	ELEL	9066659	122.3233
Century plant	*Agave utahensis*	AGUT	9062874	122.4149
Cliffrose	*Purshia mexicana*	COME	9062876	122.4149
Curl-leaf mountain mahogany	*Cercocarpus ledifolius*	CELE	9062867	122.3233
Currant	*Ribes spp.*	RI SPP.	9066057	122.3233
Datil yucca	*Yucca baccata*	YUBA	9066058	122.3233
Desert barberry	*Berberis fremonti*	BEFE	9066059	122.3233
Elderberry	*Sambucus spp.*	SA SPP.	9066047	122.3233
Fernbush	*Chamaebatiaria millifollium*	CHMI	9062866	122.3233
Fourwing saltbush	*Atriplex canescens*	ATCA	9062873	122.4149
Gambels oak	*Quercus gambelii*	QUGA	9062872	122.3233
Indian ricegrass	*Oryzopsis hymenoides*	ORHY	9062857	122.3233
Lupine	*Lupinus spp.*	LU SPP.	9062863	122.3233

[8] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

Table GCNP-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number	Vegetation Association
Muttongrass	*Poa fendleriana*	POFE	9062861	122.3233
Needle and thread	*Stipa comata*	STCO	9062859	122.3233
Penstemon (blue)	*Penstemon spp.*	PE SPP.	9062862	122.3233
Penstemon (red)	*Penstemon spp.*	PE SPP.	9066054	122.3233
Pinon pine	*Pinus edulis*	PIED	9066467	122.3233
Ponderosa pine	*Pinus ponderosa*	PIPO	9066466	122.3233
Rabbitbrush	*Chrysothamnus nauseosus*	CHNA	9062877	122.4149
Squirreltail	*Sitanion hysterix*	SIHY	9062858	122.3233
Utah juniper	*Juniperus osteosperma*	JUOS	9066055	122.3233
Utah serviceberry	*Amelanchier utahensis*	AMUT	9062869	122.3233
Western wheatgrass	*Agropyron smithii*	AGSM	9062860	122.3233
Wolfberry	*Lycium spp.*	LY SPP.	9062870	122.3233

Collection Information

In 2006, seed of bottlebrush squirreltail was collected at GCNP and sent to the LLPMC.

Seed Condition Information

The bottlebrush squirreltail seed received by the LLPMC was in good condition and will be used to grow transplants to establish a seed production field. See previous Grand Canyon Park reports for information on seed received by the LLPMC.

Seed Production Establishment

See Table GCNP-2 for the seed production fields established for the GCNP at the LLPMC.

Table GCNP-2: 2006 Established Production Fields

Common Name	*Scientific Name*	Agreement Acreage	2006 LLPMC Acreage
Blue Grama	*Bouteloua gracilis*	0.50	0.54
Muttongrass	*Poa fendleriana*	1.00	2.40
Bottlebrush squirreltail	*Elymus elymoides*	0.50	0.48

Seed Production

A. **Field Management**

9062875 Blue grama **Field 20N – 0.5 Acre** **Date**

Fertilization

75 lbs. Nitrogen 1/5, 5/23, 6/19

80 lbs. Phosphorous 1/5, 6/20

Irrigation

3" water application 3/15, 4/24, 5/24, 6/7, 7/12, 8/17, 9/7, 11/21

Insecticide

Orthene @ 1.33 pounds per acre 8/16, 9/5

Cultural Weed Control

9062875 Blue grama	**Field 20N – 0.5 Acre**	**Date**
Hand Hoeing		As needed
Harvest		
Combine		9/6

9062875 Blue grama	**Field 28S –0.5 Acre**	**Date**
Transplant		8/31
Fertilization		
40 lbs. Nitrogen		10/31
Irrigation		
3" water application		8/31, 9/5, 9/11, 9/19, 11/1, 11/20
Cultural Weed Control		
Hand Hoeing		As needed
Cultivate		11/16

9062861 Muttongrass	**Field 20N – 0.5 Acre**	**Date**
Transplant		4/20
Fertilization		
70 lbs. Nitrogen		5/23, 10/31
Irrigation		
3” water application		4/20, 4/24, 4/27, 5/1, 5/10, 5/18, 5/24, 5/30, 6/2, 6/6, 6/19, 7/12, 7/24, 8/8, 8/10, 8/17, 8/31, 9/12, 9/26, 10/19, 11/21
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		6/26

9062861 Muttongrass	**Field 25S – 0.9 Acre**	**Date**
Fertilization		
155 lbs. Nitrogen		2/10, 3/14, 6/19, 8/10, 10/31
80 lbs. Phosphorous		2/10, 6/20
Irrigation		
3” water application		1/6, 2/7, 3/17, 4/7, 4/24, 5/18, 6/6, 6/22, 7/13, 8/11, 9/1, 9/19, 10/5, 10/19, 11/1, 11/21
Herbicide Application		
2,4-D		3/15, 7/7
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		5/16, 7/5, 8/17
Harvest		
Combine		

9062861 Muttongrass	**Field 28S – 1.0 Acre**	**Date**
Transplant		9/6, 9/26
Fertilization		
40 lbs. Nitrogen		10/31
Irrigation		
3” water application		9/6, 9/11, 9/19, 9/26, 10/2, 10/19, 10/31, 11/20
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		11/16

B. **Seed Produced**

Table GCNP-3 describes the seed production for the year 2006.

