

**National Park Service
Plant Materials
Year 2005 Annual Report**

Prepared by

**USDA Natural Resources Conservation Service
Los Lunas Plant Materials Center
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Grand Canyon National Park

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 foundation seed of two native species (Blue grama and Muttongrass), and will grow transplants started from native tree and shrub seed collected at the park.

Accessions Involved

Table 1 lists the accessions involved in the GCNP project.

Table 1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number	Vegetation Association
Apache plume	<i>Fallugia paradoxa</i>	FAPA	9062865	122.3233
Big sagebrush	<i>Artemisia tridentata</i>	ARTR	9066056	122.3233
Blue grama	<i>Bouteloua gracilis</i>	BOGR	9062875	122.4149
Century plant	<i>Agave utahensis</i>	AGUT	9062874	122.4149
Cliffrose	<i>Purshia mexicana</i>	COME	9062876	122.4149
Curl-leaf mountain mahogany	<i>Cercocarpus ledifolius</i>	CELE	9062867	122.3233
Currant	<i>Ribes spp.</i>	RI SPP.	9066057	122.3233
Datil yucca	<i>Yucca baccata</i>	YUBA	9066058	122.3233
Desert barberry	<i>Berberis fremonti</i>	BEFE	9066059	122.3233
Elderberry	<i>Sambucus spp.</i>	SA SPP.	9066047	122.3233
Fernbush	<i>Chamaebatiaria millifolium</i>	CHMI	9062866	122.3233
Fourwing saltbush	<i>Atriplex canescens</i>	ATCA	9062873	122.4149
Gambels oak	<i>Quercus gambelii</i>	QUGA	9062872	122.3233
Indian ricegrass	<i>Oryzopsis hymenoides</i>	ORHY	9062857	122.3233
Lupine	<i>Lupinus spp.</i>	LU SPP.	9062863	122.3233
Muttongrass	<i>Poa fendleriana</i>	POFE	9062861	122.3233
Needle and thread	<i>Stipa comata</i>	STCO	9062859	122.3233
Penstemon (blue)	<i>Penstemon spp.</i>	PE SPP.	9062862	122.3233
Penstemon (red)	<i>Penstemon spp.</i>	PE SPP.	9066054	122.3233
Pinon pine	<i>Pinus edulis</i>	PIED	9066467	122.3233
Ponderosa pine	<i>Pinus ponderosa</i>	PIPO	9066466	122.3233
Rabbitbrush	<i>Chrysothamnus nauseosus</i>	CHNA	9062877	122.4149
Squirreltail	<i>Sitanion hystrix</i>	SIHY	9062858	122.3233
Utah juniper	<i>Juniperus osteosperma</i>	JUOS	9066055	122.3233
Utah serviceberry	<i>Amelanchier utahensis</i>	AMUT	9062869	122.3233
Western wheatgrass	<i>Agropyron smithii</i>	AGSM	9062860	122.3233
Wolfberry	<i>Lycium spp.</i>	LY SPP.	9062870	122.3233

Collection Information

There was no seed collection in 2005.

Seed Condition Information

See previous Grand Canyon Park reports for information.

Seed Production Establishment

No new seed production fields were established in 2005. See Table 2 for the seed production fields established for the GCNP at the LLPMC.

Table 2: Established Production Fields

Common Name	Scientific Name	Agreement Acreage	2005 LLPMC Acreage
Blue Grama	<i>Bouteloua gracilis</i>	0.50	0.54
Muttongrass	<i>Poa fendleriana</i>	1.00	1.65

Seed Production

Field Management

9062875 Blue grama	Field 20 – 0.5 Acre	Date
Fertilization		
120 lbs. Nitrogen		4/21, 5/18, 6/9
80 lbs. Phosphorous		4/21, 6/9
Irrigation		
3" water application		5/3, 5/27, 6/15, 7/7, 8/2, 9/1, 10/28
Herbicide Application		
Pendulum Pre-emergent		3/22
Insecticide		
Orthene @ 1.33 pounds per acre		7/20
Cultural Weed Control		
Hand Hoeing		As needed
Harvest		
Combine		10/13
9062861 Muttongrass	Field 20 – 1.0 Acre	Date
Fertilization		
205 lbs. Nitrogen		1/21, 3/4, 3/29, 5/18, 7/1
110 lbs. Phosphorous		3/29, 5/18, 7/1
Irrigation		
3" water application		3/30, 4/14, 5/3, 5/24, 6/10, 7/1, 7/19, 8/8, 9/1, 12/2
Herbicide Application		

