Upper Colorado Environmental Plant Center
Meeker, Colorado

2009
Annual Technical Report

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2009 Annual Technical Report

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Upper Colorado Environmental Plant Center

Fiscal Year 2009

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Upper Colorado Environmental Plant Center

Established primarily as a means to identify, increase and introduce superior plant materials for identified conservation uses, Upper Colorado Environmental Plant Center (UCEPC) has played a vital role in revegetating disturbances in the inter-mountain west. Owned and operated by the Douglas Creek and White River Conservation Districts, UCEPC has had, since its inception in 1975, the specific charge and primary responsibility for collecting, evaluating, testing, selecting and producing quality plant species for the Upper Colorado River Basin. Superior materials, upon research completion, are then increased, released and made available to the public where they are utilized for a variety of conservation purposes.

UCEPC, at 6500 feet in elevation, is unique in that it is the highest elevation center within the Plant Materials system. A vital need was identified over 25 years ago within NRCS and among many NRCS customers for plant materials and associated technology for high elevation uses.

The Center was also strategically placed near the world's largest deposit of oil-bearing shales, and within an area rich in other mineral deposits. The area is also home to the world's largest concentration of mule deer and elk, which made for considerable interest in providing quality plant materials for revegetation uses related to energy extraction activities.

Much of the research and development of plant materials from agronomic, arable land is provided primarily by the Agricultural Research Service and University Experiments Stations and Extension Services. As a result, the focus of the UCEPC Plant Materials Program is on plant material development for conservation uses on high elevation disturbances, rangeland, wildlife habitat and riparian corridors. There is, however, a certain degree of overlap in the utility a material may provide. For example, many of the grass species developed in the plant materials program for use in rangeland enhancement have been used on thousands of acres of agricultural ground through federal programs such as the Conservation Reserve Program (CRP). Other programs, such as the Buffer Initiative Program, Environmental Quality Incentives Program and Wildlife Habitat Improvement Program may utilize UCEPC developed materials. These programs have been initiated to reduce soil loss and improve water quality while providing concurrent benefits to livestock, wildlife and humans.

Because of the multitudes of existing problems, which can be alleviated, with the use of properly selected plant materials, the direction of the plant materials program and prioritization of projects and materials undertaken by UCEPC is largely provided by the Technical Advisory Committee. This committee is made up of State Conservationists, State Resource Conservationists and other representatives of state and federal agencies, universities and private industry. Key, too, to this process and the operation of UCEPC are local conservation districts, and NRCS Field Office and district employees. From individual districts, plant materials, which can aid in solving conservation problems are identified and collected. These materials are then provided to UCEPC for testing and evaluating against the same or comparable materials prior to seed increase or release. It is within this framework that the best materials are made available for the identified conservation use on the area they were developed for and by the users who will benefit from their inclusion in seedings or plantings.

Presently, there are many plant species and projects at UCEPC, which our Technical Advisory committee has identified as providing substantial benefit for resource conservation. These projects fall into one of five identified High Priority Areas listed below:

- Revegetation of high altitude and disturbed land
- Increased productivity of rangeland and pastures
- Improved water quality
- Wildlife habitat enhancement
- Use of native plants in xeriscape and horticulture

These projects include years of evaluations at numerous testing locations, small seed increase fields, and the production of foundation quality seed of materials released for use by the public. The plant materials, which are developed as a result of the projects encompassed by these priority areas, will provide direct and indirect benefit to the resources of Colorado and to those who call Colorado "Home" for many years to come.

Research projects utilizing plant materials developed by UCEPC have ranged in scope from channel restoration and stabilization to roadside revegetation and from enhancement of mule deer winter range to phytoremediation of heavy metal runoff from mine spoils. Range, water and soil resources have been and will continue to be conserved and improved with UCEPC products. Reclamation and revegetation of utility and transmission corridors and natural and man induced surface disturbances are more successful as a result of research and products developed for those purposes, and livestock and wildlife forage and habitat are improved by the plant materials program and the many entities which assist in and cooperate with our mission.

For information about Upper Colorado Environmental Plant Center or any of its products or services, including specific information about plants, please contact us at (970) 878-5003 or steve.parr@co.nacdnet.net.

Project No. 08A073J
Progress Report – 2009
By: Steve Parr

Antelope Bitterbrush for Fire Tolerance

INTRODUCTION

Antelope bitterbrush *Purshia tridentata* is one of the most widely distributed of all western shrubs. It can be found on arid plains, foothills, and mountain slopes in association with pinyon pine, ponderosa pine, and aspen. Antelope bitterbrush is regarded as an important browse species and is especially critical as winter forage for mule deer, elk, and as the name implies, antelope.

Antelope bitterbrush has a high priority for use in revegetation of surface disturbances related to oil and gas well disturbance, pipelines and service roads, wildlife habitat improvement, and rangeland seeding in the Upper Colorado River Basin. The prostrate layering characteristic of certain accessions of antelope bitterbrush is considered beneficial for these purposes.

Some antelope bitterbrush stands are very susceptible to fire. As a result, large areas of antelope bitterbrush have been burned in the Upper Colorado Region and have not naturally regenerated.

OBJECTIVE

The original purpose of the project was to evaluate the performance of accessions of antelope bitterbrush at Upper Colorado Environmental Plant Center (UCEPC) in Meeker. In 1992, another objective was added, to determine the relative ability of the accessions to sprout after fire. A third objective was identified after the results from the burning. This objective was to increase a seed source from the identified fire tolerant accession.

METHODS

Tubling plants of 17 accessions were grown in the greenhouse and transplanted to a dry land site on June 6, 1983. See Table 1 for the accessions included. Table 2 lists the growth form for the accessions. Plants were planted in rows with 8-foot centers (Figure 1). Each accession was planted in two replications of 15 plants each, except when not enough plants were available. Only one replication was planted for accessions 9038520, 9038526, 9030795, and 9038530.

To determine the ability to sprout after fire, 50% of the plants in each accession were burned on September 2 - 3, 1992. Prior to burning, the shrubs were pruned to a size small enough to fit into the burn barrel. The shrubs were burned at maximum intensity (about 400 F) for 2.5 minutes. A total of 139 shrubs were burned. Soil samples and weather records were taken to determine site conditions at the time of burning.

Information on soil moisture was computed in 1998 to update the project report. The procedure is outlined below.

Project No. 08A073J
Progress Report – 2009
By: Steve Parr

1992

The plants were burned on September 3 (59 plants) and September 4, 1992, (80 plants). A light to heavy rain occurred on September 3 and amounted to 0.19 inch by the time recorded on September 8. Soil samples for soil moisture were taken on September 11, after the burn and rain (figure 2). Three samples were taken; one from the top five inches of soil, another from the five to ten inch layer, and one sample was taken from under a living plant in the center of the entire plot. Soil samples were placed in an oven at 75 degrees F (23 degrees C) for over 50 days to remove moisture. The percent soil moisture was determined on a dry soil basis (Figure 2).

2005

Seed had been collected for many years from both the re-sprouted fire-tolerant accession from this project as well as from a selected class release of bitterbrush from UCEPC, 'Maybell Select'. However, in 2005, a decision was made to remove the 'Maybell Select' shrubs because of the high potential of cross pollination that was likely occurring with it and the fire-tolerant source. Both plantings were also becoming decadent from old growth and were infested with annual weeds and Canada thistle. Additionally, the source of seed for 'Maybell Select' is less than 50 miles from UCEPC, and collections could be obtained from native stands. The fire-tolerant source has been maintained as a seed source.

2007

Herbicide applications were conducted to reduce the annual weedy competition between plants and to control the infestations of Canada thistle. Applications will be conducted as necessary. Pruning of decadent material was also identified as a management activity to improve seed production potential.

2008

Herbicide was again applied to control annual weeds, and pruning of decadent growth was done to improve vigor and appearance of planting. However, no seed was collected according to the seed cleaning records. Hard freezing temperatures were recorded on June 9, 10, 12, 13, and 16 which very likely affected seed set this year.

RESULTS

Accession 9038521 (from Soda Springs, Idaho) was identified as having the best ability to sprout after fire. Both replications (Row 12 and 25) were evaluated on August 16, 1996, (Table 3). In row 12, (north) one of the six plants that were burned was dead on August 16. Three burned plants had abundant regrowth, while the other two had only a small amount of regrowth.

In row 25, (south) three of the burned plants had abundant regrowth, while one had only a small amount of regrowth.

Notes on the plants taken on August 16, 1996, are presented in Table 3.

"On July 18, 2000, 153 grams of *Purshia tridentata* fire tolerant antelope bitterbrush was harvested from field twenty-one. There are twenty-three bitterbrush plants alive in the stand from the original planting of 30 transplants (see historic records). The north row has twelve surviving plants and the south row has eleven. Due to a fire ban within the county, the plot was not burned this year."

Table 1. A listing of bitterbrush accessions with location and number planted.

ROW	ACCESSION NUMBER	COLLECTION LOCATION	PLANTED
1	9031619	Colorado, (NPMC)	15
2			0
3	9038525	Six Mile Lake, OR	15
4	9038523	Celilo, OR	15
5	9007977	Rio Blanco County, CO	15
6			0
7	9024076	Eagle, ID	15
8	9038527	Weber County, UT	12
9			0
10			0
11	9024373	Moffat County, CO	15
12	9038521	Soda Springs, ID	15
13	9009355	Inyo County, CA	15
14	9038522	South Pass, WY	15
15	9038531	Moffat County, Co	15
16	9024377	Moffat County, Co	15
17	9038524	Long Valley Jct., UT	15
18	9030795	Colorado (NPMC)	7
19	9038524	Long Valley Jct., UT	15
20	9031619	Colorado (NPMC)	15
21	9038530	College Farm, NM	14
22	9024377	Moffat County, Co	15
23	9024373	Moffat County, Co	15
24	9007977	Rio Blanco County, CO	15
25	9038521	Soda Springs, ID	15
26	9009355	Inyo County, CA	15
27	9038527	Weber County, UT	12
28	9038520	St. Anthony, ID	9
29	9038523	Celilo, OR	15
30	9038525	Six Mile Lake, OR	15
31	9038526	Caribou County, ID	15
32	9038522	South Pass, WY	15
33	9024076	Eagle, ID	15
34	9038531	Moffat County, Co	15

Table 2. Growth form for all accession of antelope bitterbrush.

Accession Growth Number	Form
9031619	Prostrate
9038520	″
9038523	″
9007977	″
9038530	″
9024076	″
9038527	″
9038526	″
9024373	″
9038521	″
9038522	″
9038531	″
9024377	″
9038524	″
9038525	Upright
9030795	″
9009355	″

Table 3. A listing of the 1996 evaluation information collected on August 16, for 9038521.

Row	Planted	Survival	Ht. Cm.	Wd. Cm.	Vigor
North					
12	15	13			
		7 (not burned)	145	230	3
		5 (burned)	55	165	4
South					
25	15	11			
		7 (not burned)	90	195	3
		4 (burned)	50	130	4

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By: Steve Parr

2007

Since the evaluation done in 2000, one plant in the northern plot has died. On September 10, 2007, there were 11 plants that were alive in each the northern plot and the southern plot. There were also three smaller plants in the southern plot, but they did not look like original plants and were not noted in the evaluation from year 2000.

2009

The northern plot still contains 11 live plants. Plant 7, the 7th plant from the northern most plant, has layered and rooting has occurred south and west of the apparent "mother plant". It is possible that seed also established these plants, but it is not very evident as rooting appears to come directly from the parent plant. Plant 8 also has rooted from layered branches.

There are 13 plants in the southern block, but 4 plants look like they are volunteers based on size. Plant 3, 8, 12 and 13 - north to south- are small plants. Additionally, there were only 11 plants present after the 1996 and 2007 evaluations. However, in 2008, considerable plot clean up, weed control and decadent woody material was removed from the project, and the two "new plants" are likely 3-5 years old.

CONCLUSION

Year 2010 will represent 27 years of growth for the bitterbrush plants at UCEPC. It is hoped that seed can be collected from the plots this year, and that more intense management will improve plant performance. Seed will be used for further studies, including the determination of fire tolerance of another generation of plants, site adaptability and comparison to other bitterbrush sources that are commercially available.

Any bitterbrush plant not "in line" with the planted plots or otherwise appearing like they may have established from seed as a volunteer, will be removed in 2010.

Project 08A213
Progress Report – 2009
By: Steve Parr

Willow Planting at an Alkaline Site

INTRODUCTION

With the increased interest in riparian improvement projects and national programs such as WHIP and EQIP, Upper Colorado Environmental Plant Center planted multiple willow species in three separate locations during the spring and summer of 2000. Each of the species planted was collected from the Center's willow cutting block, which included 13 species of native willows. Materials were collected as 24″ hardwood cuttings in February and March of 2000 and held in suspended dormancy in a cold storage/bare root facility until the time of planting. Plantings were done at sites of varying elevations and stream characteristics.

The planting into an ephemeral stream's incised channel was done at an elevation of 6100 feet into alluvial soils with some alkaline characteristics. This planting was designed for species adaptability to heavy, alkaline soils, but also to re-establish woody riparian species into an ephemeral stream which is largely devoid of such materials. Extensive erosion of deep soils had created very deeply cut, steep sided channels, with little stability. Adapted woody plants are needed to aid in channel stabilization and to improve stream system dynamics of perennial and ephemeral steams.

The White River, along with 13 of Colorado's 15 major river drainages and other rivers in the Intermountain West, has had a recent but serious problem with whirling disease. This disease is thought to be one of the causes of trout population reductions. The disease has been identified as an ailment affecting trout development prior to bone ossification. In essence, there is very little natural recruitment of young trout into adult populations in streams affected with the amoeba spores responsible for transmitting the disease. The whirling disease parasite has a two-host lifecycle that includes trout and a bottom, muddy sediment dwelling tubifex worm. The tubifex worm is found in shallow, sunny stream sites underlain with fine sediments. Efforts to reduce soil sedimentation and water temperatures and increase oxygen water content may prove beneficial to trout recruitment. Both of these stream conditions can be altered with proper selection and establishment of streamside woody riparian species.

OBJECTIVE

The objectives of this planting are to (1) determine if willow cuttings can be successfully established in Jordan Gulch, an ephemeral stream, and (2) ascertain which species and which accession within each specie is more site adapted to an alkaline, moist sodic planting; and (3) compare five-year site success with other willow planting sites.

METHODS

Two plantings were conducted on August 22, 2000, on lower Strawberry Creek west of Meeker, Colorado, on the property of Bill and Phyllis Lake. One planting will compare three accessions of *Salix lutea*, yellow willow, to each other while a second planting will compare three

accessions of *Salix exigua*, coyote willow, to one another. In addition, one accession of coyote willow, 9070981, is a wild land collection from near the Plant Center rather than the other products which are nursery grown. The yellow willow planting is located north of the designated landmark; a road crossing in the gulch. The coyote willow planting is south of the road crossing.

Yellow Willow Planting

The yellow willow planting was done with Replication I starting just north of the road crossing. The planting consists of four replications of three accessions. Each replicated accession was planted with five entries across or perpendicular to stream flow. The two-foot cuttings were placed as deeply as soil would allow such that two to three buds were above ground. The cuttings were also planted at a slanted, downstream angle to help prevent debris from hanging up on the cuttings and washing them out. In all, each accession is represented 20 times in the planting. The plot layout is presented in Figure 1.

Figure 1.

N

Replication IV	834	x	x	x	x	x
	819	x	x	x	x	x
	835	x	x	x	x	x
Replication III	835	x	x	x	x	x
	834	x	x	x	x	x
	819	x	x	x	x	x
Replication II	819	x	x	x	x	x
	835	x	x	x	x	x
	834	x	x	x	x	x
Replication I	819	x	x	x	x	x
	834	x	x	x	x	x
	835	x	x	x	x	x

Road Crossing

Coyote Willow Planting

The coyote willow planting was done in much the same fashion, but with Replication I starting just south of the road crossing and continuing southward through the last entry in Replication IV. The planting, as mentioned, has four replications of three accessions, but each accession is entered eight times per replicated plot, or a total of 32 times within the planting. Cuttings were planted perpendicular to stream flow and with similar depths and angles as described for the yellow willow planting. The plot layout is presented in Figure 2.

Figure 2.