Table GCNP-3: 2006 Seed Production

Common Name	Scientific Name	Pounds Cleaned
Blue grama	*Bouteloua gracilis*	35.46
Muttongrass	*Poa fendleriana*	No harvest

C. **Climatological Data**

See Appendix A for the climatological data for 2006 at the Los Lunas Plant Materials Center.

Transplant Production

No transplants were delivered to GCNP in 2006.

Specialized Treatments

See previous Grand Canyon National Park reports for information on specialized treatments.

Observations

The blue grama and muttongrass fields showed vigorous growth during the 2006 growing season. The production of a good, viable seed crop from these fields continues to be the goal of the LLPMC. The use of increased irrigation applications along with higher rates of fertilizer has led to improved amounts of both forage and seed production of both species since installing the plantings. Increasing the irrigation applications on the muttongrass has allowed the plants to produce abundant forage and has kept the plants from being damaged during the warmest time of the season.

The blue grama field will continue to have insecticide applications to control insects that can lower seed yields. In 2006 the blue grama field also received increased irrigation and high levels of nutrients to promote good seed production. The blue grama field responded to the higher levels of water and nutrients producing the highest amount of seed ever for this planting.

The muttongrass seed fields also produced a good amount of forage and seed for 2006, but just prior to harvest the LLPMC experienced several days of high winds that caused the majority of the seed to be lost. The seed was shattered by the high winds and no harvest was completed on any of the muttongrass fields.

Figure GCNP-1: Field 25S – Grand Canyon muttongrass seed production field.

Figure GCNP-2: Field 20N – Grand Canyon blue grama production field.

Pipe Spring National Monument

By: Danny Goodson[9]

Study Numbers: NMPMC-S-9101-OT

Background

On September 12, 2002, an agreement among the US Department of Interior (DOI), the National Park Service (NPS), the Pipe Spring National Monument (PSNM), and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) was made for propagating and harvesting native seed collected from the PSNM for the purpose of revegetation projects.

Accessions Involved

Table PSNM-1 lists the accessions involved in the PSNM agreement.

Table PSNM-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number
Blue Grama	*Bouteloua gracilis*	BOGR	9066558
Bottlebrush squirreltail	*Elymus elymoides*	ELEL	9066587
Galleta	*Pleuraphis jamesii*	PLJA	9066559
Indian ricegrass	*Achnatherum hymenoides*	ACHY	9066587

Collection Information

See previous PSNM reports for collection information.

Seed Condition Information

See the previous PSNM for seed condition information collected from the PSNM.

Seed Production Establishment

- Blue grama–No blue grama seed was available in 2006 to establish a seed production field.
- Indian ricegrass– The indian ricegrass that was direct seeded into Field 13 on December 21, 2005 was not successful. No new seeding has been scheduled for 2007.
- Galleta-Seed harvested from the LLPMC production field in 2005 was used to start transplants in 2006. The transplants were planted into Field 16 at the LLPMC on 5/25/2006.

See Table PSNM-2 for the established production fields for the PSNM at the LLPMC.

Table PSNM-2: 2006 Established Production Fields

Common name	Scientific name	Agreement Acreage	2006 LLPMC Acreage
Galleta	*Pleuraphis jamesii*	0.50	0.58
Indian ricegrass	*Acnatherum hymenoides*	0.50	0.42
Bottlebrush squirreltail	*Elymus elymoides*	0.50	0.22

[9] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

Seed Production

A. **Field Management**

9066559 Galleta	**Field 26S – 0.10 Acre**	**Date**
Fertilization		
35 lbs. Nitrogen		1/27, 8/10
40 lbs. Phosphorous		1/27
Irrigation		
3” water application		2/7, 4/7, 4/24, 5/16, 6/9, 6/21, 7/13, 9/7, 10/26
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		6/6, 7/5
Harvest		
Flail-vac		10/3, 11/1

9066559 Galleta	**Field 16 – 0.50 Acre**	**Date**
Transplant		5/25
Fertilization		
30 lbs. Nitrogen		8/10
Irrigation		
3” water application		5/25, 5/30, 6/2, 6/6, 6/16, 7/13, 7/24, 9/11, 10/5
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		6/15, 8/25

9066587 Indian ricegrass	**Field 8 – 0.25 Acre**	**Date**
Fertilization		
70 lbs. Nitrogen		1/10, 3/14, 8/10
40 lbs. Phosphorous		1/10
Irrigation		
3” water application		1/12, 3/17, 4/11, 5/1, 5/19, 6/13, 7/14, 9/13, 10/30
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		6/6, 8/9

9066590 Bottlebrush squirretail	**Field 23N – 0.22 Acre**	**Date**
Fertilization		
135 lbs. Nitrogen		1/27, 4/21, 5/23, 8/10, 10/31
40 lbs. Phosphorous		1/27

9066590 Bottlebrush squirretail Field 23N – 0.22 Acre	**Date**
Irrigation	¼, 2/14, 3/14, 4/7, 4/24, 5/10, 5/9, 6/23, 7/14,
3" water application	8/10, 9/1, 9/9, 10/5, 10/19, 11/2, 11/21
Herbicide application	
2,4-D	3/3, 7/7
Cultural Weed Control	
Hand hoeing	As needed
Mechanical cultivation	3/14, 5/16, 7/5, 8/30

B. **Seed Produced**

Table PSNM-3 describes the seed production for the year 2006.