2,4-D	1/25, 8/19
Pendulum Preemergent	5/19
Cultural Weed Control	
Hand Hoeing	As needed
Mechanical Cultivation	10/21
Harvest	
Combine	5/12

9062861 Muttongrass	Field 25S – 0.9 Acre	Date
Fertilization		
200 lbs. Nitrogen		1/21, 3/4, 3/29, 5/18, 6/9
100 lbs. Phosphorous		1/21, 3/29, 5/18
Irrigation		
3” water application		3/30, 4/15, 5/5, 5/20, 6/10, 7/1, 7/19, 8/8, 9/1, 10/28, 12/2
Herbicide Application		
Pendulum Preemergent		5/19
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		10/21
Harvest		
Combine		5/25

Seed Produced

Table 3 describes the seed production for the year 2005.

Table 3: 2005 Seed Production

Common Name	Scientific Name	Pounds Bulk
Blue grama	<i>Bouteloua gracilis</i>	8.26 PLS
Muttongrass	<i>Poa fendleriana</i>	30.58 PLS

Climatological Data

See the attachment *Climatological Data* for the 2005 climatological data at the LLPMC in Los Lunas, New Mexico.

Transplant Production

No transplants were delivered to GCNP in 2005.

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 2005 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 use of pepperwax on young plants of muttongrass to repel rabbits has also prevented damage to young tender growth.

The blue grama field will continue to have insecticide applications to control insects that can lower seed yields. In 2005, the blue grama field was burned to remove the existing stubble. The management technique of burning stubble during the dormant winter season has been demonstrated to increase seed production at the LLPMC. This process of burning will be evaluated on the GCNP blue grama and will only continue if an appreciable seed increase is noted. The burning of the blue grama in 2005 did not lead to any increase in seed production and therefore the field will not be burned in 2006. It is possible that burning this particular collection of blue grama does not respond to the burning of stubble as noted for other collections of blue grama grown at the LLPMC.

The LLPMC continues to run soil tests on the muttongrass in field 20N and in field 25S to determine the nutrients levels of both fields and to monitor the effectiveness of the fertilizer applications (see Tables 4 through 8). These tests provide useful data for the continued yield of abundant seed from the GCNP fields. Soil test results were not available for inclusion in the 2005 report.

Table 4: Soil Test Results for Muttongrass, Field 20

Collector: Joe Aragon Collected on: January 12, 2001 Submitted on: January 16, 2001			
Test Parameter	Units	Test Result	Detection Limit
PH of Soil Saturation Test		7.69	
Elect. Cond. Of Soil Paste Extr.	mmhos/cm	0.44	0.01
Magnesium (for SAR) -	meq/L	0.54	0.01
Calcium (for SAR) -	meg/L	2.68	0.01
Sodium (for SAR) -	meg/L	1.43	0.01
Sodium Adsorption Ratio (SAR)		1.13	0.01
Calculated Exchangeable Na %-ESP		.04	0.1
Organic Matter	percent	0.49	0.01
NO ₃ -N 1:5 (soil:water) extract	ppm	3.6	0.1
Phosphorus (NaHCO ₃ extracted)	ppm	6.9	0.1
K 1:5 (soil:water) extract	ppm	16	1
Texture of soil by feel		Loamy Sand	

Table 5: Soil Test Results for Muttongrass, Field 20

Collector: Joe Aragon Collected on: April 15, 2002 Submitted on: April 15, 2002			
Test Parameter	Units	Test Result	Detection Limit
PH of Soil Saturation Test		7.88	