		N							
		Road Crossing							
Replication I	830	x	x	x	x	x	x	x	x
	981	x	x	x	x	x	x	x	x
	831	x	x	x	x	x	x	x	x
Replication II	830	x	x	x	x	x	x	x	x
	831	x	x	x	x	x	x	x	x
	981	x	x	x	x	x	x	x	x
Replication III	981	x	x	x	x	x	x	x	x
	831	x	x	x	x	x	x	x	x
	830	x	x	x	x	x	x	x	x
Replication IV	981	x	x	x	x	x	x	x	x
	830	x	x	x	x	x	x	x	x
	831	x	x	x	x	x	x	x	x

Results from these plantings will help satisfy stated objectives. Survival, new growth, and vigor will be monitored for five years to determine species/site suitability, and to provide confidence in recommendations for area buffer projects.

RESULTS

On September 25, 2002, evaluations were conducted to determine success of the project to date. The evaluations of two species, represented by six accessions, were conducted on Jordan Gulch, a tributary of the White River. Of the original planted materials, only three rows of yellow willow were identified in the yellow willow planting. While no original coyote willow rows were identified, numerous coyote willows were found growing where few existed when the planting occurred in August of 2000. Several theories about the “missing willow cuttings” center around large rainstorm events depositing sediment over the cuttings or washing the

cuttings out. One row of yellow willows, two plants, was also noted in the coyote willow planting. These plants, however, were in a row and are thought to have been planted in the wrong location.

The project was next evaluated in September of 2003. An excerpt from the 2003 report identifies the prolific willow growth. "None of the planted yellow willow rows were identified, but individual plants were persisting. However, no identification as to accession could be determined from observations. The results to date of the coyote willow planting are also difficult to interpret, but for different reasons. Coyote willows are now filling in the planted area (the bottom of a wash) to such an extent that planted willows cannot be detected from new growth. New growth is likely from vegetative growth and seed because the percent cover from willows has gone from only planted accessions at less than 5% cover to over 20% from the planted area upstream to a cross-fence and downstream approximately 30 yards from the estimated last planted location. The upstream migration is fairly clearly divided at the fence, which is also the location of a junction of two ephemeral stream channels. This upstream migration will be closely monitored through time. The downstream migration is less clearly defined. Some migration may be a result of the planting, while other willows may be coming in naturally".

2006

Six years after planting, willows persist upstream and downstream of the planting location. However, only coyote willows were observed, but they are present along the stream channel approximately 300 feet below the previously mentioned benchmark location for the planting. Willow presence downstream terminates just upstream from a pipeline installed and seeded in 2005. Willow migration upstream is about 200 feet. Through this entire reach, no yellow willows were found. However, the coyote willow component is quite well represented, albeit without recognition to individual collections. There does appear to be a reduction in the total willow density since the evaluation done in 2003. Trapped sediment from the planting has made a very suitable site for a robust herbaceous vegetative component, and has raised the incised channel approximately 50 inches vertically. This increased herbaceous component has likely competed with willow expansion perpendicular to channel flow. There now exists vegetation from bank to bank with approximately 70% cover.

2009

The evaluation was conducted October 16, 2009. It was noted that the planted site was very much grassed in, and that there was not any substantial incised channel remaining. Willow persistence was very good below the road crossing in the bottom, but willows had not migrated further downstream much from the last evaluation. The furthest downstream willows we located were about 100 feet above a pipeline crossing which is downstream from the road crossing.

Upstream willows were primarily on the west side of the draw from the fence line at the northern extent, downstream to where the "imaginary" or historic channel crosses to the east side of the draw about 50 feet above the road.
The site from general observation has few indications or characteristics that would make one think it could support willows, but is doing so still. Willows have been grazed, but look to be in good health.

The most notable thing about the site is the level of sediment deposition and build up that has occurred – mostly below the road. The original planting had approximately a 2.5 to 4-foot floor below the level of the road crossing. Today, the deposit level above and below the road is equal. There is no drop-off on the downstream side.

This build up of sediment in the lower part of the draw after planting willows has truly been impressive. Similar sites should produce similar results, but UCEPC has not done any more as of this date.

CONCLUSION

This observed species shift has been both dramatic and rapid. In 2000, the year of the planting, the site was largely devoid of woody vegetation, and had limited locations of herbaceous clumps along the undefined channel. Two years after planting, the 2002 evaluation revealed identifiable planted rows of both yellow willow and coyote willow, but still little herbaceous component within the incised channel.

Three years after planting, the willow growth and migration up and down the channel was impressive and unexpected. Willows were over six feet in height and well represented in the channel. Both species were identified, but individual accessions were not. Too much growth and expansion had occurred to locate, with certainty, the original planted stock. An herbaceous component was noted, but was minor in its presence.

Just six years after the willows were installed in Jordan Gulch, a fully vegetated channel bottom with a well defined “green line” of willows was observed.

Two of the objectives have partially been met while the third offers an opportunity for additional plantings. The first objective is to determine whether willow cuttings can be established on lower Jordan Gulch. Evaluations two, three, and six years after planting indicate that willows can be successfully established as cuttings and both persist and expand beyond the location of their planting. Portions of the second objective have also been met. Both yellow willow and coyote willow were established as cuttings and appeared to be healthy and vigorous in the early years following planting. However, during the shift from woody riparian stock to a more heavily vegetated herbaceous component, yellow willow died out. In addition, the identity of which accessions persisted is not possible without extensive effort. Coyote willow, as a species, is well suited to this site when compared to yellow willow. An additional planting site has been identified for a future study that will be used to compare the same objectives contained in this study, the third of which was to use this planting as a benchmark for planting comparisons.

The willow planting in an ephemeral stream has been successful in reducing erosion, trapping sediment, increasing herbaceous cover, and for determining that coyote willow is well suited for use in stream channel improvement projects in similar sites.

PROJECT 08I020J
Project Report – 2009 – Final Report
By: Dr. Gary L. Noller

Transplanted Woody Species - Orchard

INTRODUCTION:

The original planting was completed on August 8, 1977. Information on the methods for the original planting can be found in the project report for 1980. An additional planting of some woody species was done in 1981. The methods for this planting can be found in the project report for 1987 on additions to the orchard. The project contained 179 accessions of mostly woody tubling plant materials that were planted in fields 14 and 15 at the plant center. The plant center is characterized by a growing season of approximately 90 days, an elevation of about 6500 feet and average annual precipitation of slightly more than 16 inches. In 2007 and 2008 certain accessions were removed from the project and those remaining were trimmed to facilitate management and weed control. Accessions remaining in the planting are those that are candidates for release or are important for plant identification purposes. The remaining accessions are listed in Table 1. Each accession is identified as to the field (14 or 15) where they grow, accession numbers (old and new), common and scientific names. A map of locations for each accession in fields 14 and 15 was prepared in 2009 and is included in the report as Table 2.

Table 1. A listing of plant accessions for materials remaining in fields 14 and 15 at the plant center.

Accession Numbers		Common Name	Scientific Name
Old No.	**New No.**		
Field 14.			
154	9021438 (Released)	Utah serviceberry	*Amelanchier utahensis*
224	9021442	Saskatoon serviceberry	*Amelanchier alnifolia*
229	9024060(Released)	Chokecherry	*Prunus virginiana*
174	9024059	Chokecherry	*Prunus virginiana*
476	9008027	Silver buffaloberry	*Shepherdia argentea*
634	9024115	Utah honeysuckle	*Lonicera utahensis* (3)
635	9030476	Utah honeysuckle	*Lonicera utahensis* (15 & 18)
337	9030913	Golden currant	*Ribes aureum*
372	9024288	Wax currant	*Ribes cereum*
529	9024289	Wax currant	*Ribes cereum*
232	9015840	River hawthorn	*Crataegus rivularis*
459	9024181	Hawthorn	*Crataegus spp.*
609	9024176	Hawthorn	*Crataegus spp.*
698	9021435	Rocky Mountain Maple	*Acer glabrum*
615	9024147	Singleleaf ash	*Fraxinus anomala*
155	9024145	Singleleaf ash	*Fraxinus anomala*
?	?	Gooseberry	*Ribes spp.*

Accession Numbers		Common Name	Scientific Name
Old No.	**New No.**		
398	9024230	Littleleaf mountain mahogany	*Cercocarpus intricatus*
708	9024111	Bearberry honeysuckle	*Lonicera involucrate*
779	9040106	Snowberry	*Symphoricarpos spp.*
287	9030911	Shrubby cinquefoil	*Potentilla fruticosa*
Field 15.			
1097	9024220	Red barberry	*Berberis haematocarpa*
365	9024219	Barberry	*Berberis fendleri*
701	9024200	Utah juniper	*Juniperus utahensis*
208	9024313	Utah juniper	*Juniperus utahensis*
209	9024314	Utah juniper	*Juniperus utahensis*
275	9024158	Common juniper	*Juniperus communis*
881	9024312	Common juniper	*Juniperus communis*
461	9007948	Squaw-apple	*Peraphyllum ramosissimum*
631	9024285	Squaw-apple	*Peraphyllum ramosissimum*
651	9024286	Squaw-apple	*Peraphyllum ramosissimum*
580	9024141	Apache-plume	*Fallugia paradoxa*
353	9024096	Littleleaf mock orange	*Philadelphus microphyllus*
469	9024308	Buckthorn	*Rhamnus smithii*
376	9007949	Mountain ninebark	*Physocarpus monogynus*
436	9024154	Bush oceanspray	*Holodiscus dumosus*
579	9024155	Bush oceanspray	*Holodiscus dumosus*
456	9024143	Cliff fendlerbush	*Fendlera rupicola*
254	9024222	Creeping barberry	*Berberis repens*
227	9007990	Skunkbush sumac	*Rhus trilobata*
664	9007993	Skunkbush sumac	*Rhus trilobata*
655	9024269	Skunkbush sumac	*Rhus trilobata*

Note: Plant 3, 15, and 18 are identified in Utah honeysuckle for resistance to witches broom aphids.

Table 2. A listing by rows of accessions of plants in fields 14 and 15 of the orchard. Accessions are listed from West to East. Stumps are noted since sprouts may develop leading to additional plants.

Field 14 (West field)

Row 1 (North)	**Species**	**Accession Nos. New**	**Old**	**Number of plants.**
	Fraxinus anomala Single Leaf Ash	9024145	155	2
	" "	9024147	615	2 plus stump
	Acer glabrum Rocky Mtn Maple	9021435	698	1 plus 3 stumps
Row 2				
	Prunus virginiana Chokecherry	9024059	174	7
	" "	9024060	(Colorow) 229	4
Row 3				
	Amelanchier utahensis Utah Serviceberry	9021438	(Long Ridge) 154	14
Row 4				
	Amelanchier alnifolia Saskatoon Serviceberry	9021442	224	17
Row 5				
	Crataegus rivularis River Hawthorn	9015840	232	10
	Crataegus spp. Hawthorn	9024181	459	9
	"	9024176	609	4

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	Species	Accession No. New	Accession No. Old	Number of plants.
Row 6	*Shepherdia argentea* Silver Buffaloberry	9008027	476	18 plus stumps
Row 7	*Ribes aureum* Golden Currant	9030913	337	8 approx. plus stumps
	Ribes cereum Wax Currant	9024288	372	15
	" "	9024289	529	22
	Ribes spp. **Gooseberry**	For Identification only		6 approx
	Cercocarpus intricatus Littleleaf Mountain Mahogany	9024230	398	2
Row 8				
	L*onicera utahensis* Utah Honeysuckle	9024115	{plant **3**) 634	15 plus 2 stumps
	" "	9030476 (plant **15** and 18) 635 (Plant **3** and **15** have best resistence)		21 plus 2 stumps
	Lonicera involucrata Bearberry Honeysuckle	9024111	708	7
Row 9				
	Lonicera utahensis Utah Honeysuckle	9024117 (very susceptible)	660	1
	Symphoricarpos spp. Snowberry	9040106	779	9
Row 10				
	Potentilla fruticosa Shrubby Cinquefoil	9030911	287	7 with stubs

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Field 15 (East field)

Species	Accession No. New	Accession No. Old	Number of plants.
Row 1 (North) This row planted in 1981			
Berberis haematocarpa Red Barberry	9024220	1097	2
Berberis fendleri Colorado Barberry	9024219	365	10
Juniperus utahensis Utah Juniper	9024200	701	3 (small plant gone)
" "	9024313	208	4
" "	9024314	209	2
Juniperus communis Common Juniper	9024158	275	3
" "	9024312	881	2
Row 2			
Peraphyllum ramosissimum Squawapple	9007948	461	16
" "	9024285	631	18
" "	9024286	651	16
Fallugia paradoxa Apacheplume	9024141	580	(hard to count)
Philadelphus microphyllus Mockoragne	9024096	353	17
Row 3			
Rhamnus smithii Smith Buckthorn	9024308	469	25

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Species	Accession No. New	Accession No. Old	Number of plants.
Row 4			
Physocarpus monogynus Mountain Ninebark	9007949	376	hard to count
Row 5			
Holodiscus dumosus Bush Oceanspray – Rockspirea	9024154	436	6
" "	9024155	579	3 plus stump
Fendlera rupicola Cliff Fendlerbush	9024143	456	9
Berberis repens Creeping Barberry	9024222	254	numerous sprouts
Rhus trilobata Skunkbush Sumac	9007990	227	10 approx
" "	9024269	655	6
" "	9007993	664	16 approx

The shrubs north of field 15 are from Los Lunas. They are *Eunonymus bungeanus* ' Pink Lady' winterberry, *Forestiera neomexicana* ' Jemez 'New Mexico forestiera and *Rhus trilobata* 'Bighorn' skunkbush sumac. I think there was more than one accession of skunkbush sumac in the planting.

Project: 08S0192
Project Report-2009
By: Terri Blanke

San Luis Columbia Needlegrass

INTRODUCTION

Columbia needlegrass *Achnatherum nelsonii* is a cool-season, erect, fine-stemmed perennial bunchgrass. Its adaptable area ranges from dry plains and meadows up to sub-alpine parks and open woods. The Colorado specimen's range of elevation is from 5500 to 9500 feet where there is more than 15 inches of annual precipitation. Columbia needlegrass is a fair to good forage grass for cattle, horses, and sheep. Upper Colorado Environmental Plant Center's (UCEPC) Advisory Committee had identified Columbia needlegrass as an important species for revegetation of disturbed land associated with roadsides, coal mined lands, and oil shale lands.

Columbia needlegrass *Achnatherum nelsonii* was collected from the San Luis Valley, Colorado, by Glen Niner in 1976. Very little was known about Columbia needlegrass seed production, field performance, or forage production. In order to test these qualities, seed supply was needed.

UCEPC began studying *Achnatherum nelsonii* 27 years ago.

OBJECTIVE

Pre-cultivar release with seed increase and technology development for seed harvest and cleaning of accession 9040137

METHODS

A total of 18 accessions of Columbia needlegrass were evaluated at UCEPC from 1981 - 1983. Project number 08I057H identified the best overall performers based on results from three studies. Additional information on germination, forage yields, and re-growth results from the initial evaluation can be found in progress report September 30, 1983, project 08I057H.

Five top performing accessions were selected for seed increase from 1984 to 1987. The accessions selected had some characteristic that separated them from the average performers in the initial evaluation trial. Those blocks provided an opportunity to evaluate seed production and provide a seed supply for expanded field trials. Information for this project can be found in Project No. 08S075Z, 1984 – 1988. From those evaluations, Columbia needlegrass accession 9040137 from the San Luis Valley, Colorado, was selected for a large-scale seed increase project.

Field 2A was summer fallowed and free of noxious weeds. On August 28, 1989, a 0.94-acre field was seeded with accession number 9040137. The field established poorly and was reseeded

on June 6, 1990. For plot size, field prep, seeding rates, irrigation, fertilizer application, and seed production records, see Project report 08S192, 1990 – 1995.

In addition, accession number 9040137 was made available to cooperators for off-site field plantings.

The Columbia needlegrass field 2A, produced seed for ten years. Due to contamination from an unknown source, the field was removed in 2000.

In efforts to retain viable seed for accession number 9040137, on August 27, 2008, UCEPC seeded 4- twenty foot rows in field 20 to provide material for further evaluations as well as a breeders and/or a foundation block. Columbia needlegrass seed, previously produced in field 2A, 1998-99, was used to plant the new field. Due to poor establishment, UCEPC staff reseeded the four rows on August 24, 2009, using those same lots.

RESULTS

Columbia needlegrass, accession 9040137, has been a consistent performer since the initial evaluation in 1983. Accession 9040137 was grown strictly under dryland conditions and only a few plants had established in 1985. This could have been the cause for lower seed production in 1985-1986. The following three years, 1987-1989, accession 9040137 was the second and first highest seed producer. Tests conducted in 1988 showed no difference in laboratory germination rates or field germination rates. However, it was noted that indications from UCEPC plots and comments from North Dakota growers warranted concern about invading grass species. That factor, along with deterioration of production capability may limit the life of a seed production field to less than five years. (Project Report-December 30, 1988, Sam E. Stranathan and Helen Cahn.)