Table PSNM-3: Seed Production in 2006

Common name	**Scientific name**	**Pounds Cleaned**
Galleta	*Pleuraphis jamesii*	3.08
Indian ricegrass	*Acnatherum hymenoides*	40.96
Bottlebrush	*Elymus elymoides*	None

C. **Climatological Data**

See Appendix A for the climatological data for 2006 at the Los Lunas Plant Materials Center.

Transplant Production

Transplant production is not part of this agreement.

Specialized Treatments

See the previous Pipe Spring National Monument report for information on specialized treatments.

Observations

On May 5, 2006 a ½-acre field of PSNM galleta was transplanted into Field 16 at the LLPMC. The transplants were grown using seed produced from the small seed production block in Field 26S in 2005. A small quantity of seed was produced in 2006 from the galleta, and it will be harvested in 2007. The PSNM bottlebrush squirreltail field produced only a very small amount of seed in 2006. Seed will be harvested from the squirreltail in 2007. The PSNM indian ricegrass field did produce a good crop of seed in 2006, and it should produce as much or more seed in 2007.

Figure PSNM-1: Field 8 – Pipe Spring indian ricegrass production field.

Figure PSNM-2: Field 26S – Pipe Springs galleta production field.

Figure PSNM-3: Pipe Spring – Field 16 contains galleta production field.

Figure PSNM-4: Pipe Spring – Field 23N contains bottlebrush squirreltail production field.

Zion National Park

By: Danny Goodson[10]

Study Numbers: NMPMC-S-9101-OT

Background

On September 12, 2002, an agreement among the US Department of Interior (DOI), the National Park Service (NPS), Zion National Park (ZNP), and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) was made for the collection of native seed from the ZNP, the propagation of those seeds at the LLPMC, and the increase of native grass species.

The agreement states that ZNP will use the plant materials produced by the LLPMC to revegetate disturbed areas at the park. The seed will be collected by the park staff and sent to the LLPMC for conditioning. The seed then will be used to establish production fields to satisfy the agreement.

Accessions Involved

Table ZNP-1 lists the accessions involved in the ZNP project.

Table ZNP-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number
Blue grama	*Bouteloua gracilis*	BOGR	9066530
Bottlebrush squirreltail	*Elymus elymoides*	ELEL5	9066532
Cane bluestem	*Bothrichloa barbinodis*	BOBA	9066543
Galleta	*Pleuraphis jamesii*	PLJA	9066586
Indian ricegrass	*Acnatherum hymenoides*	ACHY	9066528
Muttongrass	*Poa fendleriana*	POFE	9066531
Sand bluestem	*Andropogon hallii*	ANHA	9066529

Collection Information

See previous ZNP reports for collection information prior to 2006.

Seed Condition Information

See previous Zion National Park reports for the seed condition information prior to 2006.

Seed Production Establishment

The LLPMC established the following seed production fields:

- Bottlebrush squirreltail– On May 9, 2006, ZNP bottlebrush squirreltail seedling transplants that were started and grown at the LLPMC were planted in Field 19, increasing the production field size from 0.58 to 0.59 acres.

[10] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

- Galleta– On June 16, 2006, ZNP galleta seedling transplants that were started and grown at the LLPMC were planted in Field 24S, increasing the production field size from 0.35 to 0.60 acres.

See Table ZNP-2 for the seed production fields established for ZNP at the LLPMC.

Table ZNP-2: 2006 Established Production Fields

Common name	Scientific name	Agreement Acreage	2006 LLPMC Acreage
Sand bluestem	*Andropogon hallii*	0.50	0.50
Cane bluestem	*Bothriochloa barbinodis*	0.50	0.50
Bottlebrush squirreltail	*Elymus elymoides*	0.50	0.59
Galleta	*Pleuraphis jamesii*	0.33	0.55
Muttongrass	*Poa fendleriana*	0.50	0.50
Indian ricegrass	*Acnatherum hymenoides*	0.50	0.42

Seed Production

A. **Field Management**

9066543 Cane bluestem	**Field 21S – 1.1 Acre**	**Date**
Fertilization		
115 lbs Nitrogen		1/5, 6/19, 8/10, 11/21
80 lbs. Phosphorous		1/5, 6/20
Irrigation		
3” water application		4/25, 5/18, 6/2, 6/21, 7/10, 8/25, 9/11
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical		5/15, 9/15
Cultivation		
Harvest		
Flail-Vac		7/21, 10/25