Table 5: Soil Test Results for Muttongrass, Field 20

Collector: Joe Aragon		Collected on: April 15, 2002		Submitted on: April 15, 2002	
Test Parameter	Units	Test Result	Detection Limit		
Elect. Cond. Of Soil Paste Extr.	mmhos/cm	0.53	0.01		
Magnesium (for SAR) -	meq/L	0.56	0.01		
Calcium (for SAR) -	meg/L	3.53	0.01		
Sodium (for SAR) -	meg/L	2.25	0.01		
Sodium Adsorption Ratio (SAR)		1.57	0.01		
Calculated Exchangeable Na %-ESP		1.0	0.1		
Organic Matter	percent	0.42	0.01		
NO ₃ -N 1:5 (soil:water) extract	ppm	3.1	0.1		
Phosphorus (NaHCO ₃ extracted)	ppm	16.8	0.1		
K 1:5 (soil:water) extract	ppm	8	1		
Texture of soil by feel		Loamy Sand			

Table 6: Standard Soil Test for Muttongrass, Field 20

Collector: Danny Goodson		Collected on: March 20, 2003		Submitted on: March 21, 2003	
Test Parameter	Units	Test Result	Detection Limit		
PH of Soil Saturation Test		8.07			
Elect. Cond. Of Soil Paste Extr.	mmhos/cm	0.62	0.01		
Magnesium (for SAR) -	meq/L	0.45	0.01		
Calcium (for SAR) -	meg/L	2.00	0.01		
Sodium (for SAR) -	meg/L	4.10	0.01		
Sodium Adsorption Ratio (SAR)		3.70	0.01		
Calculated Exchangeable Na %-ESP		4.0	0.1		
Organic Matter	percent	0.41	0.01		
NO ₃ -N 1:5 (soil:water) extract	ppm	3.3	0.1		
Phosphorus (NaHCO ₃ extracted)	ppm	12.4	0.1		
K 1:5 (soil:water) extract	ppm	20	1		
Texture of soil by feel		Sand			
Zinc by DTPA extraction	ppm	0.41	0.02		
Manganese by DTPA extraction	ppm	1.33	0.04		
Iron by DTPA extraction	ppm	2.16	0.10		
Copper by DTPA extraction	ppm	0.87	0.01		

Table 7: Standard Soil Test for Muttongrass, Field 20

Collector: Danny Goodson Collected on: February 3, 2004 Submitted on: April 7, 2004			
Test Parameter	Units	Test Result	Detection Limit
PH of Soil Saturation Test		8.05	
Elect. Cond. Of Soil Paste Extr.	mmhos/cm	0.43	0.01
Magnesium (for SAR) -	meq/L	0.49	0.01
Calcium (for SAR) -	meg/L	2.08	0.01
Sodium (for SAR) -	meg/L	3.20	0.01
Sodium Adsorption Ratio (SAR)		2.82	0.01
Calculated Exchangeable Na %-ESP		2.8	0.1
Organic Matter	percent	0.17	0.01
NO ₃ -N 1:5 (soil:water) extract	ppm	2.4	0.1
Phosphorus (NaHCO ₃ extracted)	ppm	5.0	0.1
K 1:5 (soil:water) extract	ppm	24	1
Texture of soil by feel		Loamy Sand	

Table 8: Standard Soil Test for Muttongrass, Field 25S

Collector: Danny Goodson Collected on: February 3, 2004 Submitted on: April 7, 2004			
Test Parameter	Units	Test Result	Detection Limit
PH of Soil Saturation Test		7.95	
Elect. Cond. Of Soil Paste Extr.	mmhos/cm	0.59	0.01
Magnesium (for SAR) -	meq/L	0.53	0.01
Calcium (for SAR) -	meg/L	2.69	0.01
Sodium (for SAR) -	meg/L	4.59	0.01
Sodium Adsorption Ratio (SAR)		3.62	0.01
Calculated Exchangeable Na %-ESP		3.9	0.1
Organic Matter	percent	0.65	0.01
NO ₃ -N 1:5 (soil:water) extract	ppm	3.5	0.1
Phosphorus (NaHCO ₃ extracted)	ppm	6.0	0.1
K 1:5 (soil:water) extract	ppm	20	1
Texture of soil by feel		Loamy Sand	



Figure 1: Field 25S–Muttongrass production field



Figure 2: Field 20N–Muttongrass production field



Figure 3: Field 20N–Muttongrass production field prior to harvest



Figure 4: Field 20N–Blue grama production field March 2005 following burning of stubble.

Pipe Spring National Monument

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 1 lists the accessions involved in the PSNM agreement.

