**Project COPMC-S-0401-CR**
**Project Report 2007**
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# Seed Increase for Fire Rehabilitation Needs
# Bureau of Land Management-Colorado

## INTRODUCTION

The Bureau of Land Management has reseeded over 50 thousand acres in western Colorado over the past 15 years. Like many western states, large wildfires in Colorado are recently more common; being both more numerous and larger in scale than had been historic wildfires. In fact, the largest fire in Colorado's history occurred in 1988. The "I Do" fire near Maybell, Colorado, consumed more than 15,000 acres with about one third of those acres on BLM managed lands. Only two years later, the "Bircher" fire near Cortez, Colorado, broke the record again by burning over 23,000 acres. In 2002, the Hayman fire consumed over 70,000 acres. The trend does not appear to have peaked, as much of the west is consumed by individual wildfire events burning thousands of acres annually. Since much of the burned acreage is also treated with some type of seeding to reduce erosion and to reestablish vegetative cover, seed has been in high demand.

With increases in sizes of wildfires and frequency of events, the demand on the seed industry, especially for native species, has been greater than the supply during recent years. This demand has created an unfavorable situation in which seed of desired species may be in short supply, costly, of low quality (poor germination or purity), or unavailable altogether. This often results in price fluctuations and quality or even species sacrifices by entities purchasing seed for revegetation projects. These seed substitutions often result in revegetation projects achieving less than they are capable of based on testing.

## BACKGROUND

During the record fire season of 2000, BLM of Colorado treated over 18,000 acres at a cost of over one million dollars. Limited availability and quality of desired native materials prompted the BLM office in Meeker, Colorado, to contact Upper Colorado Environmental Plant Center (UCEPC) about a potential cooperative project for seed increase. An informational meeting was held on January 16, 2001, with UCEPC staff and Meeker BLM personnel to determine what the local BLM office needed and how UCEPC could help them get what they needed. What was expressed by BLM as the most important items included a consistent supply of locally adapted native seed with purity and germination standards no less than the industry standard for certified seed of that individual species, and at a price that was not prohibitive for project inclusion.

Interest in the project soon expanded from the Meeker field office to include a good portion of those offices affected by the same chronic seed source problems related to revegetation projects. Jim Cagney of the Meeker BLM office contacted Mark Stiles about the project potential in late February, and interest was expressed at the state level. On March 19, 2001, a meeting was held at UCEPC, which included local and state BLM personnel, Plant Center staff, and members of the Administrative Board. BLM needs were addressed as well as the capabilities of UCEPC to deliver products and services to meet the expressed needs. A review of UCEPC facilities and its

structure as well as a potential scope of activities were discussed. In addition, a list of potential seed increase species was reviewed and Rusty Roberts agreed to survey field offices for input regarding desired species for fire rehabilitation.

Rusty reported back via e-mail on May 7, 2001, that six of the species reviewed during the meeting in March had favorable responses and three additional species were added to the list of candidates. A preliminary proposal from UCEPC was submitted to Dennis Zachman of the state BLM office for review. Dennis submitted to the state a proposal to determine the level and willingness of the state to support a seed increase project. Revisions and further proposal development continued, but species for the increase effort had to be targeted so collections could be initiated and conducted as efficiently as possible.

Rusty followed up with an e-mail to field offices on June 7, 2001, that five species had been selected for initial increase efforts and that contact by UCEPC personnel would be forthcoming. On June 8, a detailed project proposal with budgetary estimates was submitted by UCEPC to Dennis Zachman for inclusion into a cooperative agreement between BLM, UCEPC, and NRCS.

## METHODS

Project activities started with a sit down session in Grand Junction on June 25, 2001. This, as with the other sit down sessions at field office locations, was extremely beneficial in identifying potential collection sites, revegetation history, grazing or other use history, fire history etc. These factors and others were discussed to aid in selecting the sites with the highest potential for successful collecting.

A few days later, on July 3, the first day of collection by UCEPC occurred in the Little Park area on the Uncompahgre Plateau south of Grand Junction. A recap of the coordination meetings, collection areas, and clean seed amounts obtained from 2001, 2002, 2003, and 2004 is included in this report as a separate attachment.