9066529 Sand bluestem	**Field 25S, 27N – 0.50 Acre**	**Date**
Fertilization		
120 lbs. Nitrogen		1/23, 6/28, 11/21
110 lbs. Phosphorus		1/23, 6/26
Irrigation		
3” water application		1/4, 2/3, 3/14, 4/4, 4/19, 4/27, 5/1, 5/9, 5/23, 6/2, 6/9, 6/15, 6/29, 7/13, 8/10, 9/5, 9/21, 10/19, 11/27
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical		4/24, 5/23
Cultivation		
Harvest		
Flail-Vac		9/14

9066532 Bottlebrush Squirreltail	**Field 19 – 0.59 Acre**	**Date**
Transplanted 0.1 acre		5/9
Fertilization		
120 lbs. Nitrogen		2/27, 4/27, 6/29, 10/24
40 lbs. Phosphorous		2/27
Irrigation		
3” water application		1/6, 2/28, 3/20, 4/12, 4/28, 5/9, 5/12, 5/24, 6/16, 7/20, 9/25, 11/20
Herbicide Application		
2,4-D		4/12, 6/30, 9/1
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		2/28, 4/27, 7/5, 8/18
Harvest		
Flail-vac		6/1, 6/9

9066528 Galleta	**Field 35N – 0.10 Acre**	**Date**
Fertilization		
35 lbs. Nitrogen		1/11, 4/211/6, 4/21, 8/10
40 lbs. Phosphorus		1/11
Irrigation		
3” water application		2/17, 4/7, 4/24, 5/18, 6/9, 6/30, 7/25, 8/17, 9/5, 10/19
Herbicide Application		
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		5/10, 6/6, 7/5, 8/17
Harvest		
Flail-vac harvester		6/1, 10/4

9066586 Galleta	**Field 24S – 0.50 Acre**	**Date**
Transplanted		6/15
Fertilization		
65 lbs Nitrogen		1/6, 4/21, 8/10
40 lbs. Phosphorous		1/6
Irrigation		
3” water application		2/14, 4/12, 4/21, 5/12, 5/24, 6/7,
Herbicide Application		6/15, 6/22, 6/30, 7/12, 7/25, 9/5
2,4-D		11/22 3/3, 7/7
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		5/10, 6/6, 7/5, 8/17
Harvest		

9066586 Galleta	**Field 24S – 0.50 Acre**	**Date**
Flail-vac Harvester		6/1, 10/4

9066531 Muttongrass	**Field 35S – 0.50 Acre**	**Date**
Fertilization		
150 lbs Nitrogen		1/23, 3/14, 4/21, 6/19, 10/31
40 lbs. Phosphorous		1/23
Irrigation		
3” water application		1/4, 2/17, 3/17, 4/7, 4/24, 5/10, 5/9, 6/23, 7/14, 8/10, 9/1, 9/9, 10/5, 10/19, 11/2, 11/21
Herbicide Application		
2,4-D		3/15, 7/7
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		5/16
Harvest		
Flail-vac harvester		6/22

9066528 Indian ricegrass	**Field 35N – 0.41 Acre**	**Date**
Fertilization		
40 lbs. Nitrogen		1/23, 3/14
40 lbs. Phosphorus		1/23
Irrigation		
3” water application		2/17, 3/17, 4/7, 4/24, 5/10, 5/22, 6/13, 7/19, 9/12, 10/20
Herbicide Application		
2,4-D		3/15, 5/22
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		6/6, 8/23
Harvest		
Flail-vac harvester		5/19, 5/22, 6/8

B. **Seed Produced**

Table ZNP-3 describes the seed production for the year 2006.

Table ZNP-3: 2006 Seed Production

Common name	**Scientific name**	**Pounds bulk**
Bottlebrush squirreltail	*Elymus elymoides*	28.72
Cane bluestem	*Bothriochloa barbinodis*	2.14
Galleta	*Pleuraphis jamesii*	1.76
Indian ricegrass	*Acnatherum hymenoides*	53.10
Muttongrass	*Poa fendleriana*	1.84
Sand bluestem	*Andropogon hallii*	14.06

C. **Climatological Data**

See Appendix A for the climatological data for 2006 at the Los Lunas Plant Materials Center.

Transplant Production

Transplants are not part of this agreement.

Specialized Treatments

See previous Zion National Park reports for information on specialized treatments.

Observations

During the 2006 season, the following observations were made for the ZNP agreement:

- Blue grama – There is not any blue grama production blocks established at the LLPMC.
- Sand bluestem **–** In 2006, seed was harvested from the LLPMC production field.
- Bottlebrush squirreltail – Seed was harvested in 2006 from Field 19 at the LLPMC. Seed produced in 2005 at the LLPMC was used to start and grow seedling transplants at the LLPMC to increase the seed production block from 0.58 to 0.59 acres.
- Galleta – In 2006, seed produced in Field 35N at the LLPMC was used to start and grow seedling transplants to increase the seed production from .33 to 0.50 acres.
- Indian ricegrass – In 2006 seed was harvested from the production field at the LLPMC.
- Muttongrass **–** In 2006, only a small amount of seed was harvested from the production field at the LLPMC. Most of the seed was sheltered during several days of high winds just prior to harvesting.