Table 1: Accessions Involved

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

Collection Information

In 2005, 0.16 lbs of bottlebrush squirreltail seed was received by the LLPMC from collections made at the PSNM.

Seed Condition Information

The bottlebrush squirreltail seed received in 2005 was in good condition and will be used to start transplants to establish a seed production block at the LLPMC.

See the previous Pipe Springs National Monument reports for seed condition information collected from the PSNM.

Seed Production Establishment

- Blue grama—No blue grama seed was available in 2005 to establish a seed production field.
- Bottlebrush squirreltail—The bottlebrush seed collected in 2004 at the Monument was used to grow transplants at the LLPMC. These transplants were used to establish a 0.22 acre production block in field 23N on October 4, 2005.
- Indian ricesgrass—Indian ricegrass seed was direct-seeded into a 0.18 acre block in Field 13 on December 21, 2005.

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

Table 2: Established Production Fields

Common name	Scientific name	Agreement Acreage	2005 LLPMC Acreage
Galleta	<i>Pleuraphis jamesii</i>	0.50	0.08
Indian ricegrass	<i>Acnatherum hymenoides</i>	0.50	0.42
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.22

Seed Production

- Blue grama– No blue grama seed was received by the LLPMC in 2005.
- Indian ricegrass–No seed was harvested from the indian ricegrass production block in 2005.
- Galleta–A small amount of galleta grass seed was harvested on September 23, 2005 from field 26S and this seed will be used to increase the production field acreage at the LLPMC in 2006.

Field Management

9066559 Galleta	Field 26S – 0.10 Acre	Date
Fertilization		
80 lbs. Nitrogen		5/18, 7/1
40 lbs. Phosphorous		9/23
Irrigation		
3” water application		4/14, 5/18, 6/23, 7/19, 8/3, 9/6
Herbicide Application		
2,4-D		1/26, 5/12
Pendulum		3/10
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		10/21
Harvest		
Flail-vac		9/23
9066587 Indian ricegrass	Field 8S – 0.25 Acre	Date
Fertilization		
70 lbs. Nitrogen		5/6, 7/1, 10/5
100 lbs. Phosphorous		5/6, 7/1, 10/5
Irrigation		
3” water application		4/4, 4/14, 5/10, 5/25, 6/23, 7/7, 8/4, 9/6

Herbicide Application

2,4-D 4/13, 7/22, 8/19, 10/18
 Pendulum 4/13

Cultural Weed Control

Hand Hoeing As needed
 Mechanical cultivation 4/22, 5/31

9066590 Bottlebrush squirreltail Field 23N – 0.22 Acre Date

Transplanted 10/4
 Irrigation
 3” water application 10/4, 10/21, 10/31, 11/30

Seed Produced

Table 3 describes the seed production for the year 2005.

Table 3: Seed Production in 2005

Common name	Scientific name	Pounds Bulk
Galleta	<i>Pleuraphis jamesii</i>	N/A
Indian ricegrass	<i>Acnatherum hymenoides</i>	None
Muttongrass	<i>Poa fendleriana</i>	None
Bottlebrush	<i>Elymus elymoides</i>	None

Climatological Data

See the attachment *Climatological Data* for the 2005 climatological data at the LLPMC in Los Lunas, New Mexico.

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 December 21, 2005, a dormant seeding of the PSNM Indian ricegrass was completed. To promote seed germination, a dormant seeding allows the seed to go through a cold stratification process. Because of the hard-seed coat found on the ricegrass seed, this cold-stratification process has been proven necessary for good seed germination. Seed germination will be monitored in 2006, and it may take up to two years to complete the germination process.



Figure 1: Field 8: Indian ricegrass production field



Figure 2: Field 26S–Galleta production field



Figure 3: Field 26S–Galleta production field

Zion National Park

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 1 lists the accessions involved in the ZNP project.

Table 1: Accessions Involved

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

Collection Information

In 2005, 0.52 lbs. of bottlebrush squirreltail seed was received by the LLPMC from collections made by ZNP. Small amounts of galleta, muttongrass, and Indian ricegrass also were received by the LLPMC from ZNP in 2005.

Seed Condition Information

The seed sent from ZNP in 2005 arrived in good condition; it will be used to start or increase seed production fields at the LLPMC.

