

# LITTLE BIGHORN BATTLEFIELD NATIONAL MONUMENT

## 2007 Annual Technical Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE  
PLANT MATERIALS CENTER  
BISMARCK, NORTH DAKOTA

### INTRODUCTION

The National Park Service (NPS) has a need to preserve the native plant resources and restore the parkland of the Little Bighorn Battlefield National Monument (LIBI). The NPS requires that restoration of native plants will be accomplished using germplasm from populations as closely related genetically and ecologically as possible to the park populations. Quantities of native seed are needed to restore areas disturbed by construction activities for a proposed road rehabilitation project. The NPS has requested assistance from the Bismarck Plant Materials Center (PMC). The PMC has agreed to increase seed of four selected grass species collected at LIBI. Technical assistance in planting, growing and cleaning of seed will also be provided to LIBI. The agreement was signed in September 2005 and runs through FY 2008.

### Targeted Species

Species	Common name	PLS lbs (goal)	2007 harvest (lbs)
<i>Nassella viridula</i>	Green needlegrass	100	2.88 (clean)
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	100	30 (clean)
<i>Bouteloua curtipendula</i>	Sideoats grama	50	36 (clean)
<i>Bouteloua gracilis</i>	Blue grama	10	4 (clean)

### MATERIALS AND METHODS

Seed was collected by LIBI personnel in 2005 and sent to the PMC in the fall for cleaning and increase. The seed was cleaned using a two-screen office size fanning mill, a small debarker with rubber bats and rubber corrugated lining, and pan screens. Each species of seed was assigned an accession number (identification number). Seed germination and purity were tested by the North Dakota State Seed Department. Cleaned seed of green needlegrass was planted at the Bismarck PMC in late fall of 2005. The other grasses were planted in the spring of 2006. The seedbeds were black and had been firmed (packed) prior to seeding. Seed was planted using a modified Truax grass drill with 42-inch row spacing. Blue grama seed, which was very limited, was planted using a plot seeder with 8 inch row spacing. Fields were maintained by hand weeding, tillage, irrigation and herbicide application. Approximately 100 seedlings were grown in the greenhouse for each of the targeted species. These were transplanted to the field to fill in gaps in some of the rows. Seed produced in any of the fields in 2006 were harvested by hand. Following are details related to seed increase activities for each grass.

**Green needlegrass: accession 9092048**

Collected seed: Dirty weight-7.7 lbs; bulk after cleaning-4.5 lbs.

Seed cleaning: Debearder and a two-screen office fanning mill. The debearder speed was 160 rpm for 15 minutes. The office mill screen sizes were #9 round on top and a 1/22 bottom screen, with air ½ open.

Seed quality: Purity-97.09%; Germination-2%; Dormancy-86%.

Seeding date: November 23, 2005. Due to high dormancy, seed was planted in late fall.

Site preparation: The field was cultivated and packed. Trust (trifluralin) herbicide was applied at 2 pints/ac and incorporated prior to seeding. Field conditions were very moist at the time of seeding.

Seeding: Seeding rate was approximately 50 seeds (bulk)/linear foot. Eight rows, approximately 800 feet long were planted on 42-inch row spacing. The field had little snow cover over the winter, so little moisture was available in the spring of 2006.

Maintenance: In 2006, the field was hand weeded and irrigated. Broadleaf weeds were sprayed with 2, 4-D at 2 pints/ac on August 10 and August 21, 2006. In the fall, the tops of the weeds were clipped to prevent further seeding of weeds. On April 2, 2007, the field was fertilized with 23-37-00 at around 80 lbs/ac of actual N. On April 23, Pendant (pendimethalin) herbicide was applied at 1.8 pints/ac. On May 7 and on June 20, Curtail (clopyralid+2, 4-D) herbicide was applied at 2 pints/ac. 2, 4-D herbicide was applied on August 15. The field was also cultivated, roto-tilled and hoed by hand periodically during the summer of 2007. After the field was roto-tilled, loose soil was raked off the newly emerged seedlings.

Plant performance: Stand was poor in the spring of 2006 and remained poor throughout the growing season. The field had some rows with stretches of good plants, while other plants were widely scattered. Broadleaf weeds were a problem. In the spring of 2007, growing conditions were much improved. The rainfall from April-June was about three times as much as was received in the same period in 2006. Much more seed germinated and a good stand has developed. Newly germinated plants remained vegetative in 2007.

Harvest: No harvest in 2006. In 2007, seed was harvested periodically by hand, beginning on June 27. Seed was primarily harvested from plants which had germinated in 2006. The plants that first emerged in the spring of 2007 did not produce seed. A total of 2.88 lbs of clean seed were harvested in 2007.

**Bluebunch wheatgrass: accession 9092050**

Collected seed: Dirty weight-6.4 lbs; bulk after cleaning-3.9 lbs.

Seed cleaning: Debearder and a two-screen office fanning mill. Seed was run in the debearder for 10 minutes. A #14 round screen was used as a top screen and a blank was used on the bottom. Wind was ¼ to ½ open.

Seed quality: Purity-90.2%; germination-90%.