Figure ZNP-1: Field 19 –Bbottlebrush squirreltail production field

Figure ZNP-2: Field 21S – Cane bluestem production field.

Figure ZNP-3: Field 27N – Sand bluestem production field.

Figure ZNP-4: Field 25S – Sand bluestem production field.

Figure ZNP-5: Field 35N – Indian ricegrass production field.

Figure ZNP-6: Field 35N – Galleta production field.

Figure ZNP-7: Field 24S – Galleta production field.

Figure ZNP-8: Field 24S – Galleta production field 2006 transplanting.

Hubbell Trading Post National Historic Site

By: Danny Goodson[11]

Study Numbers: NMPMC-S-9101-OT

Background

On August, 13, 2002 an agreement among the US Department of Interior (DOI), the National Park Services (NPS), the Hubbell Trading Post National Historic Site (HTPNHS), and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) was made to produce plants and cuttings of native species for the HBPNHS.

Accessions Involved

Table HTPNHS-1 lists the accessions involved in the HTPNHS project.

Table HTPNHS-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number
Banana yucca	*Yucca baccata*	YUBA	9066409
Boxelder	*Acer negundo*	ACNE2	9066468
Desert false indigo	*Amorpha fruticosa*	AMFR	9066114
Fourwing saltbush	*Atriplex canescens*	ATCA2	478838
Fremont cottonwood	*Populus fremontii*	POFR2	9066457
Fremont mahonia	*Mahonia fremontii*	MAFR3	9066439
Golden currant	*Ribes aureum*	RIAU	9066545
New Mexico Locust	*Robinia neomexicana*	RONE	9066428
Prairie sagewort	*Artemisia frigida*	ARFR4	9066234
	Quercus pauciloba	QUPA4	9066437
Sacahuista	*Nolina microcarpa*	NOMI	9066469
Skunkbush sumac	*Rhus trilobata*	RHTR	483445
Squawapple	*Peraphylium ramosissimum*	PERA4	9066549
Squawthom	*Lycium torreyi*	LYTO	9066430
Stretchberry	*Forestiera pubescens*	FOPUP	9004570
Utah agave	*Agave utahensis*	AGUT	9066408
Utah serviceberry	*Amelanchier utahensis*	ANTUT	9066397
Winterfat	*Krascheninnikovia lanata*	KRLA2	9066471
Woods' rose	*Rosa woodsii*	ROWO	9066421

Collection Information

In 2006, no seed was received from the HTPNHS. Seed received in previous years was in fair-to-good condition, and it was used to start transplants as per the agreement.

[11] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

Seed Condition Information

No 2006 seed condition information to report.

Seed Production Establishment

Seed production is not part of this agreement.

Seed Production

Seed production is not part of this agreement.

A. **Climatological Data**

See Appendix A for the climatological data for 2006 at the Los Lunas Plant Materials Center.

Transplant Production

Table HTPNHS-2 describes the transplant production and delivery to HTPNHS in 2006.

Table HTPNHS-2: 2006 Transplant Production and Delivery

Common Name	2006 Delivery
Chokecherry	10
Redosier dogwood	10
Stretchberry	10
Banana yucca	7
Plains false willow	10
New Mexico locust	10
Squawthorn	5
Quercus pauciloba	20
Sacahuista	10
Silver buffaloberry	10
Total	**120 treepots**

Specialized Treatments

No specialized treatments are reported for 2006.

Observations

Native plant species collected as seed on the HTPNHS were started and grown as transplants at the LLPMC and were shipped to HTPNHS as per the 2002 agreement.

This agreement has expired.

Capulin Volcano National Monument

By: Danny Goodson[12]

Study Numbers: NMPMC-S-9101-OT

Background

On August 30, 2004 an agreement among the US Department of Interior (DOI), the National Park Service (NPS), the Capulin Volcano National Monument (CVNM), and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) was made to propagate and increase native grass species found on CVNM. CVNM will be responsible for the collection of native seed. The LLPMC will propagate the seed for the purpose of establishing seed production fields.

Accessions Involved

Table CVNM-1 lists the accessions involved in the CVNM project.

Table CVNM-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number
Blue grama	*Bouteloua gracilis*	BOGR	9066609
Little bluestem	*Schizacharium scoparium*	SCSC	9066612
Mountain muhly	*Muhlenbergia montana*	MUMO	9066611
Western wheatgrass	*Pascopyrum smithii*	PASM	9066610

Collection Information

No seed was received by the LLPMC from CVNM in 2006.

Seed Condition Information

See previous CVNM reports for seed condition information.