See previous Zion National Park reports for the seed condition information prior to 2005.

Seed Production Establishment

The LLPMC established the following seed production fields:

- Bottlebrush squirreltail– On October 4, 2005, ZNP bottlebrush squirreltail seedling transplants that were started and grown at the LLPMC were planted in Field 19, increasing the production field size from 0.41 to 0.58 acres.
- Galleta– On June 2, 2005, ZNP galleta seedling transplants that were started and grown at the LLPMC were planted in Field 24S, increasing the production field size from 0.10 to 0.25 acres.
- Indian ricegrass–On December 30, 2005, ZNP Indian ricegrass was direct-seeded into Field 35N, increasing the production field size from 0.25 to 0.42 acres.
- Muttongrass–On April 19, 2005, ZNP muttongrass seedling transplants started and grown at the LLPMC were planted in Field 35S, 0.50 acres.
- Sand bluestem–On August 23, 2005, ZNP sand bluestem seedling transplants that were started and grown at the LLPMC were planted in F27N, increasing the production field size from 0.16 to 0.50 acres.

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

Table 2: Established Production Fields

Common name	Scientific name	Agreement Acreage	2005 LLPMC Acreage
Sand bluestem	<i>Andropogon hallii</i>	0.50	0.50
Cane bluestem	<i>Bothriochloa barbinodis</i>	0.50	0.50
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.41
Galleta	<i>Pleuraphis jamesii</i>	0.33	0.42
Muttongrass	<i>Poa fendleriana</i>	0.50	0.50
Indian ricegrass	<i>Acnatherum hymenoides</i>	0.50	0.42

Seed Production

Field Management

9066543 Cane Bluestem	Field 21S – 0.25 Acre	Date
Fertilization		
80 lbs Nitrogen		6/8, 7/1
80 lbs. Phosphorous		1/14, 8/22
Irrigation		
3” water application		5/13, 6/9, 7/1, 7/22, 9/27
Herbicide Application		
2,4-D		1/25
Pendulum		3/22

9066543 Cane Bluestem	Field 21S – 0.25 Acre	Date
Cultural Weed Control		
Hand Hoeing		As needed
Harvest		
Flail-Vac		7/22, 9/15
9066529 Sand Bluestem	Field 25S – 0.06 Acre	Date
Fertilization		
110 lbs. Nitrogen		1/21, 5/18, 6/9
80 lbs. Phosphorus		1/14, 5/18
Irrigation		
3” water application		4/15, 5/18, 6/9, 6/30, 7/20, 9/1
Herbicide Application		
Pendulum		3/10
Cultural Weed Control		
Hand Hoeing		As needed
Harvest		
Flail-Vac		9/15, 9/26, 9/28
9066532 Bottlebrush Squirreltail	Field 19 – 0.58 Acre	Date
Transplanted 0.17 acre		10/4
Fertilization		
95 lbs. Nitrogen		3/4, 4/21, 10/31
110 lbs. Phosphorous		1/24, 4/21/10/3
Irrigation		
3” water application		4/4, 4/21, 5/12, 5/27, 6/23, 7/29, 9/1, 10/4, 10/14, 12/1
Herbicide Application		
2,4-D		1/25, 7/20, 9/12
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		3/24, 9/27, 12/28
Harvest		
Flail-vac		6/7, 6/13, 6/27
9066528 Galleta	Field 35N – 0.10 Acre	Date
Fertilization		
70 lbs. Nitrogen		1/24, 5/18
40 lbs. Phosphorus		1/19
Irrigation		
3” water application		4/14, 5/18, 5/26, 6/23, 7/22, 8/3, 9/2
Herbicide Application		

