National Park Service Plant Materials
1999 Annual Report

Prepared by

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Los Lunas Plant Materials Center
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TABLE OF CONTENTS

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Bandelier National Monument, New Mexico

I. Background of Project

An Agreement was made with Bandelier National Monument, New Mexico, and the Natural Resources Conservation Service, (formerly the Soil Conservation Service), New Mexico, in 1990 to collect and increase seed of selected species for use on the Monument. This Agreement covers a five year period starting in 1994. At the end of the five year period, the agreement can be reaffirmed for a period not to exceed five years.

These plant materials will be used to revegetate disturbed sites on the monument. Technical assistance is also to be provided, as necessary, for the revegetation program on the monument. Reports on the plant materials or activities completed under the agreement shall be made available to the NPS. The Annual Work Plan will identify activities to be carried out by the NRCS.

The 1999 Annual Work Plan provides for the maintenance of the Monuments Seed Fields.

Seed production fields of park grasses and wildflowers at the PMC have been established by direct seeding or by growing seedlings in the greenhouse and transplanting them to the field.

II. Accessions Involved

The following species are included in this project:

Common Name	Scientific Name	Plant Symbol	Accession Number
Sideoats grama	*Bouteloua curtipendula*	BOCU	9066162
Mountain muhly	*Muhlenbergia montana*	MUMO	9066159
Blue grama	*Bouteloua gracilis*	BOGR	9066163
Sand dropseed	*Sporobolus cryptandrus*	SPCR	9066161
Little bluestem	*Schizachyrium scoparium*	SCSC	9066160
White Prairieclover	*Dalea candida*	DACA	9066443

III. Collection Information

No collections were made in 1999. All collections were made previously by both, Monument and PMC employees.

IV. Seed Condition Information

See previous Bandelier reports.

V. Seed Production Establishment

No seed production fields were established in 1999.

VI. Seed Production

Climatological Data for 1999 **Los Lunas PMC Weather Site**

Month	Average Temperature Fahrenheit			Precipitation
	Low	High	Monthly	Inches
Jan	59.7	8.6	39.1	0.12
Feb	64.4	19.3	41.8	0.00
Mar	68.8	31.1	49.9	1.05
Apr	72.4	33.9	53.2	0.81
May	80.9	45.3	63.1	1.02
Jun	90.2	52.7	71.5	1.12
Jul	92.4	61.4	76.9	2.43
Aug	91.4	59.2	75.3	3.83
Sep	82.4	47.5	64.9	1.22
Oct	77.9	45.3	61.6	0.38
Nov	69.7	22.2	46.0	0.00
Dec	52.3	14.2	33.2	0.18
			Total	12.16

Harvest Data

Common Name	Harvest Date	Bulk Lbs	PLS Yield	PLS Yield /Acre	Germ %	Purity %	Pesticide Used
Blue grama	10/16/98	7.40	3.14	4.83	62.00	68.40	2,4-D

Field Management

9066163 Blue Grama

Field Residue Burned	3/4/1999
Field Ripped to 12" depth	5/18/1999
Fertilization Broadcast spreader	
50 lbs Nitrogen	7/15/1999
50 lbs P2O5	7/15/1999
Irrigation	
3" water application	2/3, 6/8, 6/29, 7/16 and 9/28/1999
Herbicide Application	
2,4-D @ 1.5 quart per Acre	3/10 and 6/18/1999
Harvest	
Combine	10/13/1999
Settings Cylinder speed–1100 rpm, Ground speed 2 mph, chaffer sieve 3/4 open and finishing sieve 1/2 open	
Cleaning and Processing	
Hammermill settings–3/8 inch screen with 400 rpm (setting #4)	
297-D Clipper with screen size of 10-8-1/12-28x28	
Rate of feed through hopper–fast, upper adjustment 1/2 open, top door air opening–1/3, fan speed 150 rpm and shaker speed–450 rpm	

VII. Observations

The Blue Grama seed production field looked very good this year, with the plants producing an abundant supply of seed heads. However, upon checking the seed heads, seed production was expected to be low, because of very little fill in the heads. The White Prairie clover was not harvested in 1999 and the field was plowed out in late summer.

National Park Service Plant Materials
1999 Annual Report
Grand Canyon National Park, Arizona

I. Background of Project

This Agreement with the Grand Canyon National Park, Arizona, was executed in July 1990 and provides for the collection, propagation, and increase of grasses, forbs, shrubs, and trees.

The Park will use the plant materials for nine acres of roadside revegetation on East Rim Drive: one acre at Maswik Parking lot; five acres of cut slope and roadsides on Center Road; 0.5 acres at Yavapai Parking Area; nine acres of new road construction at the East Rim Entrance; with additional revegetation to be done at Village Loop Road from the residential area to the business center.