Seed Production Establishment

Table CVNM-2: 2006 Established Production Fields

Common Name	Agreement Acreage	2006 LLPMC Acreage	Accession Number
Blue grama	0.50	0.50	9066609
Little bluestem	0.50	0.50	9066612
Mountain muhly	0.50	0.50	9066611
Western wheatgrass	0.50	0.14	9066610

[12] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

Seed Production

A. **Field Management**

9066609 Blue grama	**Field 23S–0.50 acre**	**Date**
Fertilization		
115 lbs. Nitrogen		1/27, 5/23, 6/19, 10/2
80 lbs. Phosphorous		1/27, 10/2
Irrigation		
3” Water Application		1/4, 4/11, 5/1, 5/31, 6/19, 7/19, 9/6, 10/5, 11/27
Herbicide Application		
2,4-D		3/3, 7/7
Pesticide Application		
Orthene		6/8, 6/30, 8/10, 9/5, 9/13
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		5/10, 7/5, 8/17

9066612 Little bluestem	**Field 23S–0.50 acre**	**Date**
Fertilization		
105 lbs. Nitrogen		1/27, 5/23, 6/19, 8/10
40 lbs. Phosphorous		1/27
Irrigation		
3” Water Application		1/4, 4/20, 5/12, 5/31, 6/19, 7/19, 9/6, 10/5, 11/27
Herbicide Application		
2,4-D		3/3, 7/7
Pesticide Application		
Orthene		6/30, 7/13, 8/10, 9/5
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		5/23, 6/13, 7/5

9066611 Mountain muhly	**Field 27N–0.50 acre**	**Date**
Fertilization		
145 lbs. Nitrogen		1/23, 4/27, 5/23, 6/28, 11/21
110 lbs. Phosphorous		1/23, 5/23, 6/26
Irrigation		
3” Water Application		1/4, 2/3, 3/14, 4/4, 4/19, 4/27, 5/1, 5/9, 5/23, 6/2, 6/9, 6/15, 6/29, 7/13, 8/10, 9/5, 9/21, 10/19, 11/27
Hand Hoeing		As needed
Mechanical Cultivation		4/24, 6/1, 7/20, 8/9, 8/17

9066610 Western wheatgrass	**Field 14 – 0.14 acre**	**Date**
Fertilization		
140 lbs. Nitrogen		4/27, 5/23, 6/19, 8/10, 10/24
40 lbs. Phosphorous		6/20
Irrigation		
3" Water Application		1/4, 2/14, 3/20, 4/6, 4/27, 5/12, 5/24, 6/7, 7/10, 8/18, 10/2, 10/30
Herbicide Application		
2,4-D		4/12, 5/12, 6/30, 9/1
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		5/23, 6/19, 7/24

B. **Seed Produced**

Table CVNM-3 describes the seed production for the year 2006.

Table CVNM-3: 2006 Seed Production

Common name	Scientific name	Pounds Cleaned
Blue grama	*Bouteloua gracilis*	13.26
Little bluestem	*Schizacharium scoparium*	23.80
Mountain muhly	*Muhlenbergia montana*	14.06
Western wheatgrass	*Pascopyvum smithii*	None

C. **Climatological Data**

See Appendix A for the climatological data for 2006 at the Los Lunas Plant Materials Center.

Transplant Production

Transplant production is not part of this agreement.

Specialized Treatments

There was no specialized treatment in 2006.

Observations

The western wheatgrass field did not produce seed in 2006. No seed was collected at CVNM in 2006, and as a result, this species may be dropped from the contract in 2007. The little bluestem, blue grama and mountain muhly fields are established and produced seed in 2006. Sideoats grama seed was not collected in 2006 at CVNM, and no seed field has been established at the LLPMC.

Figure CVNM-1: Field 27 – Mountain muhly production field.

Figure CVNM-2: Field 23S – Blue grama production field.

Figure CVNM-3: Field 23S – Little bluestem production field.

Carlsbad Caverns National Park

By: Danny Goodson[13]

Study Numbers: NMPMC-S-9101-OT

Background

On August 23, 2004, and agreement among the US Department of Interior (DOI), the National Park Service (NPS), Carlsbad Caverns National Park (CCNP), and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) was made for the collection, propagation, and increase of native grass species.

Accessions Involved

Table CCNP-1 lists the accessions involved in the CCNP project.

Table CCNP-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number
Blue grama	*Bouteloua gracilis*	BOGR	9066604
Curlyleaf muhly	*Muhlenbergia setifolia*	MUSE	9066608
Plains bristlegrass	*Setaria vulpiseta*	SEVU2	9066606
Purple threeawn	*Aristida purpurea*	ARPU9	9066607
Sideoats grama	*Bouteloua curtipendula*	BOCU	9066605
Green sprangletop	*Leptochloa dubia*	LEDU	9066658

Collection Information

See previous CCNP reports for seed collection information.

Seed Condition Information

The seed collected in 2005 of green sprangletop and plains bristlegrass from CCNP was used to grow transplants in order to establish seed production fields at the LLPMC. See previous CCNP reports for seed condition information.

[13] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

Seed Production Establishment

Table CCNP-2 describes the 2006 seed production fields established at the LLPMC.