The large-scale seed increase of Columbia needlegrass, accession 9040137, began in 1989. Field 2A was seeded with 1.47 lb of seed and at a rate of 30-40 seeds per foot, ¼ inch deep. Because of poor establishment it was seeded again on June 6, 1990, with 1.10 lb of seed. Irrigation was applied only once in 1989 and three times 1990. The planting received fertilizer at a rate of 30 lb per acre in the fall. This field produced seed for the next ten years. The table below shows seed production quantities for UCEPC's field 2A.

Table 1. Seed production quantities for Columbia needlegrass accession 9040137.

Year	Harvest Date	Bulk Weight	Cleaned Weight	Comments
1990	n/a	unknown	0.033 lb	'90 Prog. Rpt.08S192
1991	7/18/91	68 lb	46 lb	Seed report only
1992	7/01/92	unknown	52.40 lb	'92 Prog. Rpt.08S192
1993	7/10/93	unknown	26.70 lb	'93 Prog. Rpt.08S192
1994	6/27/94	unknown	9 lb	'94 Prog. Rpt. 08S192
1995	7/17/95	unknown	18 lb	'95 Prog. Rpt. 08S192
1996	7/02/96	unknown	12 lb	Seed report only
1997	6/30/97	unknown	29 lb	Seed report only
1998	7/08/98	unknown	15 lb	Seed report only *
1998	7/08/98	unknown	6.37 lb	Re-cleaned & tested **
1999	7/13/99	unknown	29 lb	Seed report only *
2000	n/a	n/a	n/a	Field plowed

* Field contaminated with wheatgrass and prostrate pigweed
** 1998 produced 21+ lb of seed. It was heavily contaminated and 6.37 lb were re-cleaned and sent to the Colorado Seed Laboratory.

On August 27, 2008, UCEPC staff planted 4-twenty foot rows in field-20 with Columbia needlegrass accession 9040137. Seed from field 2A, lot 98 & 99 was used in the planting. Only a few plants established and on August 24, 2009, the block was reseeded heavily with 2 lb. from the same lots. The field received supplemental irrigation to help with establishment.

OFF-SITE PLANTINGS

Columbia needlegrass *Achnatherum nelsonii* has been implemented in many off-site plantings during the last 15 years. The following is a list of those projects with a brief history of the performance of Columbia needlegrass.

1986-2002 Soda Lake-Pinedale, Wyoming Field Evaluation Planting (FEP)
The mean was based off of a seven year average. Columbia needlegrass had a 5.7 Vigor where 1=excellent and 9=poor. Seven year annual average stand percent basal cover - 11.6%. The four year means of yield lb to the acre - 173.8 (below average performance)

2006- 2010 UCEPC Demonstration Planting
Project COPMC-F-0603-RA was designed to establish grasses and forbs of plant materials releases and experimental species for training, educational, and demonstration purposes. Seed from lot #1997 was used to establish the planting and Columbia needlegrass had 100% cover as of 2008. No seed has been collected.

2005-2010 South Park, Colorado, Field Evaluation Planting
Project COPMC-F-0601-CR was planted to determine which selected materials will establish and persist in peat rich soils once irrigated and now dryland. South Park, Colorado's, elevation is near 9000 feet. Seed from lot #1998 was used in this planting and replicated four times. Results were taken for plant stand and vigor where 1=poor and 5=excellent. Columbia needlegrass has had an average of 2.6 for vigor and the average stand after four years is 6.48%.

2007-2010 Snowmass, Colorado, Filed Evaluation Planting
Project COPMC-F-0801-RA was initiated to determine suitability of grasses for high altitude revegetation. This site is located near 7800 feet. Each entry was replicated four times and evaluated for plant stand where four complete rows = 100% and vigor where 1=excellent, 5=poor. The Columbia needlegrass had 17 % stand and 2.5 for vigor.

2009-2013 Piceance Basin Evaluation Planting
Project COPMC-F-0805-CR was planted in the fall of 2008. The goal of this project is to identify practices and products that result in successful well pad revegetation. The principle objective is to identify which conservation plant materials will establish and persist on abandoned well pads, and secondarily, to compare how new releases and experimental products compare to current seed mix and source recommendations by NRCS and BLM field offices. No evaluation results could be taken due to the heavy infestation from invasives. UCEPC plans to retreat the site with herbicide and in 2010, reseed.

CONCLUSION

UCEPC will continue to increase seed from Columbia needlegrass *Achnatherum nelsonii* accession 9040137. Information will continue to be collected from off-site plantings. From these evaluations, UCEPC will determine if this accession is suitable for a release.

PROJECT 08S213
Report - 2009
By: Steve Parr

Seed Increase of 9043501 Salina Wildrye *Leymus salinus*

INTRODUCTION

Salina wildrye has been identified as one of the most important grasses native to the Upper Colorado Region. It has been rated by the Upper Colorado Environmental Plant Center (UCEPC) Advisory Committee as a high priority for coal mined lands, roadside stabilization, surface disturbed areas, and areas of heavy use.

Harrington, 1954, lists *Leymus ambiguus* (Colorado wildrye) and *Leymus salinus* (Salina wildrye) as occurring 5200 to 8500 feet in elevation primarily in central and northwestern Colorado. Both species are perennial, cool-season bunchgrasses with culms standing between 30 to 50 cm. tall. *Leymus ambiguus* is often found on open slopes, canyons, and rocky hillsides in Colorado, Montana, and Utah. *Leymus salinus* is found on rocky slopes, sagebrush hills, and saline soils in Wyoming, Idaho, Utah, Arizona, and Colorado.

The Soil Conservation Service range site manual lists *Leymus salinus* as a component of shale sites in Utah, often associated with Pinyon-Juniper or mountain brush in 15-inch precipitation zones. Colorado range sites with *Leymus salinus* are described as clayey slopes, clayey salt desert, and semi-desert loams above l2 inches of precipitation.

Leymus salinus was described by Dr. Kay Assay, ARS, Logan, UT, as actively hybridizing with other wildryes. The hybrid from this crossing is sterile. The species is wind pollinated. In general, the species is weak to establish and tends to produce poor quality seed that has some inherent dormancies. However, once established, the species tends to be very persistent and vigorous.

Over a five-year period (1987 - 1992), accession 9043501 was consistently evaluated as superior in UCEPC Initial Evaluation 08I114. Project 08I114 consisted of five randomized replications, each of which contained five plants per accession of 31 accessions. 'Prairieland' *Leymus angustus* (altai wildrye) was included in the trial for comparison. In 1994, Project 08I114 was removed from UCEPC.

In addition to the field trial, a germination trial was conducted in 1987 at UCEPC for 38 accessions of *Leymus salinus.* In general, 50% of the seed from filled lots germinated within two days after being removed from a 20-day stratification period and being placed in the germinator.

An Advanced Evaluation for *Leymus salinus*, 08Al58, was installed by UCEPC in 1987. One block of 12 plants per accession was established in Field 25 using 27 accessions. Forage tendencies, as well as general notes concerning vigor, were taken for the planting from 1987 to 1992. Similar to the Initial Evaluation accession 9043501 was judged to be superior. Evaluation 08A158 was removed in 1994 from UCEPC.

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Report - 2009
By: Steve Parr

As result of its superior performance in the Initial and Advanced Evaluations, a seed and plant increase for accession 9043501 was initiated in 1993 and 1994. In addition, in 1993 vegetative samples for the accession were sent to Utah State University for species confirmation. It was determined that accession 9043501 represents *Leymus salinus.*

OBJECTIVE

To increase seed (pre-cultivar with seed increase and technology development) for foundation material as well as field plantings, Off-Center trials, and Inter-Center Strain Trials

METHODS

In 1993, a 0.10 acre increase field for accession 9043501 was established by seed in the UCEPC Headquarters Nursery utilizing seed from the original Kaiser Steel of Price, UT, and a Planet Junior. Although establishment has been slow, the planting has filled in quite nicely from residual germination.

In 1994, culms were lifted from the UCEPC Field 25 08I114 and 08A158 plantings and established in Field 4. Survival for the transplanted culms appears to have been 100%. Plants were established on three-foot centers. Either seed, or perhaps, the plants themselves, will be planted/transplanted from the headquarters nursery to Field 4 in 1995.

In 2004, a new planting was conducted on July 29, 2004. Four rows (or 0.13 acre) were planted with a hand pushed Planet Junior. Additional treatments for 2005 included a spring burn and an herbicide treatment to open up spaces between established plants.

RESULTS

No appreciable seed has been harvested to date from either the breeder or foundation fields. Seed production records are provided in Table 1, from the initiation of the seed increase project to present. Since seed production has been poor for this accession, alternative cultural management practices will be investigated over several years to find out if seed production can be increased.

Table 1. Seed Production Records of Two Salina Wildrye Fields at UCEPC. Accession No. 9043501 Project No. 08S213.

Year	Acres	Harvest Date	Field No.	Cleaned Weight	
1996	0.02	7/22	Hqts.	154.00	g
1996	0.10(B)	7/22	4	631.00	g
1996	0.20(F)	Planted	4	No harvest	
1997	0.02	Field plowed	Hqts.	No harvest	
1997	0.10(B)	7/21	4	2.96	lb
1997	0.20(F)	7/21	4	5.32	lb
1998	0.10(B)	8/4	4	4.00	lb
1998	0.20(F)	8/4	4	9.00	lb

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Year	Acres	Harvest Date	Field No.	Cleaned Weight	
1999	0.10(B)	7/15	4	22.00	g
1999	0.20(F)	7/15	4	32.00	g
2000	0.10(B)	No harvest	4	--	
2000	0.20(F)	7/7	4	6.00	g
2001	0.20(F)	7/9	4	174.00	g
2001	0.10(B)	7/9	4	227.00	g
2002	0.10(B)	7/11	4	7.00	g
2002	0.20(F)	7/11	4	23.00	g
2003	0.10(B)	7/9	4	1.69	lb
2003	0.20	7/9	4	0.60	lb
2004	0.10(B)	7/9	4	19.00	g
2004	0.20(F)	7/9	4	146.00	g
2004	0.13	New planting	4	No harvest	
2005	0.13	New planting	4	No harvest	
2005	0.10(B)	7/13	4	1.4	lb
2005	0.20(F)	7/13	4	302	g
2006	0.10 (B)	7/12	4	2	g
2006	0.30 (F)	7/13	4	7	g
2006	0.13(F-2)	7/13	4	76	g
2007	0.10 (B)	7/13	4	296	g
2007	0.30(F-2)	7/11	4	5.5	lb
2008	0.10 (B)	7/28	4	1.17	lb
2008	0.30 (F)	7/28	4	1.27	lb
2009	0.10 (B)	7/17	4	0.0	
2009	0.30 (F)	7/20	4	1.00	lb

* B=Breeder field, F = Foundation field, F-2 = Foundation field second planting

In spring of 2005, two sections of the foundation field were chosen to conduct some preliminary testing to enhance seed production. A west section block, approximately 20 x 18 ft, was treated with herbicide, Roundup, and an east block about 120 x 18 ft was burned with a torch. The purpose of the herbicide treatment was to thin out some of the old stand and get spaced plants at about 3 x 3 ft in contrast to an existing crowded solid row of plants. The burning treatment was to determine if invigorating the plants by burning and getting rid of old plant material (thatch) might also induce better seed production. The herbicide Roundup was applied May 9, 2005, at the rate of 1-quart /25 gallons of water (1% solution).

Evaluations for 2005

On June 7, 2005, the herbicide section was evaluated. Roundup worked very well leaving spaced grass bunches at about 3 x 3 ft as expected, however, no seed set difference was observed between the treated and untreated plants, perhaps because the treatment was done when the plants had already spent a lot of energy in spring growth. The burned area showed a more vigorous re-growth after the burning, and also did an excellent job of getting rid of dead plant material. However, no difference in seed set was observed between unburned and burned plants. Burned plants did however, look greener and healthier.

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By: Steve Parr

Evaluations for 2006

Breeder and foundation fields were harvested during July 12-13. See Table 1 for amount of seed harvested. The new planting done on July 29, 2004, produced the most seed in 2006, and we hope seed production will be better in 2007, since the planting is new and plants are not crowded yet. The section that was treated with herbicide had more seed heads than the un-sprayed section, however, seed fill was poor. This might indicate that the salina wildrye might need plenty of space to get into the reproductive mode. The same trend was observed in the new planting, plants that had more ground available had more seed heads. The next step is to set up a trial to compare space plants versus solid row planting to determine if lack of space is what has been hindering seed production in this accession of salina wildrye.

Evaluations for 2007

Substantial differences were noted on the "foundation" field plantings. The old planting had very few seed heads, and most of those were again on the most southern row (next to fallow ground), but are very likely the result of snow accumulation from southwest prevailing winds; and hence, much more early spring moisture. The new planting, however, had abundant seed heads. This year represented the second highest seed production for salina wildrye, and only four rows contributed any appreciable seed. In essence, each row produced approximately 1.25 pounds of clean seed. In addition, the field was swathed and picked up by hand. This harvest method very likely resulted in reduced seed capture compared to direct combining.

2008

A disappointing seed harvest was realized with both the Breeder and Foundation portions of the salina wildrye project this year. The low seed yield is preventing the release of an otherwise very much needed conservation plant for the central Rocky Mountains and Colorado Plateau. Because of the unknown yield information on this product, a new spaced planting project, COPMC-T-0802-RA, was initiated this year to determine optimal spacing for seed yield. Plans are to again spray out sections of the foundation field to improve seed yield in 2009 and beyond.

2009

There were harvests for both the Breeder and Foundation fields in 2009, but production was very poor. Between both fields, only one pound of seed was cleaned from the effort. A separate study, COPMC-T-0802, Space Planting of Salina Wildrye, is being conducted to determine optimal spacing for seed production. Three separate seed lots were utilized to plant a one-acre seed increase field for Mesa Verde National Park on August, 11, 2009. Breeder seed from 2003, 2005, and foundation seed from 2008 were the three seed lots used to plant the one-acre increase plot.

CONCLUSION

Unquestionably, the younger seed field with less crowded plants, and possibly greater vigor, produce substantially more seed than the older portion of the field. Whether the improved production is a result of a younger field, less crowding among individual plants and roots, or a combination of both, will be investigated with the design of the above referenced salina wildrye study. Adequate, consistent seed production is the biggest obstacle to overcome before getting this product on the market. As an important species in the Rocky Mountain west, continued efforts will be directed toward its development and eventual release.

Project COPMC-F-0202-OT
Project Report-2009
By: Terri Blanke

Inter-Center Planting of Sweetgrass

INTRODUCTION

Four Northern Plains Region Plant Material Centers compared six sources of sweetgrass; accessions nos. 9039770, 9050243, 9070225, 9063351, 9063128, and South Dakota Radora. The variety 'Radora' was used as the standard variety for comparison. The information obtained was to be used to evaluate genetic variability and recommend potential areas of adaptation for local collections.

OBJECTIVE

To compare and evaluate regionally collected sweetgrass *Hierochloe odorata* as a culturally significant plant.

METHODS

Each PMC exchanged a minimum of ten potted (or cone-tainerized) sweetgrass plants of their local plant material. Bismarck PMC provided ten plants of 'Radora' sweetgrass. Materials arrived around May 15, 2002.

Notes on initial establishment at the Colorado PMC are recorded in the 2002 Annual Technical Report.

Plot design, initial evaluation, follow up evaluation, seed harvest and discussion are in the 2003 – 2008 Annual Technical Reports.

In June of 2006, one sample of each accession of sweetgrass was hand dug, soaked and separated. They were then shipped to Vicki L. Bradley, Agronomy Curator at the Western Regional Plant Introduction Station in Pullman, Washington. These accessions were supplied for germplasm storage.

In 2008 and 2009 experimental work was conducted on the sweetgrass for the possible use as lawn material. Fertilizer, irrigation, weeding, and mowing techniques were all applied to the plots.

The sweetgrass was separated into north and south plots. Both plots were weeded, irrigated, evaluated and mowed throughout the 2009 growing season. The south plot received a one time application of Greenthumb Premium Fertilizer, 30-0-3. The fertilizer was applied by hand at a rate of 3.2 lbs to 1000 square feet.