9066528 Galleta	Field 35N – 0.10 Acre	Date
2,4-D		9/23
Pendulum		10/31
Cultural Weed Control		
Hand Hoeing		As needed
Harvest		
Flail-vac		9/23
Forage harvester		10/31
9066586 Galleta	Field 24S – 0.25 Acre	Date
Transplanted		6/2
Fertilization		
40 lbs Nitrogen		8/22
40 lbs. Phosphorous		8/22
Irrigation		
3” water application		6/2, 6/7, 6/13, 6/23, 6/30, 7/8, 7/15, 7/28, 8/9, 8/25, 9/8, 9/22, 10/31
Cultural Weed Control		
Hand Hoeing		As needed
Harvest		
Forage Harvester		10/31
9066531 Muttongrass	Field 35S – 0.50 Acre	Date
Transplanted		4/19
Fertilization		
115lbs Nitrogen		5/6, 7/1, 8/2
110lbs. Phosphorous		5/6, 7/1, 8/2
Irrigation		
3” water application		4/19, 4/29, 5/6, 5/31, 6/8, 6/17, 7/1, 7/15, 7/22, 8/2, 8/16, 9/2, 9/13, 9/27, 10/31, 11/30
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical		5/16
Cultivation		
9066528 Indian ricegrass	Field 35N – 0.25 Acre	Date
Seeding		12/30
Fertilization		
65bs. Nitrogen		5/6, 10/5
60lbs. Phosphorus		5/6, 10/5
Irrigation		
3” water application		4/4, 4/14, 5/6, 5/52, 6/21, 7/8, 8/2,

9066528 Indian ricegrass	Field 35N – 0.25 Acre	Date
		9/7, 10/31, 12/16
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical		4/283
Cultivation		10/31
9066529 Sand bluestem	Field 27N – 0.37 Acre	Date
Transplanted		8/23
Fertilization		
35 lbs Nitrogen		10/5
35 lbs. Phosphorous		10/5
Irrigation		
3” water application		8/23, 8/25, 8/31, 9/9, 9/15, 9/20, 9/26, 10/21, 11/30
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical		11/1
Cultivation		

Seed Produced

Table 3 describes the seed production for the year 2005.

Table 3: 2005 Seed Production

Common name	Scientific name	Pounds bulk
Bottlebrush squirreltail	<i>Elymus elymoides</i>	65.54
Cane bluestem	<i>Bothriochloa barbinodis</i>	2.56
Galleta	<i>Pleuraphis jamesii</i>	N/A
Indian ricegrass	<i>Acnatherum hymenoides</i>	None
Muttongrass	<i>Poa fendleriana</i>	None
Sand bluestem	<i>Andropogon hallii</i>	N/A

Climatological Data

See the attachment *Climatological Data* for the 2005 climatological data at the LLPMC in Los Lunas, New Mexico.

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 2005 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 2005, seedling transplants grown at the LLPMC were used to increase the seed production block from 0.16 to 0.50 acres.
- Bottlebrush squirreltail—Seed was harvested from field 19 at the LLPMC. Seed received from ZNP was used to start and grow seedling transplants at the LLPMC to increase the seed production block from 0.41 to 0.58 acres.
- Galleta—In 2005, seed received from ZNP was used to start and grow seedling transplants at the LLPMC to increase the seed production to 0.25 acres.
- Indian ricegrass—The 2004 dormant seeding of Indian ricegrass had approximately 80 percent germination and the plants were healthy and vigorous. On December 30, 2005, Indian ricegrass seed received from ZNP in 2004, was used to increase the production block in field 35N to 0.42 acres.
- Muttongrass—In 2005, seed received from ZNP was used to start and grow seedling transplants at the LLPMC to establish a 0.50-acre production block in field 35S.



Figure 1: Field 19—Bottlebrush squirreltail production field



Figure 2: Field 19–Bottlebrush squirreltail production field



Figure 3: Field 21S–Cane bluestem production field



Figure 4: Field 25S–Sand bluestem production field



Figure 5: Field 25S–Sand bluestem production field



Figure 6: Field 35N–Indian ricegrass production field



Figure 7: Field 35N–Indian ricegrass production field



Figure 8: Field 35N–Galleta production field



Figure 9: Field 35N–Galleta production field



Figure 10: Field 24S–Galleta production field



Figure 11: Field 24S–Galleta production field



Figure 12: Field 35S–Muttongrass production field

Hubbell Trading Post National Historic Site

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 HTPNHS.

Accessions Involved

Table 1 lists the accessions involved in the HTPNHS project.

Table 1: Accessions Involved

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

Collection Information

In 2005, 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.

Seed Condition Information

No 2005 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.

See the attachment *Climatological Data* for the 2005 climatological data at the LLPMC in Los Lunas, New Mexico.