Table CCNP-2: Established Production Fields

Common name	Scientific name	Agreement Acreage	2006 LLPMC Acreage
Blue grama	*Bouteloua gracilis*	0.50 acre	0.50 acre
Purple three-awn	*Aristida purpurea*	0.50 acre	0.50 acre
Sideoats grama	*Bouteloua curtipendula*	0.50 acre	0.50 acre
Green sprangletop	*Leptochloa dubia*	0.50 acre	0.50 acre
Plains bristlegrass	*Setaria vulpiseta*	0.50 acre	0.10 acre

Seed Production

A. **Field Management**

9066604 Blue grama– Field 13–0.50 acre	**Date**
Fertilization	
75 lbs. Nitrogen	1/9, 8/10, 10/31
40 lbs. Phosphorous	1/9
Irrigation	
3” Water Application	2/9, 4/19, 5/15, 6/7, 7/10, 9/5, 11/1
Herbicide Application	
2,4-D	3/3, 6/26
Pesticide Application	
Orthene	8/16, 9/5
Cultural Weed Control	
Hand Hoeing	As needed
Mechanical Cultivation	5/4, 6/5, 8/25
Harvest	
Combine	10/25

9066605 Sideoats grama– Field 23N–0.50 acre	**Date**
Transplanted	6/29
Fertilization	
185 lbs. Nitrogen	1/5, 5/23, 6/28, 8/10, 10/2, 11/21
120 lbs. Phosphorous	1/5, 6/26, 10/2
Irrigation	
3” Water Application	5/31, 6/16, 6/29, 7/3, 7/12, 7/25, 9/5, 11/27
Herbicide Application	
2,4-D	7/7
Cultural Weed Control	
Hand Hoeing	As needed
Mechanical Cultivation	5/15, 7/10, 7/20,
Harvest	
Combine	9/28

9066605 Sideoats grama– Field 23N–0.50 acre	**Date**
Forage Harvester	11/7

9066606 Plains bristlegrass – Field 20S– 0.10 acre	**Date**
Transplanted	7/20
Fertilization	
40 lbs. Nitrogen	10/31
Irrigation	
3” Water Application	7/20, 7/24, 8/17, 9/7, 9/26, 11/3
Cultural Weed Control	
Hand Hoeing	As needed
Mechanical Cultivation	8/17
Harvest	
Flail-vac harvester	10/18
Forage Harvester	10/27

9066658 Green sprangletop– Field 24N–0.50 acre	**Date**
Transplanted	7/11
Fertilization	
40 lbs. Nitrogen	11/21
Irrigation	
3” Water Application	7/11, 7/14, 7/18, 7/24, 8/17, 9/5, 9/25, 11/22
Cultural Weed Control	
Hand Hoeing	As needed
Mechanical Cultivation	7/24, 9/1
Harvest	
Combine	11/2

9066607 Threeawn–Field 24S – 0.50 acre	**Date**
Transplanted	6/22
Fertilization	
135 lbs. Nitrogen	1/6, 4/21, 5/23, 8/10, 11/21
40 lbs. Phosphorous	1/6
Irrigation	
3”Water Application	2/17, 4/4, 4/24, 5/10, 5/24, 6/7, 6/22, 6/30, 7/12, 7/24, 8/24, 8/31, 9/5, 9/10, 11/22
Herbicide Application	
2,4-D	7/7
Cultural Weed Control	
Hand Hoeing	As needed
Mechanical Cultivation	5/10, 6/6, 7/5
Harvest	
Flail-vac harvester	7/11, 9/25, 10/18
Forage harvester	11/16, 11/17

B. **Seed Produced**

Table CCNP-3 describes the seed production for the year 2006.

Table CCNP-3: 2006 Seed Production

Common name	Scientific name	Pounds cleaned
Blue grama	*Bouteloua gracilis*	88.48
Sideoats grama	*Bouteloua curtipendula*	84.12
Threeawn	*Aristida purpurpea*	11.78
Green sprangletop	*Leptochloa dubia*	62.52
Plains bristlegrass	*Setaria vulpiseta*	2.22

C. **Climatological Data**

See Appendix A for the climatological data for 2006 at the Los Lunas Plant Materials Center.

Transplant Production

Transplant production is not part of this agreement.

Specialized Treatments

There was no specialized treatment in 2006.

Observations

- Green sprangletop – Although green sprangletop was not specified in the original agreement, it was added by CCNP in 2006. Sprangletop seed collected in 2005 from CCNP was used to grow transplants to establish a 0.50 acre seed production field at the LLPMC. The field was established, and a seed crop was harvested in the fall of 2006.

- Plains bristlegrass – Seedling transplants of bristlegrass were grown by the LLPMC in 2006 and a 0.10 acre seed production was established in Field 20S. The seed field was established and a small quantity of seed was produced in 2006. This 2006 seed will be used to expand the seed field to a full ½ acre in 2007.

Figure CCNP-1: Field 23N – Sideoats grama production field.

Figure CCNP-2: Field 23N – Sideoats grama production field 2006 planting.

Figure CCNP-3: Field 24S – Threeawn production field.

Figure CCNP-4: Field 13 – Carlsbad Caverns blue grama production field.

Figure CCNP-5: Carlsbad Caverns plains bristlegrass production field.

Figure CCNP-6: Carlsbad Caverns green sprangletop production field.