Project COPMC-F-0202-OT
Project Report-2009
By: Terri Blanke

RESULTS

The south plot grew back much quicker, healthier, and nearly two – five inches taller following mowing. The north plot continued to show mower damage to the leaves while the south sides had all new growth. However, the south plot did not show any more density than the north plot.

CONCLUSION

Generally, survival of this native perennial has been excellent. The plots do not receive much attention. Phenotypic characteristics are still not evident. The decision to continue to maintain the sweetgrass plots was largely influenced by the plant's cultural significance to Native Americans. Sweetgrass is used by the Native Americans for ceremonial blessings.

Due to the lack of seed production, the plot is also being maintained for requests of either rhizomes or potted plants, but the project will be discontinued. This is the final report for this project.

Project COPMC-F-0504-PA
Report 2009
Report by: Heather Plumb

False Quackgrass Performance Trial

INTRODUCTION

Native, perennial, drought adapted, palatable species are high on the list of desirable products for land owners as well as land managers. In 2001, landowner Lynn Bower, from Moffat County, Colorado, brought samples of a grass he said his horses particularly preferred when grazing a specific pasture. He also indicated that his father had noted the same behavior in the same pasture on the same ranch many, many, years before passing along his observation. Mr. Bower wanted to find out what species he had that his horses found so palatable and if the Plant Center was interested in increasing, observing or otherwise working with this plant. He also told Upper Colorado Environmental Plant Center (UCEPC) that his father called it "false quackgrass". Dr. Gary Noller, UCEPC Senior Scientist at the time, and Steve Parr, UCEPC Manager, identified taxonomically that the specimen Lynn brought to us was indeed "false quackgrass". Neither Dr. Noller nor Steve Parr had any familiarity with the species whatsoever, so the project was not initially a high priority. Mr. Bower invited UCEPC staff out to his place to collect some "false quackgrass" specimens. Three years later, in the fall of 2004, UCEPC personnel collected sods from Lynn's place and transplanted individual plugs in a spaced planting and a single row in November 2004.

OBJECTIVE

The objective of the project is to evaluate the potential for the material to be used in pasture renovation, riparian enhancement, and also livestock and wildlife habitat improvement projects through the use of transplants or seed.

METHODS

Individual plugs were separated from sod collected at Lynn Bower's ranch in Moffat County. Plugs were planted approximately one foot apart in rows approximately 15 feet long. A single row on the south end of the plot was plugged without spacing. No supplemental water has been added to the project and plots have been maintained weed free.

In the fall of 2007, harvested seed was sent to Dr. Richard Wang, ARS Logan, Utah, to identify species from root tip chromosome counts. Earlier, we had Dr. Mary Barkworth, Utah State University Herbarium Curator, identify our specimen. Her taxonomic attempts were inconclusive, and suggested we contact Dr. Wang. Dr. Barkworth felt the specimen was possibly a hybrid because it is rhizomatous which, besides *E. pseudorepens*, places it into one of three possible species for consideration; *Elymus repens*, *E. lanceolatus*, or *Pascopyrum smithii*. She did not feel it was conclusively any of the four. Because the tribe hybridizes readily, she suggested we have the chromosome number identified. *E. repens* is a hexaploid while *E. albicans* is a tetraploid. She also felt *E. pseudorepens* was very likely a tetraploid, but did not confirm that.

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Report 2009
Report by: Heather Plumb

2008

The "false quackgrass" seed from the plots at UCEPC was harvested and sent to Dr. Wang for a root tip chromosome count.

> Steve,
>
> I was able to count the chromosome number for your plant, even though the chromosomes were too long and curvy for karyotype analysis. The species is a hexaploid with 42 chromosomes.
>
> Richard Wang, Ph.D.
> Research Geneticist
> USDA-ARS-NPA-FRRL
> 695 N 1100 E
> Logan, UT 84322-6300
> Phone: 435-797-3222
> FAX: 435-797-3075
> E-mail: Richard.Wang@ars.usda.gov

The material sent to Dr. Wang came back as a hexaploid. The material we sent to Dr. Barkworth and to Dr. Wang is not the same material that Dr. Noller and Steve Parr identified. The original specimen of false quackgrass collected by the UCEPC staff had no awns, and the original specimen remains at UCEPC. The plants growing in our plots at UCEPC are awned. Because there were no seed heads at the time to identify the sod that was transplanted, we very likely transplanted a separate species.

RESULTS

Efforts in 2009 were made by UCEPC staff to revisit the collection site. Several e-mails and phone calls were made to the land owner. The landowner was planning to set up cages around the original collection site, and UCEPC staff was going to collect from the caged sites only to help insure collections were only false quackgrass. However, the cages were never set up so a visit to the site never occurred in 2009.

CONCLUSION

At the end of the 2009 growing season it was decided that the project was no longer an active project. The original collection was chromosomally identified not to be false quackgrass. Efforts were made by UCEPC to recollect at the site, but the landowner didn't follow up so this will be the final report for this project.

Project COPMC-F-0505-PA
Report-2009
By: Manuel Rosales, Pat Davey, Herman Garcia, Christine Taliga

Boulder County Open Space Demo

INTRODUCTION

Boulder County, Colorado, has an area of 753 square miles with 475,000 acres. The terrain in Boulder County is very diverse, including: plains, foothills grasslands, forest montane, and alpine zones. This demonstrational planting was set up in cooperation with Boulder County Parks & Open Space, Longmont USDA-NRCS Field Office, Longmont and Boulder County Conservation Districts, Colorado State University, Boulder Extension Service, and the Arkansas Valley, and Pawnee Buttes Seed companies. The purpose of the planting is to demonstrate the potential of a variety of native grasses and some introduced grasses for pasture and hayland purposes as well as for other uses such as prairie restoration, prevention of noxious weeds, xeriscaping, etc., in Boulder County and nearby counties in Colorado. The planting will also be used for educational purposes.

OBJECTIVE

To demonstrate to land owners, land managers, and area Field Office employees some of the attributes of various selected plant materials.

METHODS

A total of 65 entries were seeded on March 7-9, 2005: Fifty-seven single grass species (41 native & 16 non-native), six grass-mixtures, and one legume (planted at two seeding rates). The seeder was a 16-row FLEX-II Truax. Rows were spaced about 7.5 inches apart. The plot size is 20 x 100 feet with 32 rows per plot (2000 square feet). The rate of seeding was based on the recommended Pure Live Seed rate/acre per species. Small and fluffy seeded grasses were enhanced with number-1 rice hulls to provide a better flow through the drill. The site is located on Boulder County land north of Denver. The planting will be maintained as dryland.

A list of all the entries is presented in the following table:

Table 1. List of 65 entries for the demonstrational planting

Entry #	Cultivar/Release or Accession #	Common Name	Scientific Name	Seed Source
Single Grass Species				
1	Cheyenne	Indiangrass (ws)**	*Sorghastrum nutans*	Arkansas Valley Seed Co
2	9005439	Switchgrass (ws)	*Panicum virgatum*	Bridger, PMC
3	Dacotah	Switchgrass ((ws)	*Panicum virgatum*	Bismarck, PMC
4	Kaw	Big bluestem (ws)	*Andropogon gerardii*	Arkansas Valley

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Entry #	Cultivar/Release or Accession #	Common Name	Scientific Name	Seed Source
				Seed Co
5	Bonilla	Big bluestem(ws)	*Andropogon gerardii*	Bismarck, PMC
6	Pawnee	Big bluestem(ws)	*Andropogon gerardii*	Arkansas Valley Seed Co?
7	Lodorm	Green needlegrass	*Nassella viridula*	Bismarck, PMC
8	Aldous	Little bluestem (ws)	*Schizachyrium scoparium*	Arkansas Valley Seed Co
9	Camper	Little bluestem (ws)	*Schizachyrium scoparium*	Arkansas Valley Seed Co
10	Pastura	Little bluestem (ws)	*Schizachyrium scoparium*	Arkansas Valley Seed Co
11	Niner	Sideoats grama (ws)	*Bouteloua curtipendula*	Los Lunas, PMC
12	BSOG-02B	Sideoats grama (ws)	*Bouteloua curtipendula*	
13	El Reno	Sideoats grama (ws)	*Bouteloua curtipendula*	Manhattan, PMC
14	Hachita	Sideoats grama (ws)	*Bouteloua curtipendula*	Los Lunas, PMC
15	Bad river	Sideoats grama (ws)	*Bouteloua curtipendula*	Bismarck, PMC
16	Lovington	Sideoats grama(ws)	*Bouteloua curtipendula*	Los Lunas, PMC
17	Texoka	Buffalograss (ws)	*Buchloe dactyloides*	Arkansas Valley Seed Co
18	Viva	Galleta grass(ws)	*Pleuraphis jamesii*	Los Lunas, PMC
19	9092261	Prairie Junegrass (cs)	*Koeleria macrantha*	Meeker, PMC
20	Covar	Sheep fescue (cs)	*Festuca ovina*	Arkansas Valley Seed Co
21	Redondo	Arizona fescue (cs)	*Festuca arizonica*	Meeker, PMC
22	Sherman	Big bluegrass (ws)	*Poa secunda*	Arkansas Valley Seed Co
23	Rimrock	Indian ricegrass (cs)	*Achnatherum hymenoides*	Bridger, PMC
24	Paloma	Indian ricegrass (cs)	*Achnatherum hymenoides*	Los Lunas, PMC
25	Tusas	Squirreltail (cs)	*Elymus elymoides*	Los Lunas, PMC
26	San Luis	Slender wheatgrass (cs)	*Elymus trachycaulus*	Meeker, PMC
27	Pryor	Slender wheatgrass (cs)	*Elymus trachycaulus*	Bridger, PMC
28	Volga	Mammoth wildrye (cs)	*Leymus racemosus*	Meeker, PMC
29	UNIDENTIFIED	Needle & thread (cs)	*Hesperostipa comata*	Arkansas Valley Seed Co
30	Climax	Timothy (cs)	*Phleum pratense*	Arkansas Valley Seed Co
31	Paiute	Orchard grass(cs)	*Dactylis glomerata*	Aberdeen, PMC
32	Renegade	Orchard grass (cs)	*Dactylis glomerata*	Arkansas Valley Seed Co.
33	Salado	Alkali sacaton (ws)	*Sporobolus airoides*	Los Lunas, PMC
34	Fawn	Tall fescue (cs)	*Festuca arundinacea*	Arkansas Valley Seed Co.
35	Trailhead	Basin wildrye (cs)	*Leymus cinereus*	Bridger, PMC
36	Magnar	Basin wildrye (cs)	*Leymus cinereus*	Aberdeen, PMC
37	Garnet	Mountain brome (cs)	*Bromus marginatus*	Meeker, PMC

Entry #	Cultivar/Release or Accession #	Common Name	Scientific Name	Seed Source
38	UNIDENTIFIED	Nodding brome (cs)	*Bromus anomalus*	Arkansas Valley Seed Co.
39	Regar	Meadow brome cs)	*Bromus biebersteinii*	Aberdeen, PMC
40	Manchar	Smooth brome (cs)	*Bromus inermis*	Arkansas Valley Seed Co.
41	Critana	Streambank wheatgrass (cs)	*Elymus lanceolatus*	Bridger, PMC
42	Bannock	Streambank wheatgrass cs)	*Elymus lanceolatus*	Aberdeen, PMC
43	Goldar	Bluebunch wheatgrass (cs)	*Pseudoroegneria spicata*	Aberdeen, PMC
44	Anatone	Bluebunch wheatgrass (cs)	*Pseudoroegneria spicata*	Aberdeen, PMC
45	Luna	Pubescent wheatgrass cs)	*Thinopyrum intermedium*	Meeker, PMC
46	Rush	Intermediate wheatgrass(cs)	*Thinopyrum intermedium*	Aberdeen, PMC
47	Arriba	Western wheatgrass(cs)	*Pascopyrum smithii*	Meeker, PMC
48	Rosana	Western wheatgrass(cs)	*Pascopyrum smithii*	Bridger, PMC
49	Sodar	Streambank wheatgrass(cs)s	*Elymus lanceolatus*	Aberdeen, PMC
50	UNIDENTIFIED?	Tufted hairgrass (cs)	*Deschampsia cespitosa*	Arkansas Valley Seed Co.
51	Jose	Tall wheatgrass cs)	*Thinopyrum ponticum*	Los Lunas, PMC
52	Mandan	Canada wildrye (cs)	*Elymus canadensis*	Bismarck, PMC
53	Bozoisky-select	Russian wildrye cs)	*Psathyrostachys juncea*	Bridger, PMC
54	Newhy	Hybrid wheatgrass cs)	*Elymus hoffmannii*	Aberdeen, PMC
55	Douglas	Crested wheatgrass (cs)	*Agropyron cristatum*	Aberdeen, PMC
56	Hycrest	Crested wheatgrass (cs)	*Agropyron cristatum X desertorum*	Aberdeen, PMC
57	Ephraim	Crested wheatgrass (cs)	*Agropyron cristatum*	Aberdeen, PMC
	Grass-Mixtures			
58	Rocky Mountain. Native mix	Mix-1* See entries below		Arkansas Valley Seed Co.
59	Aggressive dryland mix	Mix-2* See entries below		Pawnee Butte Seed Co.
60	Low grow mix	Mix-3* See entries below		Arkansas Valley Seed Co.
61	Dryland mix	Mix-4*-See entries below		Arkansas Valley Seed Co.
62	Boulder NRCS-mix-Regular	Mix-5*-See entries below		
63	Boulder NRCS-mix-heavy	Mix-6*-See entries below		
	Legume			
64	Medic-@ 14.2 lb/ac	Medic	*Medicago spp.*	CSU Ext. Service
65	Medic @ 29.1 lb/ac	Medic	*Medicago spp.*	CSU Ext. Service

Entries for Grass-Mixtures				
Mix-1*	**Mix-2***	**Mix -3***	**Mix-4***	**Mix-5/6***
Slender wheatgrass	Green needlegrass	Crested wheatgrass	Crested wheatgrass-Hycrest	Pubescent wheatgrass
Slender wheatgrass	Slender wheatgrass	Perennial ryegrass	Smooth brome-Lincoln	Smooth brome
Thickspike wheatgrass	Slender wheatgrass	Blue fescue	Wildrye-Bozoisky	
Buffalograss	Pubescent wheatgrass	Canada bluegrass	Tetraploid PER	
Blue grama	Intermediate wheatgrass	Chewing fescue	Orchardgrass-Renegade	
Big bluestem			Intermediate wheatgrass-Oahe	
Arizona fescue-Sherman-				

** (ws) = warm season grass; (cs) = cool season grass

RESULTS, ACCOMPLISHMENTS & OBSERVATIONS

Growing Season of 2005

During the summer of 2005, most of the plots were sprayed with herbicide Roundup® to control emerging weeds. All plots were mowed to control Kochia weed *Kochia scoparia*. Plant establishment was evaluated during summer-2005. Results are presented in Table-2.