Transplant Production

Table 2 describes the transplant production and delivery to HTPNHS in 2005.

Table 2: 2005 Transplant Production and Delivery

Common Name	2005 Delivery
Netleaf hackberry	20
Skunkbush sumac	20
Stretchberry	20
Woods' rose	20
Total	80 treepots

Specialized Treatments

No specialized treatments are reported for 2005.

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

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 1 lists the accessions involved in the CVNM project.

Table 1: Accessions Involved

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

Collection Information

No seed was received by the LLPMC from CVNM in 2005.

Seed Condition Information

See previous CVNM reports for seed condition information.

Seed Production Establishment

In 2005, the LLPMC established the production fields listed in Table 2 using seedling transplants grown by the LLPMC.

Table 2: 2005 Established Production Fields

Common Name	Agreement Acreage	2005 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	6066610

Seed Production

Field Management

9066609 Blue grama	Field 23S–0.50 acre	Date
Transplanted		8/4
Fertilization		
35 lbs. Nitrogen		10/5
35 lbs. Phosphorous		10/5
Irrigation		
3” Water Application		8/4, 8/8, 9/2, 9/9, 9/22, 10/28, 11/30
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		8/12
9066612 Little bluestem	Field 23S–0.50 acre	Date
Transplanted		7/21
Fertilization		
35 lbs. Nitrogen		10/5
35 lbs. Phosphorous		10/5
Irrigation		
3” Water Application		7/21, 7/25, 7/29, 8/5, 8/12, 8/18, 8/25,9/2, 9/9, 9/22, 10/28, 12/1
Cultural Weed Control		
Hand Hoeing		As needed
9066611 Mountain Muhly	Field 27N–0.50 acre	Date
Transplanted		9/15
Irrigation		
3” Water Application		9/15, 9/20, 9/26, 10/21, 11/30
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		10/31, 11/1
9066610 Western Wheatgrass	Field 14–0.14 acre	Date
Transplanted		10/14
Irrigation		
3” Water Application		10/14, 10/21, 11/14, 12/1
Cultural Weed Control		
Hand Hoeing		As needed

Climatological Data

See the attachment *Climatological Data* for the 2005 climatological data at the LLPMC in Los Lunas, New Mexico.

Transplant Production

Transplant production is not part of this agreement.

Specialized Treatments

There was no specialized treatment in 2005.

Observations

To help increase the western wheatgrass production field established at the LLPMC to 0.50 acre (as specified in the agreement), the CVNM needs to collect western wheatgrass seed in 2006. Field 14 will not be able to produce an adequate amount of seed in 2006.



Figure 1: Field 27–Mountain muhly production field



Figure 2: Field 23S–Blue grama production field



Figure 3: Field 23S–Little bluestem production field

Carlsbad Caverns National Park

Background

On August 23, 2004, an 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 1 lists the accessions involved in the CCNP project.

Table 1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number
Blue grama	<i>Bouteloua gracilis</i>	BOGR	9066604
Curlyleaf muhly	<i>Muhlenbergia setifolia</i>	MUSE	9066608
Plains bristlegrass	<i>Setaria vulpiseta</i>	SEVU2	9066606
Purple threeawn	<i>Aristida purpurea</i>	ARPU9	9066607
Sideoats grama	<i>Bouteloua curtipendula</i>	BOCU	9066605

Collection Information

In 2005, the staff from the LLPMC collected seed from two native grass species at CCNP: plains bristlegrass and green sprangletop. Green sprangletop is not part of the agreement, but it was collected by the LLPMC staff because the seed was abundant.

Seed Condition Information

The 2005 grass species collections received from CCNP have been cleaned. This seed will be used to establish seed production fields in 2006. See Table 2 for the seed amounts and the condition of the seed harvested in 2004.

Table 2: CCNP 2005 Seed Collection Condition

Common Name	Scientific Name	Amount (lbs)	Seed Fill Condition
Green sprangletop	<i>Leptochloa dubia</i>	0.42	Good
Plains bristlegrass	<i>Setaria vulpiseta</i>	0.16	Fair

Seed Production Establishment

See Table 6-3 for the seed production fields that were established in 2005 using seedling transplants started and grown by the LLPMC.