Seed collection results were disappointing for the first year. Drought conditions over much of the collection area produced little amounts of viable seed. In addition, a hard freeze occurred on May 20, which also contributed to the poor seed fill in much of Northwest Colorado. Seed of one species, Utah sweetvetch, was collected in quantities large enough to plant a seed increase field, but was collected primarily from one site. It is the recommendation of UCEPC that we add to the genetic variability and diversity of the increase species by collecting from several locations, bulking the seed and then planting the source field. Additional collections were obtained in 2007, but on a limited scale. The other four materials, bottlebrush squirreltail, beardless bluebunch wheatgrass, western wheatgrass, and Sandberg's bluegrass were collected in gram quantities in 2001. One species that was noted to have produced good quantities of seed but was not collected was bluebunch wheatgrass *Pseudoroegneria spicata spicata*. Our agreement called for the collection of beardless bluebunch *Pseudoroegneria spicata inermis*. Because of such limited success with beardless bluebunch collections (12 grams), we decided

during our coordination meeting with Dennis Zachman on March 30, 2002, to expand the collection list to include bluebunch wheatgrass and needle and thread. Adding these two species would increase the opportunities to collect quantities necessary to establish some production fields for the project.

In 2002, collection results were also limited. As the driest recorded year since the establishment of the Plant Center, extremely poor seed fill resulted in collections of gram quantities of two species, Sandberg's bluegrass and bottlebrush squirreltail. A single site produced a little less than two pounds of needle and thread.

As fate would have it, collections in 2003 were quite good. Even though 2002 was one of the driest years in recorded history in the west, spring moisture was adequate to produce seed in most early season species in 2003. As a result, good quantities of seed of five of the targeted six species were obtained. Utah sweetvetch was the only targeted species that did not produce good collections in 2003. One site located north of Gypsum, Colorado, had good numbers of plants blooming on a collection trip June 17, 2003. The following week, a brush fire encompassed the area which prohibited access. In addition, Carla Scheck, Glenwood office BLM indicated there would likely be no seed to collect for a few years on the sites we were using because of the scope and location of the fire.

A cool but dry spring in 2004 also resulted in extremely poor seed fill. On two collection trips, no seed of targeted materials was collected. As a result, no additional attempts at seed collection were made in 2004. Seed collection quantities were good in 2003, and after confirmation with Dennis Zachman, BLM state office, it was determined to proceed with the project. As planned, blended collections were used for the seed increase plantings to maximize species diversity within the range of anticipated use.

Bottlebrush squirreltail was planted using two separate collections from separate years, but from the same source. Accession 9092275 was collected in 2001 and again in 2003. Together, the collections provided adequate seed for an increase planting. Furthermore, the bottlebrush squirreltail complex was undergoing taxonomic transformation during the collection years. Historically, bottlebrush squirreltail was know as *Sitanion hystrix*, but was renamed *Elymus elymoides.* There had been much confusion on separate species, subspecies or genetic gradients of individual populations by taxonomists with squirreltails. Currently, there are two accepted species, *E. multisetus* and *E. elymoides*, with four subspecies of the latter. In Colorado, two subspecies of *E. elymoides* exist in identifiable populations: *E. elymoides elymoides* and *E. elymoides brevifolius.* We had also collected from extreme northwest Colorado an *E. elymoides elymoides* sub-species. Again, after consultation with Dennis Zachman, we opted to use the same source material rather than mixing sub-species or waiting for a good collection opportunity for the *elymoides* sub-species.

Western wheatgrass is represented by one collection, accession 9092278, from one location during a single year. This increase, although containing the least genetic diversity of the collected increase species, was also the only collected population with enough viability in the seed to establish a planting.

The third material, bluebunch wheatgrass, was the most equally represented blend used for increase. Three collections from northwest Colorado were utilized to establish this species. Collections were obtained from Pisgah Mountain in north central Colorado, State Bridge in the central portion of the mountains and Irish Canyon in extreme northwest Colorado. These collections are identified by accessions 9092276, 9092277, and 9092274, respectively.

On April 28, 2005, a site visit was conducted with the State Plant Materials Specialist and the State Range Conservationist for NRCS to determine the collection potential for Utah sweetvetch. It was determined that the site would not have adequate seed for a collection effort, so no collection effort for this species was conducted for 2005. To date, Utah sweetvetch has been collected one year out of five from a single site. Concern had been expressed about the lack of genetic composition for a material that may be used throughout the state of Colorado on BLM lands. However, the species has been recognized as being an important component in the fire rehabilitation seed mix. Because the species is also insect pollinated, subsequent seed collections could be added to a seed production field to increase the genetic base if the opportunity exists for additional collections.

## 2006

A collection trip was taken on June 2, 2006, along Highway 64 and Highway 40 in extreme northwest Colorado. A small amount of seed was acquired from the trip, but seed collection potential looked to be grim for 2006. Thirteen grams of Sandberg's bluegrass were collected from two different sites. No other collections of target species were made in 2006.