II. Accessions Involved

The following species are included in this project:

Common Name	Scientific Name	Plant Symbol	Accession Number	Vegetation Association
Indian Ricegrass	**Oryzopsis hymenoides**	ORHY	9062857	122.3233
Squirreltail	*Sitanion hysterix*	SIHY	9062858	122.3233
Needle and thread	*Stipa comata*	STCO	9062859	122.3233
Western wheatgrass	*Agropyron smithii*	AGSM	9062860	122.3233
Muttongrass	*Poa fendleriana*	POFE	9062861	122.3233
Penstemon (blue)	*Penstemon spp.*	PE SPP.	9062862	122.3233
Penstemon (red)	*Penstemon spp.*	PE SPP.	9066054	122.3233
Lupine	*Lupinus spp.*	LU SPP.	9062863	122.3233
Apacheplume	*Fallugia paradoxa*	FAPA	9062865	122.3233
Fernbush	*Chamaebatiaria millifollium*	CHMI	9062866	122.3233
Curl-leaf mountain mahogany	*Cercocarpus ledifolius*	CELE	9062867	122.3233
Elderberry	*Sambucus spp.*	SA SPP.	9066047	122.3233
Utah serviceberry	*Amelanchier utahensis*	AMUT	9062869	122.3233
Wolfberry	*Lycium spp.*	LY SPP.	9062870	122.3233
Gambels oak	*Quercus gambelii*	QUGA	9062872	122.3233
Fourwing saltbush	*Atriplex canescens*	ATCA	9062873	122.4149
Century plant	*Agave utahensis*	AGUT	9062874	122.4149
Blue grama	*Bouteloua gracilis*	BOGR	9062875	122.4149
Rabbitbrush	*Chrysothamnus nauseosus*	CHNA	9062877	122.4149
Cliffrose	*Purshia mexicana*	COME	9062876	122.4149
Utah juniper	*Juniperus osteosperma*	JUOS	9066055	122.3233
Big sagebrush	*Atriplex tridentata*	ARTR	9066056	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

III. Collection Information

No seed was collected on the Park in 1999.

IV. Seed Condition Information

See previous Grand Canyon National Park reports for seed condition information.

V. Seed Production Establishment

No fields established in 1999.

VI. Seed Production

Climatological Data for 1999	**Los Lunas PMC Weather Site**		
Month	Average Temperature Fahrenheit		Precipitation
	Low	High	Monthly	Inches
Jan	59.7	8.6	39.1	0.12
Feb	64.4	19.3	41.8	0.00
Mar	68.8	31.1	49.9	1.05
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Aug	91.4	59.2	75.3	3.83
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Nov	69.7	22.2	46.0	0.00
Dec	52.3	14.2	33.2	0.18
			Total	12.16

Harvest Data

Common Name	**Harvest Date**	**Bulk Lbs**	**PLS Yield**	**PLS Yield /Acre**	**Germ %**	**Purity %**	**Pesticide Used**
Blue grama	09/23/99	1.82					2,4-D
Western wheatgrass	10/13/99	58.00					Roundup 2,4-D
Muttongrass	05/11/99	2.56	1.83	3.66	72.00	99.30	2,4-D

Field Management

9062875 Blue Grama

Field Residue Burned	3/25/1999
Field Ripped to 12" depth	5/18/1999
Fertilization Broadcast spreader	
50 lbs Nitrogen	7/18/1999
50 lbs P2O5	7/18/1999
Irrigation	3/5, 6/9, 6/28, 7/26, and
3" water application	10/26/1999
Herbicide Application	
2,4-D @ 1.5 quart per Acre	4/20, 6/8 and 9/17/1999
Cultural Weed Control	
Hand Hoeing	7/16/1999
Mechanical Cultivation	4/21, 7/20 and 10/05/1999
Harvest	
Combine	9/23/1999
Settings–Cylinder speed–1100 rpm, Ground speed 2 mph, chaffer sieve 2/4 open and finishing sieve 1/2 open	
Cleaning and Processing	
Hammermill settings–3/8 inch screen with 400 rpm (setting #4)	
297-D Clipper with screen size of 10-8-1/12-28x28	
Rate of feed through hopper–fast, upper adjustment 1/2 open, top door air opening–1/3, fan speed 150 rpm and shaker speed–450 rpm	

9062861 Muttongrass

Field Ripped to 12" depth	3/2 and 11/15/1999
Broadcast spreader	
28 lbs Nitrogen	5/17/1999
35 lbs P2O5	5/17/1999
30 lbs Nitrogen	10/13/1999
30 lbs P2O5	10/13/1999
Irrigation	
3" water application	3/5, 5/3, 5/20, 6/7, 8/2, 9/29, 10/28, and 11/17/1999