Wupatki National Monument

By: Danny Goodson[14]

Study Numbers: NMPMC-S-9101-OT

Background

On May 16, 2006, an agreement was made between the Wupatki National Monument (WNM) of the U. S. Department of Interior (USDI) and the Natural Resources Conservation Service (NRCS) of New Mexico. This agreement declares that the Los Lunas Plant Materials Center (LLPMC) of the NRCS will produce seed for the WNM.

Accessions Involved

Table WNM-1 lists the accessions involved in the CCNP project.

Table WNM-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number
Bottlebrush squirreltail	*Elymus elymoides*	ELEL	9066656
Needleandthread	*Hesperostipa comata*	HECO	9066655
Galleta	*Pleuraphis jamesii*	PLJA	9066657

Collection Information

Seed from bottlebrush squirreltail, needleandthread and galleta was received from Wupatki National Monument in 2006. The seed was used to start transplants to establish seed fields at the LLPMC.

Seed Condition Information

Table WNM-2: CCNP 2006 Seed Collection Condition

Common Name	Scientific Name	Plant Symbol	Seed Fill Condition
Bottlebrush squirreltail	*Elymus elymoides*	ELEL	Good
Needleandthread	*Hesperostipa comata*	HECO	Good
Galleta	*Pleuraphis jamesii*	PLJA	Good

Seed Production Establishment

See Table WNM-3 for the seed production fields that were established in 2006 using seedling transplants started and grown by the LLPMC.

Table WNM-3: Established Production Fields

Common name	Scientific name	Agreement Acreage	2006 LLPMC Acreage
Bottlebrush squirreltail	*Elymus elymoides*	1.00	N/A
Needleandthread	*Hesperostipa comata*	1.00	0.24
Galleta	*Pleuraphis jamesii*	2.00	0.32

[14] Agronomist, Los Lunas Plant Materials Center, danny.goodson@nm.usda.gov

Seed Production

A. Field Management 2006

9066655 Needleandthread–Field 34S-0.24 acre	Date
Transplanted	5/8
Fertilization	
40 lbs. Nitrogen	11/21
Irrigation	
3" Water Application	5/8, 5/10, 5/12, 5/18, 5/24, 5/30, 6/9, 6/19, 7/10, 7/24, 9/1, 9/21, 10/26, 11/22
Cultural Weed Control	
Hand Hoeing	As needed

9066657 Galleta–Field 20S–0.32 acre	Date
Transplanted	6/16
Fertilization	
70 lbs. Nitrogen	8/10, 10/31
Irrigation	
3" Water Application	6/16, 6/19, 6/23, 6/30, 7/12, 7/24, 8/17, 9/6, 9/25, 11/2
Cultural Weed Control	
Hand Hoeing	As needed
Harvest	
Flail-vac harvester	10/3, 10/20

B. Seed Produced

Table WNM-3 describes the seed production for the year 2006.

Table WNM-3: 2006 Seed Production

Common name	Scientific name	Pounds Cleaned Seed
Needleandthread	*Hesperostipa comata*	None
Galleta	*Pleuraphis jamesii*	2.18

C. Climatological Data

See Appendix A for the climatological data for 2006 at the Los Lunas Plant Materials Center.

Transplant Production

Transplant production is not part of this agreement.

Specialized Treatments

There was no specialized treatment in 2005.

Observations

The bottlebrush squirreltail seed received from WNM in 2006 was used to start transplants to establish a seed production field. The transplanted were planted on May 8, 2006 into Field 34S at the LLPMC. The plants were irrigated and growth of the transplants was excellent. Once the

plants had started to produce seedheads, it was very noticeable it was not the bottlebrush squirreltail species. The plants were identified as a weed species. The WNM and Russ Haas were notified of the situation and all parties agreed to remove the field before seed was produced. The WNM will harvest seed of bottlebrush squirreltail in 2007, and a seed production field will be established once the seed has been provided to the LLPMC.

The galleta field was established on May 16, 2006 with transplants grown by the LLPMC. The field produced seed in 2006, and this seed will be used to grow transplants in 2007 to complete the 2-acres needed to complete the agreement.

The needleandthread field did not produce seed in 2006. Seed will be harvested in 2007 from this field, and it will be used to grow transplants to complete the 1-acre needed for the agreement acreage.

Figure WNM-1: Field 20S – Wupatki National Monument galleta production field.

Figure WNM-2: Field 34S – Wupatki National Monument needleandthread production field.

Appendix A
Climatological Data

2006 Climatological Data – Los Lunas Plant Materials Center

Month	Average Temperatures Fahrenheit High	Low	Monthly Average	Monthly Precipitation/Inches
January	57.1	15.9	36.5	0.03
February	62.5	20.1	41.3	0.00
March	65.9	28.8	47.4	0.28
April	79.0	38.9	59.0	0.05
May	88.5	48.0	68.3	0.00
June	96.0	56.2	76.1	0.86
July	95.1	63.0	79.1	2.53
August	88.0	60.3	74.2	2.84
September	81.5	46.7	64.1	0.51
October	81.5	46.7	64.1	0.51
November	67.2	24.9	46.1	0.10
December	49.5	16.0	32.8	0.93
	Avg. High 75.3	Avg. Low 38.0	Mean Temp. 56.6	Yearly Total 9.72