Table 2. Plant stand for 65 entries four months after planting.
Boulder County Open Space Demo-Summer-2005

Cultivar/Release or accession #	Common Name	Scientific Name	Plant Stand*
VNS	Nodding brome	*Bromus anomalus*	5
Regar	Meadow brome	*Bromus biebersteinii*	5
Garnet	Mountain brome	*Bromus marginatus*	5
Paiute	Orchardgrass	*Dactylis glomerata*	5
Renegade	Orchardgrass	*Dactylis glomerata*	5
Fawn	Tall fescue	*Festuca arundinacea*	5
Paloma	Indian ricegrass	*Achnatherum hymenoides*	4
Douglas	Crested wheatgrass	*Agropyron cristatum*	4
Hycrest	Crested wheatgrass	*Agropyron cristatum X desertorum*	4
Manchar	Smooth brome	*Bromus inermis*	4
Mandan	Canada wildrye	*Elymus canadensis*	4
Newhy	Hybrid wheatgrass	*Elymus hoffmannii*	4

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Cultivar/Release or accession #	Common Name	Scientific Name	Plant Stand*
Critana	Streambank wheatgrass	*Elymus lanceolatus*	4
Bannock	Streambank wheatgrass	*Elymus lanceolatus*	4
San Luis	Slender wheatgrass	*Elymus trachycaulus*	4
Pryor	Slender wheatgrass	*Elymus trachycaulus*	4
Lodorm	Green needlegrass	*Nassella viridula*	4
Arriba	Western wheatgrass	*Pascopyrum smithii*	4
Rosana	Western wheatgrass	*Pascopyrum smithii*	4
Goldar	Bluebunch wheatgrass	*Pseudoroegneria spicata*	4
Anatone	Bluebunch wheatgrass	*Pseudoroegneria spicata*	4
Rush	Intermediate wheatgrass	*Thinopyrum intermedium*	4
Luna	Pubescent wheatgrass	*Thinopyrum intermedium*	4
Jose	Tall wheatgrass	*Thinopyrum ponticum*	4
Ephraim	Crested wheatgrass	*Agropyron cristatum*	3
Kaw	Big bluestem	*Andropogon gerardii*	3
Texoka	Buffalograss	*Buchloe dactyloides*	3
Tusas	Squirreltail	*Elymus elymoides*	3
Sodar	Streambank wheatgrass	*Elymus lanceolatus*	3
Magnar	Basin wildrye	*Leymus cinereus*	3
Dacotah	Switchgrass	*Panicum virgatum*	3
Rimrock	Indian ricegrass	*Achnatherum hymenoides*	2
Bonilla	Big bluestem	*Andropogon gerardii*	2
Pawnee	Big bluestem	*Andropogon gerardii*	2
Bad river	Sideoats grama	*Bouteloua curtipendula*	2
Lovington	Sideoats grama	*Bouteloua curtipendula*	2
Redondo	Arizona fescue	*Festuca arizonica*	2
VNS	Needle & thread	*Hesperostipa comata*	2
Trailhead	Basin wildrye	*Leymus cinereus*	2
9005439	Switchgrass	*Panicum virgatum*	2
Niner	Sideoats grama	*Bouteloua curtipendula*	1
BSOG-02B	Sideoats grama	*Bouteloua curtipendula*	1
El Reno	Sideoats grama	*Bouteloua curtipendula*	1
Hachita	Sideoats grama	*Bouteloua curtipendula*	1
Covar	Sheep fescue	*Festuca ovina*	1
9092261	Prairie Junegrass	*Koeleria macrantha*	1
Volga	Mammoth wildrye	*Leymus racemosus*	1

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Cultivar/Release or accession #	Common Name	Scientific Name	Plant Stand*
Climax	Timothy	*Phleum pratense*	1
Sherman	Big bluegrass	*Poa secunda*	1
Bozoisky-select	Russian wildrye	*Psathyrostachys juncea*	1
Aldous	Little bluestem	*Schizachyrium scoparium*	1
Camper	Little bluestem	*Schizachyrium scoparium*	1
Pastura	Little bluestem	*Schizachyrium scoparium*	1
Cheyenne	Indian grass	*Sorghastrum nutans*	1
Salado	Alkali sacaton	*Sporobolus airoides*	1
VNS	Tufted hairgrass	*Deschampsia cespitosa*	0
Viva	Galleta grass	*Pleuraphis jamesii*	0
Dryland mix.	Mix-4* See entries inTable-1		5
Aggressive dryland mix	Mix-2* See entries inTable-1		4
Rocky Mountain Native mix	Mix-1* See entries inTable-1		4
Low grow mix	Mix-3*- See entries inTable-1		4
Boulder NRCS-mix-Regular	Mix-5*- See entries inTable-1		4
Boulder NRCS-mix-heavy	Mix-6*- See entries inTable-1		4
Medic @ 29.1 lb/ac	Medic	*Medicago* spp.	3
Medic-@ 14.2 lb/ac	Medic	*Medicago* spp.	2

* Plant stand: 0 = Poor or no establishment; and 5 = Excellent establishment

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Growing Season of 2006

In March of 2006, the plots and surrounding area have caught lots of plastic trash (mainly grocery store type plastic bags) in the weed stems that were mowed last summer. Trash had blown from adjacent businesses west of the plots. The demonstrational plots were located in an accessible and visible area from the road for demonstrational purposes. However, in this occasion the view was not very pleasant and a complaint was placed to the Longmont Conservation District to remove the trash. On April 11, 2006, Patrick Davey, Plant Materials Specialist for Colorado Natural Resources Conservation Service, used an All-Terrain-Vehicle with a chain to pull a gravel pit crusher screen over the 9-acre field to knock down the standing weed stems and release the attached trash. The operation worked and the trash was collected and removed. After removal of the trash the cool-season grass plots were visible. All wheatgrasses and both the Paiute Orchard and Renegade orchardgrasses had about 100 percent stands. No written evaluation was done at this time.

Patrick Davey visited the plots again on April 18, 2007, to check for weed growth and do a visual evaluation of the plots. He found newly kochia rosettes about ½ inch tall and Russian thistle seedlings growing mainly on the warm season grass plots. He also reported that the wheatgrasses (cool season) were growing very well, especially 'Rosana' and 'Arriba' which were spreading out of the planted rows. Both entries of orchardgrass showed decline in plant stand, 100 to 25 percent from last summer. 'Texoka' buffalograss was the only visible warm season grass at this time.

On July 26, 2006, Patrick Davey, visited the plots to perform a summer evaluation. He reported that all cool season species were completely dried up and in a dormant stage, perhaps due to lack of precipitation and summer heat. Leaves were brown and crispy, and crumbling when touched. Again, 'Texoka' buffalograss was the only grass showing signs of growth. No formal evaluation of all the plots was done for this summer.

Growing Season of 2007

On April 27, Pat Davey visited the site and sprayed the warm season grass plots that did not establish last year. Plots were sprayed with a 3% glyphosate (Roundup®) to kill cheatgrass and Kochia seedlings.

On June 29, Pat Davey, spot sprayed 2,4-D to control Canada thistle and to prevent it from blooming. The perimeter and all plots were spot sprayed at the rate of 1.5 lb/acre. In addition, about 20 large spotted knapweeds plants were removed by hand.

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By: Manuel Rosales, Pat Davey, Herman Garcia, Christine Taliga

General observations for growing season of 2007

- Paiute and Renegade orchardgrasses have almost died out
- Buffalograss is doing better than last year
- Tufted hairgrass did not establish yet
- Timothy died out
- All varieties of crested wheatgrasses are doing well

The warm season grasses will be replanted during summer of 2008. Also, a tour of the plots is being planned for summer of 2008.

Growing Season of 2008

The plots were not evaluated this year; however, they were maintained by controlling the weeds. Pat Davey sprayed the broadleaved weeds with 2,4-D at the rate of 1½ pounds per acre. Boulder County Parks & Open Space mowed the weeds in late summer. A site visit is planned for late spring or early summer of 2009 to take notes on the species that have survived in the last three years.

An assessment was conducted by Pat Davey, Natural Resources Conservation Service Plant Materials Specialist on May 12, 2008, the results of which are noted in Table 3.

Growing Season of 2009

The plots were evaluated by Herman Garcia, Natural Resources Conservation Service State Range Specialist and Pat Davey, September 22, 2009. The results of the evaluations are noted in Table 3. A site visit is planned for late spring or early summer of 2010 to evaluate the plots.

Table 3. Plant stand evaluation for 65 entries 2008 and 2009. * Plant stand: 0 = Poor or no establishment; and 5 = Excellent establishment

Entry #	Cultivar/Release or Accession #	Plant evaluation conducted on 11/8/05	Plant evaluation conducted on 5/12/08	Plant evaluation conducted on 9/22/09
1	Cheyenne	1	0	0
2	9005439	2	0	1
3	Dacotah	3	0	0.1
4	Kaw	3	0	0.1
5	Bonilla	2	0	0.1
6	Pawnee	2	0	0.5
7	Lodorm	4	3+	4
8	Aldous	1	0	0
9	Camper	1	0	0.5
10	Pastura	1+	0	1
11	Niner	1	1	1
12	BSOG-02B	1	0	0.5
13	El Reno	1	1	1
14	Hachita	1	1	1
15	Bad River	2	1	1

Entry #	Cultivar/Release or Accession #	Plant evaluation conducted on 11/8/05	Plant evaluation conducted on 5/12/08	Plant evaluation conducted on 9/22/09
16	Lovington	2	1	1
17	Texoka	3	3	5
18	Viva	0	0	1
19	9092261	1	2	3
20	Covar	1	2	2
21	Redondo	2	1	0.5
22	Sherman	1	2	2
23	Rimrock	2	1	2
24	Paloma	4	3	5
25	Tusas	3	3	3
26	San Luis	4	4	4
27	Pryor	4	4	5
28	Volga	1	1	2
29	UNIDENTIFIED	2	4	5
30	Climax	1	0	0
31	Paiute	5	2+	2
32	Renegade	5+	2	1
33	Salado	1-	0	1
34	Fawn	5	1	1
35	Trailhead	2	4	5
36	Magnar	3	4	5
37	Garnet	5	3	2
38	UNIDENTIFIED	5	1	1
39	Regar	5	4+	5
40	Manchar	4+	4+	5
41	Critana	4	5	5
42	Bannock	4	5	5
43	Goldar	4	5	5
44	Anatone	4	5	5
45	Luna	4+	5	5
46	Rush	4	5	5
47	Arriba	4	5	5
48	Rosana	4	5	5
49	Sodar	3	4+	5
50	VNS (*Deschampsia cespitosa*)	0	0	1
51	Jose	4	5	5
52	Mandan	4	3+	3
53	Bozoisky-select	1+	4+	5
54	Newhy	4+	5	5
55	Douglas	4	5	5
56	Hycrest	4+	5	5
57	Ephraim	3	5	5
58	Rocky Mountain. native mix	4	4+	5

Entry #	Cultivar/Release or Accession #	Plant evaluation conducted on 11/8/05	Plant evaluation conducted on 5/12/08	Plant evaluation conducted on 9/22/09
59	Aggressive dryland mix	4	5	5
60	Low grow mix	4	5	5
61	Dryland mix	5	5	5
62	Boulder NRCS-mix-regular	4+	5	5
63	Boulder NRCS-mix-heavy	4+	5	5
64	Medic-@ 14.2 lb/ac	2	1	0
65	Medic @ 29.1 lb/ac	3		0

Project COPMC-F-0601-CR
Report-2009
By: Manuel Rosales, Pat Davey, Joe Brummer, Herman Garcia, Christine Taliga

South Park Field Evaluation Planting

INTRODUCTION

Historically, ranchers and developers have been interested in the peatlands (also referred to as fens) of South Park, Colorado. Peatlands were ditched and drained to grow crops for livestock grazing and to prevent cattle from becoming bogged down in their soft soils. Peatland is a generic term for any wetland that accumulates decayed plant material. In Colorado, peatlands are classified as fens. This type of peatland is only found in high-elevation sites above 8000 feet. These peatlands form in places where a constant supply of ground water maintains the soil saturation. This field evaluation planting was designed to help select plant materials, especially native grasses, that will grow in peatlands that were previously drained and irrigated, and no longer will be irrigated.

OBJECTIVE

To determine which selected materials will establish and persist in peat-rich soils once irrigated and now dryland

EXPERIMENTAL DESIGN

The statistical design for the study is a randomized complete block with four replications

METHODS

The planting site was prepared by rototilling, letting stand, spraying with Roundup®, and then rolling to firm up the soil prior to seeding. Seventeen native grass species and 11 introduced or manipulated grass species were planted November 2-3, 2005. The planting was done with a four-row plot cone-seeder. The rate of seeding was 60 pure live seeds per linear foot of row (30 x 2 for critical area planting). The plot size is 4 x 20 ft with four rows per plot. Table-1 lists the 28 entries for the study:

Table 1. South Park Field Evaluation Planting. UCEPC

Common Name	Scientific Name	Release Name or Accession No.
Natives		
Arizona fescue	*Festuca arizonica*	Redondo
Bluebunch wheatgrass	*Pseudoroegneria spicata spp.spicata*	Anatone
Bluebunch wheatgrass	*Pseudoroegneria spicata spp.spicata*	Goldar
Blue grama	*Bouteloua gracilis*	Bad River

Common Name	Scientific Name	Release Name or Accession No.
Bottlebrush squirreltail	*Elymus elymoides spp. brevifolius*	Pueblo
Bottlebrush squirreltail	*Elymus elymoides*	Tusas
Bottlebrush squirreltail	*Elymus elymoides spp.brevifolius*	Wapiti
Columbia needlegrass	*Achnatherum nelsonii*	9024804
Columbia needlegrass	*Achnatherum nelsonii*	9040137
Indian ricegrass	*Achnatherum hymenoides*	Paloma
Indian ricegrass	*Achnatherum hymenoides*	Rimrock
Mountain brome	*Bromus marginatus*	Garnet
Prairie Junegrass	*Koeleria macrantha*	9092261
Sandberg's bluegrass	*Poa secunda*	High plains
Streambank wheatgrass	*Elymus lanceolatus*	Sodar
Western wheatgrass	*Pascopyrum smithii*	Arriba
Western wheatgrass	*Pascopyrum smithii*	Rosana
Introduced or Manipulated		
Basin wildrye-hybrid	*Leymus cinerus*	Continental
Crested wheatgrass	*Agropyrum cristatum*	Douglas
Crested wheatgrass	*Agropyrum cristatum*	Nordan
Crested-desertorum hybrid	*Agropyrum cristatum x A. desertorum*	Hycrest
Intermediate wheatgrass	*Thinopyrum intermedia*	Rush
Meadow brome	*Bromus biebersteinii*	Regar
Pubescent wheatgrass	*Thinopyrum intermedia*	Luna
Russian wildrye	*Psathyrostachys juncea*	Bozoisky
Siberian wheatgrass	*Agropyrum fragile spp. sibiricum*	Vavilov
Smooth brome	*Bromus inermis*	Liso
Wheatgrass-hybrid	*Elymus hoffmanni*	Newhy

The site is located 15 miles south of the city Fairplay, Park County, Colorado, on U.S. Highway 285. Elevation at the site is 9000 feet, and the annual precipitation is 10 inches. The planting site is on 63-Ranch State Wildlife Area. A six-foot tall game-fence was constructed to enclose the planted area. Plots will be evaluated for stand establishment and performance.

RESULTS

Results for Year-2006

Table 2 presents percent plant stand (establishment) and plant vigor for the growing season of year 2006. The overall average for plant establishment was 8.2 percent, which is low. Bad River′-blue grama performed best for the native grasses and ′Liso′-smooth brome performed best for the introduced grasses. By mid-summer the plots had been over run by a flush of fringed sagebrush seedlings and in some areas were covered with dense four foot circles of cutleaf nightshade. The cutlef nightshade were all pulled by hand and the fringed sage was sprayed with a mix of 2,4-D and Tordon. Also, the native western wheatgrass was encroaching from the perimeter and this was sprayed with glyphosate.

Table 2. Plant Stand & Vigor for 28 entries. South Park FEP-2006

Natives			
Common Name	**Release Name or Accession No.**	**% Plant Stand Average[1]**	**Plant Vigor Average[1]**
Blue grama	Bad River	32.0	3.5
Bluebunch wheatgrass	Anatone	18.2	3.5
Indian ricegrass	Rimrock	14.5	3.5
Western wheatgrass	Rosana	12.5	3.2
Bluebunch wheatgrass	Goldar	10.5	3.7
Indian ricegrass	Paloma	7.2	3.5
Western wheatgrass	Arriba	5.5	2.7
Bottlebrush squirreltail	Pueblo	2.7	2.2
Columbia needlegrass	9024804	2.5	2.3
Mountain brome	Garnet	2.0	3.2
Columbia needlegrass	9040137	1.7	2.3
Sandberg's bluegrass	High Plains	1.2	2.0
Prairie Junegrass	9092261	1.0	2.6
Streambank wheatgrass	Sodar	0.7	2.5
Bottlebrush squirreltail	Wapiti	0.5	2.0
Arizona fescue	Redondo	0.25	2.0
Bottlebrush squirreltail	Tusas	0.25	2.0
Introduced or Manipulated			
Smooth brome	Liso	23.0	2.7
Meadow brome	Regar	17.7	3.2
Russian wildrye	Bozoisky	14.5	3.7
Basin wildrye-hybrid	Continental	12.5	3.7
Crested wheatgrass	Nordan	11.5	3.7
Intermediate wheatgrass	Rush	8.7	3.7
Crested-desertorum hybrid	Hycrest	7.7	3.2
Pubescent wheatgrass	Luna	7.5	3.2
Siberian wheatgrass	Vavilov	7.2	3.2
Crested wheatgrass	Douglas	5.0	2.5
Wheatgrass-hybrid	Newhy	1.5	2.6

1. Average of four replications. Plant stand & vigor were statistically significantly different at the 5% level of probability. The ratings for Vigor are: 2 = poor, 3 = fair, 4 = Good and 5 = Excellent. Plant stand is a visual estimate per plot basis; four-row/ plot germinated are equal 100 percent establishment.