Table 6-3: Established Production Fields

Common name	Scientific name	Agreement Acreage	2005 LLPMC Acreage
Blue grama	<i>Bouteloua gracilis</i>	0.50 acre	0.50 acre
Purple three-awn	<i>Aristida purpurea</i>	0.50 acre	0.25 acre
Sideoats grama	<i>Bouteloua curtipendula</i>	0.50 acre	0.25 acre

Seed Production

Field Management

9066604 Blue grama– Field 13–0.50 acre	Date
Transplanted	7/6
Fertilization	
35 lbs. Nitrogen	10/5
30 lbs. Phosphorous	10/5
Irrigation	
3” Water Application	7/6, 7/12, 7/22, 7/29, 8/4, 8/25, 9/1,9/15, 10/31
Herbicide Application	
2,4-D	10/15
Cultural Weed Control	
Hand Hoeing	As needed
9066605 Sideoats grama– Field 23N–0.25 acre	Date
Transplanted	6/8
Fertilization	
40 lbs. Nitrogen	8/8
40 lbs. Phosphorous	8/8
Irrigation	
3” Water Application	6/8, 6/10, 6/17, 6/24, 6/30, 7/8, 7/15, 7/28, 8/9, 8/25, 9/9, 9/22, 10/31
Cultural Weed Control	
Hand Hoeing	As needed
Harvest	
Forage Harvester	11/7

9066607 Threawn–Field 24S – 0.25 acre	Date
Transplanted	6/2
Fertilization	
40 lbs. Nitrogen	8/8
40 lbs. Phosphorous	8/8
Irrigation	
3”Water Application	6/2, 6/7, 6/13, 6/23, 6/30, 7/8, 7/15, 7/28, 8/9, 8/25, 9/8, 9/22, 10/31
Cultural Weed Control	
Hand Hoeing	As needed
Harvest	
Hand harvest	6/21
Forage harvester	10/18

Seed Produced

Table 3 describes the seed production for the year 2005.

Table 3: 2005 Seed Production

Common name	Scientific name	Pounds bulk
Blue grama	<i>Bouteloua gracilis</i>	None
Sideoats grama	<i>Bouteloua curtipendula</i>	88.66
Threawn	<i>Aristida purpurpea</i>	4.88

Climatological Data

See the attachment *Climatological Data* for the 2005 climatological data at the LLPMC in Los Lunas, New Mexico.

Transplant Production

Transplant production is not part of this agreement.

Specialized Treatments

There was no specialized treatment in 2005.

Observations

In October 2005, the LLPMC staff collected seed from two native grass speices at the CCNP: green sprangletop and plains bristlegrass.

- **Green sprangletop**–Although green sprangletop is not specified in the agreement, it may replace curlyleaf muhly upon approval by the Park. If the sprangletop is added to the agreement, seedling transplants will be grown by the LLPMC in 2006 to establish a 0.50 acre production field in 2007.

- **Plains bristlegrass**—The quantity of the plains bristlegrass seed may not be sufficient to establish the 0.50 acre production field to satisfy the agreement in 2006. Seedling transplants of bristlegrass will be started at the LLPMC in order to establish a seed production field in 2006.



Figure 1: Field 23N—Sideoats grama production field



Figure 2: Field 23N–Sideoats grama production field



Figure 3: Field 24S–Threawn production field



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

Attachment Climatological Data

The following table shows the 2005 climatological data recorded at the Los Lunas Plant Materials Center.

2005 Climatological Data – Los Lunas Plant Materials Center

Month	Average Temperatures Fahrenheit			Monthly Precipitation/Inches
	High	Low	Monthly Average	
January	56.6	24.0	40.3	1.41
February	56.4	29.9	43.2	1.56
March	62.7	30.4	46.6	0.79
April	74.3	35.1	54.7	0.50
May	84.0	46.6	65.3	0.00
June	92.4	52.4	72.4	0.30
July	98.5	59.9	79.2	0.34
August	92.8	58.5	75.7	0.39
September	89.8	51.7	70.8	1.71
October	74.1	41.5	57.8	1.14
November	65.4	24.0	44.7	0.00
December	55.7	15.5	35.6	0.08
	Avg. High 75.2	Avg.Low 39.1	Mean Temp. 60.6	Yearly Total 8.22