Two additional plantings for Utah sweetvetch were made by UCEPC in 2006 in order to improve the stand. Seed harvest of two of the three fields planted in 2004 was accomplished in 2006. In addition to seed harvest and maintenance, a comprehensive plan for the infusion of contracted seed production will also be completed. It is estimated that seed distribution to growers will be initiated in 2008 and 2009 for contracted seed increase.

## 2007

In light of the difficulties encountered with Utah sweetvetch collections, activities for 2007 included a transplant effort of containerized stock and two intra-seedings in the spaced planting. The Sandberg's bluegrass was not strongly evident in 2006, so additional efforts were necessary for the establishment of it in 2007. A small seeding was also conducted in the north end of the

bottlebrush squirreltail field. The bluebunch and western fields have filled in nicely, and they were productive in 2007.

Collections were done on several dates in 2007, and seed for each of the increase materials was acquired. However, most of the collections were limited in quantity and will likely be used more for testing than seed increase.

| Species | Date | Collection Amt. | Location |
|---|---|---|---|
| Bluebunch wheatgrass | July 18, 2007 | 25 g | Little Hills |
| Bottlebrush squirreltail | June 7, 2007 | 89 g | Masadona |
| Sandberg's bluegrass | June 7, 2007<br>June 8, 2007<br>June 8, 2007<br>July 23, 2007<br>Undated | 20 g<br>5 g<br>3 g<br>16 g<br>15 g | Moffat Cty. Rd. 61<br>Gypsum drainage<br>Gypsum radio tower<br>Ryan Ridge<br>R. Blanco Cty. Rd.73 |
| Utah sweetvetch | Undated<br>July 18, 2007<br>July 23, 2007 | 2 g<br>23 g<br>22 g | Blair Mesa<br>" "<br>" " |
| Western wheatgrass | Aug.16, 2007 | 324 g | Irish Canyon |

In 2007, seed was harvested from the bottlebrush squirreltail, western wheatgrass, and the bluebunch wheatgrass fields. No seed was harvested from the Utah sweetvetch or Sandberg's bluegrass fields, as work to establish stands continues for both of these products.

The table below outlines the establishment and production accomplishments of UCEPC to date.

| SPECIES | UCEPC FIELD # | ACREAGE | PLANTING DATE | HARVEST DATE | YIELD |
|---|---|---|---|---|---|
| Bluebunch | 6 | 0.87 | Aug.13, 2004 | 6/29/2006 | 32 lb |
| | | | | 7/6/2007 | 61 lb |
| Bottlebrush | 17 | 0.80 | Aug. 13, 2004 | 7/13/2006 | 45 lb |
| | | | | 7/20/2007 | 55 lb |
| Sandberg's bluegrass | 12 | 1.00 | Aug. 8, 2005<br>Aug. 9, 2007 | No harvest | |
| Utah sweetvetch | 12 | 1.00 | Sept. 15, 2005 | No harvest | |
| | | | Intra-seeded June 6, 2007 | | |
| | | | Transplanted June 2007 | | |
| Western wheatgrass | 7A | 0.80 | Aug. 13, 2004 | 8/2/2007 | 212 lb |

## CONCLUSION

After attempting to collect seed since 2001, seed from minimal prior collections was used to supplement sparse or weak stands of previously planted materials; specifically Utah sweetvetch and Sandberg's bluegrass. Additional collections may be necessary to supplement the existing collections and to ensure that "source seed" is on hand for future testing or development. Additional field establishment efforts will be necessary to obtain good stands of target materials. Coordination between UCEPC and field offices will again be necessary as this project progresses. A comprehensive and equitable distribution plan must also be completed and agreed upon for pre-determined contract production.

Seed production has been obtained on three of five species. Three species, bluebunch wheatgrass, western wheatgrass, and bottlebrush squirreltail, all have excellent stands and appear to be good producers. UCEPC has released two bottlebrush squirreltail sources, and the BLM source looks to be as good as our two previous releases. All three materials should produce seed again in 2008. The Utah sweetvetch may produce a limited amount of seed. Colorado State University Extension Entomologist Bob Hammon also brought some leafcutter bees to the Plant Center in 2007 in an effort to assure the presence of pollinators for the crop. However, UCEPC had difficulty keeping deer out of the sweetvetch, and as a result, there was no production. Efforts to supplement the breeder seed will be a priority, as will the establishment of Sandberg's bluegrass.

A coordinated plan for seed dispersal will need to be developed this year so that seed increase efforts on a large scale will be initiated. Coordination partners include Upper Colorado Environmental Plant Center, Colorado Seed Growers Association, and BLM.