Project COPMC-F-0601-CR
Report-2009
By: Manuel Rosales, Pat Davey, Joe Brummer, Herman Garcia, Christine Taliga

Results forYear-2007
The plots were evaluated on July 31, 2007. Plant stand and vigor for the 28 entries are presented in tables 3 and 4.

Results for Year-2008
The plots were evaluated in July 8, 2008, for the third year of establishment. Most of the species are performing well. The study results are noted in Tables 3 and 4.

Results for Year-2009
The plots were evaluated in 2009 by Herman Garcia, USDA Natural Resources Conservation Service and Dr. Joe Brummer, Extension Forage Specialist Colorado State University. Table 3 and 4 represent a comparison of the plant establishment and vigor results from 2007 to 2009**.**

Table 3. Plant Establishment for South Park Field Evaluation Planting.

Native Species					
Common Name	**Release or Accession No.**	**Percent Plant Stand[1]**			
		2007	**2008**	**2009**	**Average**
Western wheatgrass	Rosana	35.2	65	77.5	59.23
Blue grama	Bad River	20	39	41.25	33.42
Bluebunch wheatgrass	Anatone	33.7	37.5	33.75	34.98
Western wheatgrass	Arriba	9	34	43	28.67
Bluebunch wheatgrass	Goldar	14.7	16.8	21.75	17.75
Indian ricegrass	Rimrock	10.7	2.5	6	6.40
Arizona fescue	Redondo	3.2	14.8	17.5	11.83
Sandberg's bluegrass	High Plains	6	8.5	9.25	7.92
Columbia needlegrass	9040137	3.7	7.5	8.25	6.48
Columbia needlegrass	9024804	2	5.5	7	4.83
Bottle brush squirreltail	Pueblo	5	1.8	1.5	2.77
Indian ricegrass	Paloma	0.5	0.5	0.25	0.42
Mountain brome	Garnet	2.7	2.8	1	2.17
Prairie Junegrass	9092261	2.5	3.7	6.5	4.23
Streambank wheatgrass	Sodar	1.3	2	3	2.10
Bottlebrush squirreltail	Tusas	1	1	0.25	0.75
Bottlebrush squirreltail	Wapiti	0.5	0.3	1.25	0.68

1. Percent plant stand is a visual estimate per plot basis; four complete rows within the plot are equal to 100 percent establishment.

Introduced or Manipulated Species					
Common Name	**Release or Accession No**	**Percent Plant Stand[1]**			**Average**
		2007	**2008**	**2009**	
Crested wheatgrass	Nordan	41.2	40	44.25	41.82
Siberian wheatgrass	Vavilov	29	47	23.25	33.08
Russian wildrye	Bozoisky	30.2	37	51.25	39.48
Meadow brome	Regar	31	27	35.5	31.17
Crested wheatgrass	Douglas	32.7	35.8	32.5	33.67
Crested-desertorum hybrid	Hycrest	26.2	27.3	24.25	25.92
Basin wildrye-hybrid	Continental	11	37	40	29.33
Smooth brome	Liso	20	6.5	12.25	12.92
Intermediate wheatgrass	Rush	11.2	10.3	14.5	12.00
Pubescent wheatgrass	Luna	11.2	10	9.25	10.15
Wheatgrass-hybrid	Newhy	12.2	7.5	9	9.57

2. Percent plant stand is a visual estimate per plot basis; four complete rows within the plot are equal to 100 percent establishment.

Table 4. Plant Vigor for South Park Field Evaluation Planting

Native Species					
Common Name	**Release or Accession No.**	**Plant Vigor[1] 2007**	**2008**	**2009**	**Average**
Bottlebrush squirreltail	Wapiti	1.8	1.0	1.5	1.43
Prairie Junegrass	9092261	1.5	1.5	3.75	2.25
Indian ricegrass	Paloma	1.5	2.0	0.5	1.33
Sandberg's bluegrass	High Plains	2.5	1.5	3.25	2.42
Western wheatgrass	Rosana	2.5	1.8	3.75	2.68
Indian ricegrass	Rimrock	2.0	2.3	3.5	2.60
Bottlebrush squirreltail	Pueblo	1.5	3.0	1	1.83
Bottlebrush squirreltail	Tusas	3.0	1.5	0.5	1.67
Bluebunch wheatgrass	Anatone	2.5	2.3	3.75	2.85
Bluebunch wheatgrass	Goldar	2.2	2.5	4.5	3.07
Blue grama	Bad River	3.0	2.0	3.75	2.92
Arizona fescue	Redondo	3.2	2.0	4.75	3.32
Columbia needlegrass	9040137	2.7	2.5	3	2.73
Western wheatgrass	Arriba	2.7	2.8	3.5	3.00
Mountain brome	Garnet	3.0	3.0	2.75	2.92
Columbia needlegrass	9024804	3.2	3.0	3.5	3.23
Streambank wheatgrass	Sodar	4.2	2.5	2.25	2.98

1. Plant Vigor is a visual estimate per plot basis. 1 = Excellent; 2 = Good; 3 = Fair; 4 = Poor; 5 = very poor.

Introduced or Manipulated Species					
Common Name	**Release or Accession No**	**Plant Vigor[1] 2007**	**2008**	**2009**	**Average**
Russian wildrye	Bozoisky	2.0	1.5	5	2.83
Crested wheatgrass	Nordan	1.7	2.0	4.5	2.73
Siberian wheatgrass	Vavilov	1.7	2.3	3	2.33
Meadow brome	Regar	2.2	2.3	5	3.17
Basin wildrye-hybrid	Continental	2.5	2.0	4.75	3.08
Crested-desertorum hybrid	Hycrest	2.0	2.8	3	2.60
Intermediate wheatgrass	Rush	3.0	2.3	2.5	2.60
Crested wheatgrass	Douglas	2.7	2.8	2.5	2.67
Smooth brome	Liso	3.0	3.5	1.75	2.75
Pubescent wheatgrass	Luna	3.2	3.3	1.75	2.75
Wheatgrass-hybrid	Newhy	3.2	3.3	3	3.17

1. Plant Vigor is a visual estimate per plot basis. 1 = Excellent; 2 = Good; 3 = Fair; 4 = Poor; 5 = very poor.

Project COPMC-F-0602-WI
Report-2009
By: Terri Blanke and Heather Plumb

Windbreak Demonstration Planting

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC) is located in an area that experiences strong winds throughout the year. To protect the field at UCEPC from prevailing winds, a windbreak is being planted with multiple benefits in mind. In addition to providing protection from the wind, the windbreak will serve educational, demonstrational, as well as aesthetic purposes. Additionally, the windbreak will serve as a source of realeased and experimental woody plant materials.

OBJECTIVE

To demonstrate the use of different woody species for windbreak purposes and to provide a source for plant release materials at UCEPC.

EXPERIMENTAL DESIGN

This is a non-replicated planting.

METHODS

A multiple-row windbreak, with five to eight rows of woody plant materials, will be planted along the west side perimeter of UCEPC. Three rows of evergreen trees, two rows of deciduous trees, and two to three rows of shrubs will be planted during 2006-2012. Native woody species will be planted where possible, following the Natural Resources Conservation Services (NRCS) guidelines for establishing a windbreak/shelterbelt. The planting will be irrigated as needed until the plants get well establish. Plant materials for the windbreak will be acquired through Colorado State Forest Service tree program and/or UCEPC woody collections.

RESULTS

Growing Season of 2006

On May 25, 2006, sixty potted Colorado blue spruce *Picea pungens* seedlings were hand transplanted by UCEPC staff. Tree seedlings were about 6-12 inches in height. The trees were purchased at the local NRCS field office through the Colorado State Forest Program. Trees were planted in a single row, north to south, which runs parallel to the UCEPC west fence at 16-feet spacing within the row. Trees were watered by hand immediately after planting. Trees were irrigated during the summer with a hand moved 2-inch line sprinkler. Trees were also mulched with a 2-3 inch layer of wood chips around each tree. The mulch kept soil moist and prevented weeds from competing with the trees.

On July 10, 2006, the trees were evaluated for survivability. All 60 trees were alive and growing well.

Project COPMC-F-0602-WI
Report-2009
By: Terri Blanke and Heather Plumb

Growing Season of 2007
On May 10, 2007, sixty potted Colorado blue spruce were transplanted into the existing row of spruce bringing the total to 120 Colorado blue spruce trees. Holes for the transplants were dug with a hand post-hole digger. Seedlings were then placed in the holes, backfilled, and packed lightly. A basin of soil was made around each tree and watered immediately with a water tank.

On August 20, 2007, twenty-one honeysuckle plants *Lonicera utahensis*, propagated by cuttings at UCEPC, were added to the windbreak to start a row of shrubs. These plants were hand transplanted by UCEPC staff members.

On September 12, 2007, the plants in the windbreak were evaluated for survival. All transplants planted during the growing season of 2007 were alive.

Growing Season of 2008
The windbreak demonstrational planting continues to grow in height as well as in number of plant entries. Ten more spruce trees were added to the spruce row bringing the total to 124 Colorado spruce trees. More additions include four shrubs species, with five plants each, received from Bismarck Plant Materials Center for an inter-center observational planting. These shrubs were added to the designated shrub-row of the windbreak. The four shrubs include American black currant *Ribes americanum*, black chokeberry *Photinia melanocarpa*, fireberry hawthorn *Crataegus chysocarpa*, and a plum *Prunus* spp. There are now a total of forty shrubs in the windbreak.

A drip irrigation system was installed in the windbreak on August 8, 2008. The emitters put out about a half gallon of water per hour. All trees and shrubs will be irrigated with the system as needed.

Growing Season of 2009
In the spring of 2009, the honeysuckles and the Bismarck shrubs were all evaluated, photographed, and heights were recorded. After the evaluation the honeysuckles were pruned to help promote new growth for the upcoming year. Roundup herbicide was sprayed around the shrub perimeters to help with weedy species infestations. At the time of the evaluation it was observed by UCEPC staff that wildlife browsing had occurred on all shrub plants. In July, the honeysuckles were tagged according to the color of berries produced by the plant. Two colors of berries were observed; red and orange. Not all honeysuckles had berries on them and will be monitored next year to see if berries are produced and what color they are. Throughout the spring and summer the windbreak was irrigated periodically by UCEPC staff. Roundup herbicide was applied around the perimeters of the windbreak to help prevent weed infestations.

During the fall, forty-one 10 to 12 foot Colorado blue spruces were added to the windbreak to create a second row of evergreen trees. The forty-one trees were provided by a local nursery. The trees were staked down and watered to help insure proper root establishment.

In the fall of 2009, UCEPC staff fenced 11 honeysuckles to help prevent further wildlife browsing and help catch snow for additional winter moisture.

Project COPMC-F-0602-WI
Report-2009
By: Terri Blanke and Heather Plumb

CONCLUSION

The established plants in the windbreak are performing well and are steadily growing. Further development of the windbreak is planned for the upcoming growing season. Additional shrubs, deciduous and evergreen trees need to be planted to add to the species diversity of the windbreak. Potential species to be added to the windbreak include Douglas fir, aspen, Gambel oak, pinyon pine, silver buffaloberries, chokecherry, and serviceberry.

Project COPMC-F-0603-RA
Report-2009
By: Steve Parr

Grass and Forb Observational Planting

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC) usually holds tours, field days, training and other events for the general public and other guests. In the past, UCEPC has shown the array of production fields and experimental studies being conducted. However, guests are often times interested in other species besides the ones being studied at UCEPC. This planting was initiated to fill this need and provide a better service to our customers.

OBJECTIVE

To establish grasses and forbs of Plant Materials releases and experimental species for training, educational, and demonstration purposes.

METHODS

On August 2, 2006, a total of 60 entries; 40 grasses and 20 forbs species were seeded at UCEPC. The species planted are UCEPC plant releases and experimental species, as well as plant releases from other Plant Materials Centers within the region (See Table 1). The planting was done in raised beds prepared with a bed former pulled with a tractor.

Each species was planted with a hand-push belt seeder, in plots 20 feet long and six feet wide, with two rows per plot. The distance between the rows is about three feet. The planting was then irrigated with a hand moved sprinkler system to ensure germination.

Table 1. Grass and Forb Observational Planting. UCEPC

Entry #	Release Name/Accession	Common Name	Scientific Name	Seed Source
Cool Season Grass Species				
1	Arriba	Western wheatgrass	*Pascopyrum smithii*	UCEPC
2	Luna	Intermediate wheatgrass	*Thinopyrum intermedium*	UCEPC
3	San Luis	Slender wheatgrass	*Elymus trachycaulus*	UCEPC
4	Pueblo Germplasm	Squirreltail	*Elymus elymoides* spp. *brevifolius*	UCEPC
5	Wapiti Germplasm	Squirreltail	*Elymus elymoides* spp. *brevifolius*	UCEPC
6	Garnet Germplasm	Mountain brome	*Bromus marginatus*	
7	Redondo	Arizona fescue	*Festuca arizonica*	UCEPC
8	Hycrest	Crested wheatgrass	*Agropyrum cristatum x A. desertorum*	UCEPC

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Report-2009
By: Steve Parr

Entry #	Release Name/Accession	Common Name	Scientific Name	Seed Source
9	Peru Creek	Tufted hairgrass	*Deschampsia cespitosa*	UCEPC
10	Volga	Mammoth wildrye	*Leymus racemosus*	UCEPC
11	9092261	Poa	*Poa* spp.	UCEPC
12	9040137	Columbia needlegrass	*Achnatherum nelsoni*	UCEPC
13	9092282	Sandberg bluegrass	*Poa secunda*	UCEPC
14	9092272	Mutton grass	*Poa fendleriana*	UCEPC
15	9070976	Thurber's fescue	*Festuca thurberi*	UCEPC
16	9092284	Mountain muhly	*Muhlenbergia montana*	UCEPC
17	9024739	Indian ricegrass	*Achnatherum hymenoides*	
18	9070952	Bluebunch	*Pseudoroegneria spicata* spp. *spicata*	UCEPC
19	9043501	Salina wildrye	*Leymus salinus*	UCEPC
20	L-45	Basin wildrye Cross	*Leymus cinereus*	ARS-Logan, UT/UCEPC
Forb Species				
21	ARS-2678	Kura clover	*Trifolium ambiguum*	UCEPC
22	Timp	Utah sweetvetch	*Hedysarum boreale*	UCEPC
23	Summit	Louisiana sage	*Artemisia ludoviciana*	UCEPC
24	Bandera	Rocky Mountain penstemon	*Penstemon strictus*	UCEPC
25	9024993	Rydberg's penstemon	*Penstemon rydbergii*	UCEPC
26	9070934	Sticky cinquefoil	*Potentilla glandulosa*	UCEPC
27	9092283	Utah sweetvetch	*Hedysarum boreale*	UCEPC
28	9070972	Senecio	*Senecio biglovii*	UCEPC
29	9024921	Sulphur buckwheat	*Eriogonum umbellatum*	UCEPC
30	9021471	Fringed sage	*Artemisia frigida*	UCEPC
Other PMCs Cool Season Grass Species				
31	Sodar	Streambank wheatgrass	*Elymus lanceolatus*	Aberdeen , PMC
32	Critana	Thick spike wheatgrass	*Elymus lanceolatus*	Bridger, PMC
33	Rosana	Western wheatgrass	*Pascopyrum smithii*	Bridger, PMC
34	Newhy	Hybrid wheatgrass	*Elymus hoffmanni*	Aberdeen, PMC
35	Rush	Intermediate wheatgrass	*Elytrigia intermedia*	Aberdeen , PMC
36	Trailhead	Basin wildrye	*Leymus cinereus*	Bridger, PMC
37	Anatone	Bluebunch wheatgrass	*Pseudoroegneria spicata*	Aberdeen, PMC

Entry #	Release Name/Accession	Common Name	Scientific Name	Seed Source
38	Vavilov	Siberian wheatgrass	*Agropyron fragile*	Aberdeen, PMC
39	Whitmar	Beardless wheatgrass	*Pseudoroegneria spicata*	Pullman, PMC
40	Covar	Sheep fescue	*Festuca ovina*	Pullman, PMC
Other PMCs Warm Season Grass Species				
41	9005439	Switchgrass	*Panicum virgatum*	Bridger, PMC
42	Dacotah	Switchgrass	*Panicum virgatum*	Bismarck, PMC
43	Bison	Big bluestem	*Andropogon gerardii*	Bismarck, PMC
44	Bad river	Blue grama	*Bouteloua gracilis*	Bismarck, PMC
45	Salado	Alkali sacaton	*Sporobolus airoides*	Los Lunas, PMC
46	Pierre	Sideoats grama	*Bouteloua curtipendula*	Bismarck, PMC
47	Vaughn	Sideoats grama	*Bouteloua curtipendula*	Los Lunas, PMC
48	Badlands	Little bluestem	*Schizachyrium scoparium*	Bismarck, PMC
49	Alma	Blue grama	*Bouteloua gracilis*	Los Lunas, PMC
50	Viva	Galleta grass	*Pleuraphis jamesii*	Los Lunas, PMC
Other PMCs Forb species				
51	Great Northern Germplasm	Common yarrow	*Achillea millefolium*	Bridger, PMC
52	San Juan Germplasm	Penstemon	*Penstemon angustifolius*	Los Lunas, PMC
53	Richfield Germplasm	Eaton's penstemon	*Penstemon eatonii*	Bridger, PMC
54	Maple Grove Germplasm	Lewis flax	*Linum lewisii*	Aberdeen, PMC
55	Appar	Blue flax	*Linum perenne*	Aberdeen, PMC
56	Bismarck Germplasm	Violet prairie clover	*Dalea purpurea*	Bismarck, PMC
57	Antelope Germplasm	White prairie clover	*Dalea candida*	Bridger, PMC
58	Stillwater Germplasm	Prairie coneflower	*Ratibida columnifera*	Bridger, PMC
59	Bismarck Germplasm	Narrow-leaved purple coneflower	*Echinacea angustifoli*a	Bismarck, PMC
60	Medicine Creek Germplasm	Maximilian sunflower	*Helianthus maximiliani*	Bismarck, PMC
61		Canada milkvetch*	*Astragalus canadensis*	Pullman, PMC

*Added on Nov-20, 2007

Project COPMC-F-0603-RA
Report-2009
By: Steve Parr

RESULTS

On August 15, 2006, about two weeks after planting, the first evaluation was performed since some species had already emerged. Eighty percent of the grass species (including warm season grasses) had germinated, however, the forbs had only a few entries that showed emergence at this date.