Seeding date: May 4, 2006

Site preparation: The site was prepared by cultivation and packing. The herbicide Trust (trifluralin) was applied at 2 pints/ac on May 2, 2006, just prior to seeding. The field was black and soil moisture was fair at the time of planting.

Seeding: Seeding rate was approximately 40 seeds (bulk) per linear foot of row. Eight rows about 800 feet long were seeded on 42-inch centers.

Maintenance: In 2006, the field was hand weeded and irrigated throughout the growing season. No additional chemicals were applied after seeding.

On April 2, 2007, the field was fertilized with 23-37-00 at about 80 lbs/ac of actual N. On April 23, Pendant herbicide was applied at 1.8 pints/ac. On April 26, Tilt fungicide at 4 oz/ac was applied. On May 7, Curtail herbicide was applied at 2 pints/ac. 2, 4-D was applied on July 17 and August 15 at 2 pints/ac. Some hand hoeing and spot spraying was also done during the growing season.

Plant performance: During 2006, broadleaf weeds were severe in some portions of the field. Stand was spotty. Plants remained small and very few seed heads were formed. Plant growth was slow and plants remained short. Plants were larger in areas where weeds were not so competitive. With improved growing conditions in 2007, a better stand developed. Most of the field was very clean. In one area where weed cover was especially thick in 2006, the grass stand remained poor in 2007. Following the harvest, the field did not green up much with cooler fall temperatures.

Seed harvest: No seed was harvested in 2006. On July 9, 2007, 55 lbs of seed was harvested with a Wintersteiger combine. The cleaned weight was 30 lbs.

### **Blue grama: accession 9092047**

Collected seed: Dirty weight-341 grams; bulk after cleaning-51 grams. Most collected seed was empty.

Seed cleaning: Debearder and office fanning mill. Seed was run in the debearder for 10 minutes at 160 RPM. Office mill screen sizes were #12 round on top and a blank for the bottom screen. Air was ¼ to ½ open.

Seed quality: No seed tests were run. Hand cutting seed showed a fill of 80% or greater for the cleaned seed.

Seeding date: June 2, 2006

Site preparation: The field was prepared by cultivating and packing. Atrazine herbicide was applied at 2 pints/ac on May 19, 2006.

Seeding: A plot seeder was used to plant a field bed of about 800 square feet. The bed consists of 8 rows with 8-inch spacing. The seed was planted at a rate of about 1 gram of bulk seed per 30 linear feet of row.

Maintenance: The field was hand weeded and irrigated in 2006. No herbicide, other than the Atrazine prior to planting, was applied to the field. In 2007, the field was hand rogued.

Plant performance: An excellent stand developed in 2006. Due to narrow spacing weed competition was very minimal. The plants were vigorous and produced numerous seed heads. Maturity of seed was late in the field. Seed maturity is often variable the first year. However the seed fill was poor, due to hot, dry conditions. In 2007, the excellent growing conditions encouraged a better seed fill.

Seed harvest and cleaning: On September 28, 2006, the seed was harvested by hand clipping the heads. The seed was cleaned using a hammer mill, debearder and fanning mill. Fanning mill screens were #12, #11, #10, and #8 round. Seed was run in a small debearder for 10-15 minutes. Sticks were difficult to remove from the seed. Harvesting by clipping stems is not the best method. Three lbs of clean, bulk seed was harvested in 2006. On August 24, 2007, 7.5 lbs was harvested from the field with the Wintersteiger combine. The weight of clean seed was 4 lbs.

**Sideoats grama: accession 9092049**

Collected seed: Dirty weight-4.75 lbs; bulk after cleaning-1.8 lbs.

Seed cleaning: Office fanning mill, with screen sizes #20 and #24 round on top and a blank on the bottom.

Seed quality: Purity-97.93%; Germination-26%; Dormancy-15%.

Seeding date: May 30, 2006

Site preparation: The field was prepared by cultivating and packing. Atrazine was applied at 2 pints/ac on May 19, 2006.

Seeding: Seed was planted at a rate of 49 bulk seeds per linear foot of row. A modified Truax grass drill was used to plant 6 rows spaced on 42-inch centers, for a length of about 800 feet. The seed fed slowly through the drill, so both the fluffy box and the cool-season boxes were used.

Maintenance: In 2006, the field was hand weeded and irrigated. No herbicide was applied following the seeding. Rows were shallow tilled to control small weeds. In 2007, the field was worked with the two-row tiller. In June 2007, Atrazine was applied at 2 pints/ac. The field was also rogued several times during the growing season.

Plant performance: In 2006, the stand was spotty, but overall was fair. Plants were vigorous and produced some seed heads. By 2007, a much better stand had developed.

Seed harvest and cleaning: On September 28, 2006, the ripe seed was hand stripped. Flowering was very late and much of the seed was still green at the time of frost. Seed maturity was quite variable, which is common for first year seedlings. The seed was cleaned using the office-size fanning mill with # 20 and #24 round screens on the top and a blank on the bottom. Much of the seed was not filled. Dirty seed amount-5.5 lbs; clean weight-1.4 lbs. In 2007, the seed was harvested with the Wintersteiger combine on August 1. Dirty weight-54 lbs; clean weight-36 lbs. The purity was 96.09%; germination was 35%; dormancy was 44%.