Herbicide Application	
2,4-D @ 1.5 quart per Acre	6/18, and 7/19/1999
Prowl pre-emergent @ 1 gallon per Acre	11/16/1999
Cultural Weed Control	
Hand Hoeing	4/20/1999
Mechanical Cultivation	2/16, 5/14, 6/29, and 7/27/1999
Harvest	
Forage Harvester	5/11/1999
Cleaning and Processing	
Hammermill settings–3/8 inch and ¼ inch screens with 1000 rpm (setting #10)	
297-D Clipper with screen size of 12-10-8-32x32 for 1st Run	
6-1/2-1/15-6x32 2nd Run, Rate of feed through hopper–slow, upper adjustment–1/2 open, top door air opening 1/3, fan speed 120, and shaker speed–400 rpm	

9062860 Western Wheatgrass

Field Residue Burned	3/9/1999
Field Ripped to 18' depth	5/7/1999
Fertilization Broadcast Spreader	
50 lbs Nitrogen	4/28/1999
50 lbs P2O5	4/28/1999
28 lbs Nitrogen	5/17/1999
35 lbs P2O5	5/17/1999
Irrigation	
3" water application	3/4, 4/29, 5/19 and 6/17/1999
Herbicide Application	
2,4-D @ 1.5 quart per Acre	3/23, 5/19, and 9/17/1999
Harvest	
Combine	7/28/1999
Settings–Cylinder speed–1100 rpm, Ground speed 2 mph, air adjustment–closed, chaffer sieve 1/2 open and finishing sieve 1/4 closed	
Cleaning and Processing	
Hammermill settings–3/8 inch screen with 200 rpm (setting #3)	
297-D Clipper with screen size of 14-13-1/14x1/4-1/20	
Rate of feed through hopper–slow, upper adjustment-1/2 open, top door air opening–1/3, fan speed 200 rpm and shaker speed–300 rpm	

VII. Transplant Production

Common Name	Treepots Delivered 1999
Mexican Cliffrose	89
Banana Yucca	167
Fernbush	131
Rubber rabbitbrush	84
Apache plume	108
Big Sagebrush	217
Elderberry	38
Century Plant	50
Utah Serviceberry	28
Desert Barberry	77
Curl-leaf Mountain Mahogany	82
Morman Tea	58
Skunkbush Sumac	1
Currant	92
Coral-berry	50
NM Locust	27

VIII. Specialized Treatments

Seed Propagation Notes:

A. No Seed Pretreatment
   Agave utahensis
   Artemisia tridentata
   Chrysothamnus nauseosus
   Eriogonum umbellatum
   Fallugia paradoxa
   Yucca baccata

B. Cold Moist Stratification at 40°F
(Interval from initiation of cold treatment to first seedling emergence in cold)
Berberis fremontii–5 week cold
Chamaebatiaria millefolium (First lot)–17 days cold, (Second lot)–24 days cold
Cowania mexicana (First lot)–4 weeks warm followed by 3 weeks cold, (Second lot)–13 weeks cold

C. *Cercocarpus ledifolius*
Overall, very poor germination was achieved. Two seed treatments were tested: mechanical scarification for 30 seconds with 100x grit sandpaper and a control. These treatments were followed by cold moist stratification at 40°F for 24 weeks. The scarified seed had a mean germination percentage (± std. dev.) of 5.8% ± 0.8% versus 3.6% ± 0.9% for the control.

D. The *Ribes* sp. seed was subjected to cold moist stratification for 24 weeks. This *Ribes* exhibited extremely low germination; estimated germination was less than 1%.

E. The *Robinia neomexicana* seed lot was collected on September 29, 1990. Notes on the seed package indicated it had been soaked in nearly boiling water for 3 minutes on February 4, 1991. The PMC received the seed in late 1995. The seed was scarified in a rock tumbler with pea gravel and coarse carborundum grit for 3 days. The seed germinated in 5 to 8 days and was transplanted from 288 plug trays into 10 cubic inch Super Cells 11 to 13 days after sowing. The estimated germination percentage was 50 to 60%.

The *Sambucus* species had extremely low germination (probably much less than 1%) after 24 weeks cold moist stratification.

The *Symphoricarpos oreophilus* seed was subjected to 3 day gibberelic acid (GA3) or water soaks after tumble scarification for 3 days or no scarification. The seed was then cold-moist-stratified for 24 weeks. The germination percentages were as follows:

3 day water soak, no scarification	6.7%
3 day GA3 (500 mg/l) soak, no scarification	5.3%
3 day water soak, tumble scarified	9.7%
3 day GA3 (500 mg/l) soak, tumble scarified	17.1%

IX. Observations

The Blue Grama seed field looked very promising this year, with many seed heads being produced by the plants. Upon checking the seed heads, seed fill is still a problem and production was anticipated to be low. The Western Wheatgrass field looked slightly better this year and produced more seed than last year, but the field seems to be declining.