On September 29, 2006, since all warm season grass species (except 'Galleta') had germinated, the plots were mulched with grass-hay to protect them from frost heaving damage during the winter months.

On April 30, 2007, the plots were evaluated to determine survivability over the winter, and also to make note of the species that germinated in the spring of 2007. Most of the forbs that did not germinate during the fall of 2006 were showing about 50 percent germination. Also, the Indian ricegrass that had no germination during the fall-2006 had now 90 percent germination. Out of the ten entries of warm season grasses that germinated during the fall, only the blue grama species and alkali sacaton could be found. Most of the other species suffered winter damage and only a few plants were visible.

On May 24, 2007, all warm season grasses were replanted including the ones that had a few plants to insure a full stand. By July 5, 2007, the warm season grasses had all germinated and were progressing well. The entire demonstrational planting was showing excellent plant vigor and stand. Observations will continue during growing season of 2008.

2008

The demonstrational planting was evaluated in September 4, 2008, for plant establishment. Most of all species are doing well, including the warm season grasses.

2009

Of the 61 entries evaluated last year for percent stand, only two UCEPC cool season grasses were less than 85 percent stand, Peru Creek and Thurber's fescue. Three forbs, Timp, a senecio and a buckwheat, were less than 85 percent. One the other hand, four warm season grasses, Bad River, Alma, Pierre, and Vaughn all had 95 percent cover or better, and four "other Center" forbs had 95 percent or better stands. Yarrow, Eaton's penstemon, prairie clover and maximillian sunflower were all doing well. However, in 2009, stand was not evaluated. There were some additional efforts to improve stands to 100 percent in several plots, including Peru Creek, Maple Grove, buckwheats, prairie clovers and a new addition, wild iris, from South Park.

Seed was harvested from five different plots in 2009. Both Wapiti 207 grams, and Pueblo, 359 grams, bottlebrush squirreltails were harvested, a Sandberg bluegrass (Radio Tower source) 51 grams, Indian ricegrass (9024739) 177 grams, and Columbia needlegrass (9040137) 25 grams all produced adequate seed for collecting.

CONCLUSION

Efforts will continue to establish complete stands of materials for education, demonstration, and training opportunities. As materials come on board, additions will be made to the planting while other, ill-suited products will be removed.

Project COPMC-F-0604-RA
Report-2009
By: Heather Plumb

Harvey Gap Demonstrational Planting

INTRODUCTION

This demonstrational planting was set up as a request from the Glenwood Springs Field Office and the Conservation Districts in Garfield and Pitkin Counties in Colorado. At present, the Glenwood field office has a limited list of plant materials that can be recommended in the area. There is a need to increase the number of adapted perennial native grasses and forbs that can be recommended in the area. This technology development study was set up to fill this need.

OBJECTIVE

To determine adaptability of 20 cool and warm season perennial grasses and forbs for educational, demonstrational, and training purposes.

METHODS

The site was prepared with a fall application of herbicide on October 25, 2005, to eliminate existing brush, cheatgrass, native forbs, and grasses. The site received another application of herbicide on May 10, 2006, to kill some remaining brush, weeds, and perennial native grasses. The site was then plowed and disked. On November 1, 2006, a dormant planting was completed (see table 1). Seventeen perennial cool season grasses and three warm season grasses were seeded with an old 10-foot-wide grain drill, except for ′Pastura′-little blue stem which was hand broadcast. The plot size is 10 feet wide by 50 feet long; a total of 500 square feet per plot. All plots were dragged with a chain pulled with 2-ATVs (All terrain vehicles) after drilling to insure seed coverage and soil contact. The soil at the site is Vail silt loam. The entire site was then fenced to protect it from grazing of cattle and big game wildlife.

The site is located in the property of Cooperator and District board member, Larry Sweeney, near Rifle, Colorado. The average yearly precipitation for the site is 14-16 inches. The elevation is about 5600 feet. This is a dryland field planting with no irrigation.

Table 1. Sweeney's Demonstrational Planting.

Plot # (south-north)	**Release/Accession**	**Common Name**	**Scientific Name**
1	Arriba	Western wheatgrass	*Pascopyrum smithii*
2	Sodar	Streambank wheatgrass	*Elymus lanceolatus*
3	Hycrest	Crested wheatgrass	*Agropyron cristatum*
4	Whitmar	Beardless Bluebunch wheatgrass	*Pseudoroegneria spicata*
5	San Luis	Slender wheatgrass	*Elymus trachycaulus*
6	Luna	Pubescent wheatgrass	*Thinopyrum intermedium*
7	Pueblo	Squirreltail	*Elymus elymoides*
8	Newhy	Hybrid wheatgrass	*Elymus hoffmannii*
9	Lodorm	Green needlegrass	*Nassella viridula*
10	Covar	Sheep fescue	*Festuca ovina*
11	NW Colorado	Prairie Junegrass	*Poa spp.*
12	Pueblo* Wapiti**	Squirreltail Squirreltail	*Elymus elymoides* *Elymus elymoides*
13	Paloma	Indian ricegrass	*Achnatherum hymenoides*
14	Paiute	Orchard grass	*Dactylis glomerata*
15	Bozoisky	Russian wildrye	*Psathyrostachys juncea*
16	Trailhead	Basin wildrye	*Leymus cinereus*
17	Mandan	Canada wildrye	*Elymus canadensis*
18	Bad River* Appar**	Blue grama Prairie flax	*Bouteloua gracilis* *Linum perenne*
19	Niner* Timp**	Sideoats grama Utah sweetvetch	*Bouteloua curtipendula* *Hedysarum boreale*
20	Pastura* Bandera**	Little bluestem Rocky mountain penstemon	*Schizachyrium scoparium* *Penstemon strictus*

* Material planted Nov. 1, 2006
** Replacement material planted Oct. 26, 2007

Project COPMC-F-0604-RA
Report-2009
By: Heather Plumb

RESULTS

2007

On April 26, 2007, the plots were inspected to determine which species were germinating. Unfortunately, the entire area was covered with cheatgrass *Bromus tectorum* and it was very difficult to distinguish our seeded grasses. Application of herbicide was not an option since it would also kill the new grass seedlings. An attempt to get rid of cheat grass by hand-hoeing was made; however, the task was impossible since it was hard to see the rows of seedling grasses. As an alternative to hand-hoeing, the entire plot area was mowed with a hand-pushed mower to a height of about three-inches to control the growth of cheatgrass and prevent it from going to seed. The area was mowed four times until the cheat grass started to die back due to mowing and hot weather. The mowing was effective in controlling cheat grass and preventing it from forming seed heads.
Larry Sweeny reported that no measurable precipitation occurred during the months of May, June and July. Some monsoonal rains occurred in late July and early August, however, they were not recorded

On September 25, 2007, the plots were visited again to make a determination on re-seeding the plots. At this date it appeared that ′Covar′-sheep fescue, NW Colorado –Poa (prairie Junegrass), ′Paloma′-Indian ricegrass and ′Bozoisky′-Russian wildrye were the plots that had a good plant stand (35% - 40% for all of them except NW-Colorado that had 90% plant stand). A decision was made to re-seed in order to have a better demonstrational planting. On October 26, 2007, the plots were re-seeded except for NW Colorado Prairie Junegrass (Poa). The plots were re-planted with hand -Planet Jr. - seeders. The warm season plots were replaced with native perennial forbs as follow:
Plot-18- Appar-Prairie flax *Linum perenne*
Plot-19- ′Timp′-Utah sweetvetch *Hedysarum boreale*
Plot-20 ′Bandera′-Rocky Mountain penstemon *Penstemon strictus*
Also plot -12 Pueblo-squirreltail was replaced with Wapiti-squirreltail.

After finishing the re-seeding, all the plots with no signs of germination were sprayed with a 3% solution of glyphosate (Roundup) to kill the existing cheatgrass and other indigenous grass plants.

2008

On May 28, 2008, the plots were visited by Terri Blanke and Heather Plumb from UCEPC. The plots were weeded at this time and field notes were taken to record the plots that were showing signs of establishment. On July 18, Terri Blanke and Manuel Rosales visited the plots to weed and make an evaluation for the season. Good performers were Wapiti, ′Paiute′, ′Mandan′, ′Timp′, ′Bandera′, ′Covar′, Junegrass, and ′Bozoisky′. Poor performers appeared to be all wheatgrass species with the exception of a forb, a squirreltail and a needlegrass. In an attempt to establish all materials on the plot a re-seeding occurred on November 19, 2008. Ten entries were re-seeded.

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By: Heather Plumb

2009

On May 29, 2009, UCEPC staff members weeded and sprayed the demonstration plot for redstem filaree and other weeds. The re-seeded materials from the previous year were observed to have good emergence. The site was visited again on September 11, 2009, and was weeded, sprayed with 2,4-D along the boarders and all standing plant materials were cut down. The cut down materials were left within the plot. Pre-emergent, Pendulum, was spread out over the entire plot on October 9, 2009, to help ensure no seed left by the cut materials would germinate and to help prevent future weeds from coming up next year.

New wooden signs for the plot were provided to Larry Sweeny to help visitors with identification of materials.

CONCLUSION

We will continue to monitor the demonstration plot, and use whatever results we get for educational and demonstrational purposes. The re-seeded materials appear to have taken hold and will be monitored in the future to ensure successful establishment.

Project COPMC-F-0605-RA
Report-2009
By: Heather Plumb

Bluebell Field Evaluation Planting

OBJECTIVE

To determine adaptability of most applicable plant materials for use in low precipitation sandy sites to support Field Office Technical Guide (FOTG) and PM-releases. The top rated species will be recommended to be listed in the FOTG to be used by local NRCS field offices in Utah. These plant materials can then be recommended to solve rangeland resource concerns and natural resource concerns where plant materials are applicable. The off-center plots will also be used for educational, demonstrational, and training purposes.

INTRODUCTION

This off-center planting was requested by the NRCS Area Range Conservationist in Roosevelt, Utah, to further test the cool season grass species that did well on the Coyote Draw trial. The Coyote Draw site had very similar climatic conditions except the soils were clayey at Coyote Draw and the soils on this site are sandy soils. Currently, the local NRCS Field Office has very few native and introduced grass species to recommend to producers to plant under these conditions in order to solve resource concerns. There is a need to increase the number of adapted perennial native grasses that can be recommended in the area. This technology development study was set up to fill this need.

EXPERIMENTAL DESIGN

The statistical design for this study is a randomized complete block with four replications

METHODS

Fifty accessions represented by plant material releases and experimental products were planted on November 7, 2006, (See Table 1). The planting was done with a four row plot cone-seeder. The rate of seeding for each row was 30 pure live seeds per linear foot. The plot size is 4 x 20 feet with four rows per plot spaced about one foot apart. No seed bed preparation was done before planting. The average annual precipitation for the site is 8-12 inches. The soil texture for the site is sandy loam. This is a dryland off-center planting with no irrigation. The site is located about 15 miles west from the Roosevelt, Utah Service Center, at an elevation of about 6200 feet. The site was fenced to protect it from grazing cattle, big game wildlife, and rabbits.

Table 1. Fifty Entries of Perennial Grasses for Bluebell, Utah, Off-Center Evaluation.

Entry No.	Release/ Accession	Common Name	Scientific Name	Seed Source
1	Nezpar	Indian ricegrass	*Achnatherum hymenoides*	Aberdeen, ID
2	Anatone	Bluebunch wheatgrass	*Pseudoroegneria spicata*	Aberdeen, ID
3	Goldar	Bluebunch wheatgrass	*Pseudoroegneria spicata*	Aberdeen, ID
4	Bannock	Thickspike wheatgrass	*Elymus lanceolatus*	Aberdeen, ID
5	Sodar	Streambank wheatgrass	*Elymus lanceolatus*	Aberdeen, ID
6	Magnar	Basin wildrye	*Leymus cinereus*	Aberdeen, ID
7	Ephraim	Crested wheatgrass	*Agropyron cristatum*	Aberdeen, ID
8	Rush	Intermediate wheatgrass	*Elytrigia intermedia*	Aberdeen, ID
9	Rimrock	Indian ricegrass	*Achnatherum hymenoides*	Bridger. MT
10	Critana	Thickspike wheatgrass	*Elymus lanceolatus*	Bridger. MT
11	Trailhead	Basin wildrye	*Leymus cinereus*	Bridger. MT
12	Goshen	Prairie sandreed	*Calamovilfa longifolia*	Bridger. MT
13	Paloma	Indian ricegrass	*Achnatherum hymenoides*	Los Lunas, NM
14	Tusas	Bottlebrush squirreltail	*Elymus elymoides*	Los Lunas, NM
15	Alma	Blue grama	*Bouteloua gracilis*	Los Lunas, NM
16	Hachita	Blue grama	*Bouteloua gracilis*	Los Lunas, NM
17	Niner	Sideoats	*Bouteloua curtipendula*	Los Lunas, NM
18	Vaughn	Sideoats	*Bouteloua curtipendula*	Los Lunas, NM
19	Aldous	Little bluestem	*Schizachyrium scoparium*	Los Lunas, NM
20	Bad river	Blue grama	*Bouteloua gracilis*	Bismarck, ND
21	Pierre	Sideoats	*Bouteloua curtipendula*	Bismarck, ND
22	Badlands	Little bluestem	*Schizachyrium scoparium*	Bismarck, ND
23	Nordan	Crested wheatgrass	*Agropyron cristatum*	Bismarck, ND
24	739	Indian ricegrass	*Achnatherum hymenoides*	Meeker, CO
25	Pueblo	Bottlebrush squirreltail	*Elymus elymoides*	Meeker, CO
26	Wapiti	Bottlebrush squirreltail	*Elymus elymoides*	Meeker, CO
27	State Bridge	Bottlebrush squirreltail	*Elymus elymoides*	Meeker, CO
28	Colorado	Bluebunch wheatgrass	*Pseudoroegneria spicata*	Meeker, CO
29	Graystone	Needle & thread	*Hesperostipa comata*	Meeker, CO
30	Maybell	Needle & thread	*Hesperostipa comata*	Meeker, CO
31	Simms	Needle & thread	*Hesperostipa comata*	Meeker, CO
32	Yampa	Prairie Junegrass	*Koeleria comata*	Meeker, CO
33	Price	Salina wildrye	*Leymus salinus*	Meeker, CO
34	Luna	Intermediate wheatgrass	*Elytrigia intermedia*	Meeker, CO
35	Volga	Mammoth wildrye	*Leymus racemosus*	Meeker, CO
36	Arriba	Western wheatgrass	*Pascopyrum smithii*	Meeker, CO
37	Fish Creek	Bottlebrush squirreltail	*Elymus elymoides*	ARS-Logan, UT
38	Sand Hollow	Bottlebrush squirreltail	*Elymus elymoides*	ARS-Logan, UT
39	Toe Jam Creek	Bottlebrush squirreltail	*Elymus elymoides*	ARS-Logan, UT
40	P-24	Bluebunch wheatgrass	*Pseudoroegneria spicata*	ARS-Logan, UT
41	P-7	Bluebunch wheatgrass	*Pseudoroegneria spicata*	ARS-Logan, UT
42	Continental	Basin wildrye	*Leymus cinereus*	ARS-Logan, UT
43	L-46	Basin wildrye	*Leymus cinereus*	ARS-Logan, UT

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Entry No.	Release/ Accession	Common Name	Scientific Name	Seed Source
44	Douglas	Crested wheatgrass	*Agropyron cristatum*	ARS-Logan, UT
45	Hycrest-II	Crested wheatgrass	*Agropyron cristatum*	ARS-Logan, UT
46	Vavilov	Siberian wheatgrass	*Agropyron fragile*	ARS-Logan, UT
47	Bozoisky II	Russian wildrye	*Psathyrostachys juncea*	ARS-Logan, UT
48	P-22	Bluebunch wheatgrass	*Pseudoroegneria spicata*	ARS-Logan, UT
49	White River	Indian ricegrass	*Achnatherum hymenoides*	ARS-Logan, UT
50	Star Lake	Indian ricegrass	*Achnatherum hymenoides*	ARS-Logan, UT

RESULTS

2007

On May 11, 2007, the plots were sprayed with herbicide Buctril® and 2,4-D at recommended rates to eliminate some of the broadleaved weeds.

On July 24, 2007, the plots were evaluated. A visual estimate of plant stand per plot was recorded and analyzed statistically. Rabbits had gained access to the plots and had done considerable damage to most plots. Plant vigor was not taken due to the damaged performed by rabbits, making it impossible to truly assess plant vigor. A second row of chicken wire was purchased to be added to the fence surrounding the plot to help prevent future rabbit damage.

2008

The plots were evaluated for the second growing season in May 25, 2008. From the time the plots were planted to May 15, 2008, the plots received about 10 inches of precipitation for a period of 18.5 months. No rabbit damage was observed since the additional wire was added to the fence.

2009

On September 18, 2009, the plots were evaluated for the third growing season (Table 2). Visual estimates of plant percent stand and vigor were recorded and statistically analyzed. Heights of plants were also recorded.

Table 2. Percent Plant Stand and Vigor for 50 Perennial Grasses at Bluebell, UT, 2009.

Accession	Common Name	Percent Plant Stand 1*	Plant Vigor 2*
Luna	Bottlebrush squirreltail	32.5	3.25
Paloma	Indian ricegrass	28.25	1.5
Valvilov	Bluebunch wheatgrass	22	2.25
Rush	Bottlebrush squirreltail	21.5	2.5
Fish Creek	Blue grama	20	2.5
Nordan	Bluebunch wheatgrass	18.25	2.25
Volga	Crested wheatgrass	18	2.75
Douglas	Bottlebrush squirreltail	18	2.75
Continental	Indian ricegrass	16.25	2.75
Graystone	Salina wildrye	15.5	2.25
P-7	Bluebunch wheatgrass	15.25	2.25
Nezpar	Indian ricegrass	15.25	1.5
Trailhead	Needle & thread	14.75	2.75
Arriba	Blue grama	13.25	2.5
739	Bottlebrush squirreltail	13	2
Rimrock	Indian ricegrass	12.75	2
P-24	Little bluestem	11.75	2.75
Toe Jam	Thickspike wheatgrass	8.75	2.5
Sodar	Needle & thread	8.75	2.25
Sand Hallow	Western wheatgrass	8.5	3.25
White River	Bluebunch wheatgrass	8	2
P-22	Sideoats	7	3
Maybell	Bluebunch wheatgrass	6.75	2
Anatone	Sideoats	6	2.75
Bozoisky	Siberian wheatgrass	5.25	2
Critana	Basin wildrye	5	2.25
Goldar	Intermediate wheatgrass	4.5	2.75
Simms	Basin wildrye	4.5	3.25
Star Lake	Sideoats	4	2.25
Price	Crested wheatgrass	3.75	3.75
Bannock	Streambank wheatgrass	3.75	3.25
State Bridge	Bottlebrush squirreltail	3	2.75
Ephraim	Bottlebrush squirreltail	2.75	3.75
L-47	Prairie sandreed	1.75	4.3
Hycrest	Basin wildrye	1.5	4
Colorado	Bluebunch wheatgrass	1.25	2.5
Magnar	Thickspike wheatgrass	0.75	4.25
Pueblo	Indian ricegrass	0.75	3.75
Wapiti	Needle & thread	0.5	3.75
Hachita	Intermediate wheatgrass	0	5
Aldous	Mammoth wildrye	0	5
Niner	Bottlebrush squirreltail	0	5
Bad River	Basin wildrye	0	5
Goshen	Russian wildrye	0	5
Yampa	Crested wheatgrass	0	5
Badlands	Crested wheatgrass	0	5
Tusas	Indian ricegrass	0	5
Vaughn	Little bluestem	0	5
Pierre	Prairie Junegrass	0	5
Alma	Blue grama	0	5
LSD (0.05) 3*		25.02	2.39

1. Plant stand: Visual estimate per plot: Four complete rows = 100 percent
2. Plant vigor: Visual estimate per plot: 1 = Excellent; 2 = Good, 3 = Fair ; 4 = Poor; 5 = Very poor
3. LSD =Least Significant Difference at P<0.05.

CONCLUSION

With the 2009 growing season the Bluebell plot has three years of data recorded. However, only two years of those three have had complete data. In 2007, only percent plant stand was recorded. The consistency of the evaluation dates has varied as well over the years. Perhaps in the future the evaluation dates can be more consistent to help insure plants are being evaluated at the same growth points each year.

The Bluebell plots will continue to be evaluated in the future until sufficient data is collected to make confident recommendations to the NRCS Field Office.

Project COPMC-F-0801-RA
Report-2009
By: Heather Plumb

Snowmass Field Evaluation Planting

INTRODUCTION

There is limited information on the performance of perennial native grasses and forbs at altitudes near 8000 feet or above. With this in mind, Upper Colorado Environmental Plant Center (UCEPC) in cooperation with Mount Sopris Conservation District, and St. Benedict's Monastery installed a high altitude planting to evaluate the performance of different species. The site is located on the Monastery at 7800 feet.

OBJECTIVE

To determine suitability of grasses for high altitude revegetation

EXPERIMENTAL DESIGN

The statistical design for the study is a randomized complete block with four replications

METHODS

The planting site was prepared in the fall of 2006 and spring of 2007. Existing vegetation was removed by chemical and mechanical means. The site was seeded on October 4-5, 2007. Thirty eight species were seeded with a four-row cone-seeder. The rate of seeding was 30 pure live seeds per linear foot of row. The plot size is 4 x 20 ft with four rows. The site was also fenced to protect the planting from livestock use. Plots will be evaluated for establishment, vigor and performance for at least five years. Table1 lists the 38 entries for the study.

Table1. 38 Grass Species Planted at Snowmass

Common Name	Release Name or Accession No.	Scientific Name
Arizona fescue	Florrisant	*Festuca arizonica*
Arizona fescue	Redondo	*Festuca arizonica*
Big bluegrass	Yampa	*Poa secunda*
Big bluegrass	Sherman	*Poa secunda*
Bluebunch	Anatone	*Pseudoroegnaria spicata*
Bluebunch	Colorado BLM	*Pseudoroegnaria spicata*
Bluebunch	Goldar	*Pseudoroegnaria spicata*
Bluebunch	P7	*Pseudoroegnaria spicata*
Blue wildrye	California Park	*Elymus glaucus*
Blue wildrye	Flat Tops	*Elymus glaucus*
Blue wildrye	Marvine	*Elymus glaucus*
Blue wildrye	Park Range	*Elymus glaucus*
Blue wildrye	Rabbit Ears	*Elymus glaucus*

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Common Name	Release Name or Accession No.	Scientific Name
Blue wildrye	Uncompahgre	*Elymus glaucus*
Bottlebrush	State Bridge BLM	*Elymus elymoides*
Bottlebrush	Tusas	*Elymus elymoides*
Bottlebrush	Wapiti	*Elymus elymoides*
Columbia needlegrass	2A	*Achnatherum nelsonii*
Columbia needlegrass	12A	*Achnatherum nelsonii*
Indian ricegrass	715	*Achnatherum hymenoides*
Indian ricegrass	739	*Achnatherum hymenoides*
Indian ricegrass	741	*Achnatherum hymenoides*
Indian ricegrass	Rimrock*	*Achnatherum hymenoides*
Meadow brome	Regar	*Bromus biebersteinii*
Mountain brome	Garnet	*Bromus marginatus*
Mountain brome	Elk Creek	*Bromus marginatus*
Mountain muhly	Florrisant	*Muhlenbergia montana*
Salina wildrye	Price	*Leymus salinus*
Sandberg's bluegrass	Gypsum	*Poa secunda*
Sandberg's bluegrass	High Plains	*Poa secunda*
Slender wheatgrass	Pryor	*Elymus trachycaulus*
Slender wheatgrass	San Luis	*Elymus trachycaulus*
Slender wheatgrass	Summitville	*Elymus trachycaulus*
Spike trisetum	Summitville	*Trisetum spicatum*
Thurber's fescue	Hiner Spring	*Festuca thurberi*
Western wheatgrass	Arriba	*Pascopyrum smithii*
Western wheatgrass	Irish Canyon BLM	*Pascopyrum smithii*
Western wheatgrass	Rosana	*Pascopyrum smithii*

RESULTS

2008

On July 17, 2008, the plots were weeded by hand and evaluated. Most species established very well for the first year after planting. The top five percent plant stand performers were Elk Creek, 'Pryor', Garnet, 'San Luis' and Wapiti.

2009

On July 16, 2009, UCEPC staff evaluated, weeded by hand and sprayed the Snowmass plot. As the plot was weeded Steve Parr and Heather Plumb evaluated. After evaluations the broadleaf weeds were hand sprayed with Roundup®. On October 7, 2009, Terri Blanke and Heather Plumb pre-emerged the plot with Pendulum® to help prevent volunteer seedlings for the 2010 growing season.

Project COPMC-F-0801-RA
Report-2009
By: Heather Plumb

Evaluation data recorded was analyzed statistically and top percent plant stand performers were; 'Pryor', Elk Creek, 'Rosana', 'Regar' and 'Goldar'. All top percent stand performers additionally had high vigor results (See Table 2).

Table 2. Percent Plant Stand and Vigor for Snow Mass Field Evaluation Planting, 2009.

Release Name or Accession Number	Common Name	Percent Plant Stand *1	Plant Vigor *2
Pryor	Slender wheatgrass	76.5	2
Elk Creek	Meadow brome	74.5	2
Rosana	Western wheatgrass	72.5	3
Regar	Meadow brome	67	3
Goldar	Bluebunch	64	2
Flat Tops	Blue wildrye	61.75	2.5
San Luis	Slender wheatgrass	60.75	2.75
Garnet	Meadow brome	59	3
Wapiti	Bottlebrush	58	2.75
Arriba	Western wheatgrass	57.75	2.25
California Park	Blue wildrye	57.5	3
P7	Bluebunch	55.5	2.75
715	Indian ricegrass	44.5	2
Summitville-wheat	Slender wheatgrass	40.5	4
State Bridge BLM bottle	Bottlebrush	40	2.5
Irish Canyon BLM wheat	Western wheatgrass	40	3.25
Park Range	Blue wildrye	37	3
Marvine	Blue wildrye	35	3
Uncompahgre	Blue wildrye	33.75	3.25
Colorado BLM	Bluebunch	33	2.75
Anatone	Bluebunch	30.5	3.25
12A	Columbia Needlegrass	26	3
739	Indian ricegrass	24.75	3
741	Indian ricegrass	24.75	3
Rabbit Ears	Blue wildrye	21.75	3
2A	Columbia Needlegrass	21.75	3
Rimrock*	Indian ricegrass	17	2.5
Price	Salina wildrye	16.75	3
Yampa	Bluegrass	13	2.25
Sherman	Bluegrass	11	2.25
Florrisant fescue	Arizonia fescue	1.75	4
Hiner Springs	Thurber's fescue	1.75	4
Redondo	Arizonia fescue	1.5	4.25
Gypsum	Sandberg's bluegrass	1.5	4.5
Summitville-spike	Spike trisetum	1.5	4.25
Florrisant muhly	Mountain muhly	1.25	4.75
High Plains	Sandberg's bluegrass	1.25	4.25
Tusas	Bottlebrush	1	5
LSD (0.05)		19.87	0.75

1. Plant stand: Visual estimate per plot: Four complete rows = 100 percent
2. Plant vigor: Visual estimate per plot: 1 = Excellent; 2 = Good, 3 = Fair ; 4 = Poor; 5 = Very poor
3. Least Significant Difference at P<0.05.

CONCLUSION

The 2009 growing season was the second year the Snowmass plot has undergone evaluation. Most plant species have established very well, there are a few that have still not emerged. Perhaps in the future those materials can be re-seeded to determine if they unsuitable high elevation materials. The Snowmass plots will continue to be evaluated in the future until sufficient data is collected to make confident recommendations to the local NRCS Field Offices about high elevation plants.

Project: COPMC-F-0802-IN
Report- 2009
By: Heather Plumb

Tamarisk Replacement Planting

INTRODUCTION

Riparian ecosystems are ideal ecosystems for invasive plant specie infestations. There is an ever constant demand to use native plants for revegetating infested ecosystems. Upper Colorado Environmental Plant Center (UCEPC), United States Department of Agriculture (USDA), The Tamarisk Coalition and the Young Ranch are working cooperatively to rehabilitate a known riparian ecosystem where tamarisk *Tamarix* spp. has rigorously invaded and taken over the area.

OBJECTIVE

To determine what native woody species are suitable and effective in replacing post treated tamarisk infested sites.

METHODS

In February 2008, the UCEPC staff collected one hundred willow whips *Salix* spp. from Horsethief Canyon near Grand Junction Colorado. Willow whips were placed in cold storage for the winter and were kept in cold storage until spring planting. Most of the willow whips had begun developing roots and sprouts while in cold storage. Nine silver buffaloberry *Shepherdia argentea* were grown over a period of several years in the UCEPC greenhouse.

Planting of the willow whips and silver buffaloberries began May 29, 2008, at Salt Creek. Sites for willows were chosen according to erosion patterns along the creek bank. Approximately ten willows were planted in each site. Willows were planted as deeply as possible directly into the sand bank or in the creek itself. Of the 100 original willow whips, 50 were cut in half to make 50 additional whips to be inserted into the sand banks. A total of 150 willow whips were planted at the site. August 13, 2008, five more willows were planted at the site.

Two different sites were chosen for the silver buffaloberries. The first site was located 100 yards from Salt Creek in an old washed out area. The area was sprayed with glyphosate, Roundup, for weed control. Holes for the plants were hand dug and filled with water from the creek. One 4-year old plant and 3 two-year old plants were planted and watered. The second site was 1000 yards away from Salt Creek below an old terrace. The area was sprayed with Roundup for weed control. Holes were hand dug again and filled with creek water. One 4-year old, 3 two-year old plants and one 1-year old plant were planted and additionally watered.

Project: COPMC-F-0802-IN
Report- 2009
By: Heather Plumb

RESULTS

2008

USDA office in Grand Junction observed deer browsing on the silver buffaloberries. August 13, 2008, UCEPC staff evaluated willows and silver buffaloberries. Tamarisk was sprouting and coming back within the treatment areas. A 20% survival rate for the willow whips was observed, majority of willow whips were washed away or died. Surviving willows ranged in size and location along Salt Creek. Eight wire pens were made and placed around the silver buffaloberries to prevent further deer damage. One silver buffaloberry plant at the first site by the creek was not found, and only three plants were observed. All plants at the second site were found. Silver buffaloberries that were observed were alive and trimmed to help promote growth.

2009

On March 24, 2009, UCEPC staff visited the Mack site. At this time buds were beginning to form on the buffaloberries and pictures were taken.

June 4, 2009, Heather Plumb and Terri Blanke evaluated the buffaloberries and took height measurements. Of the buffaloberries planted by Salt Creek only one was observed to be alive; the others were dead. The height of the surviving plant was 47.5 inches and it was the plant that was furthest from the creek. The buffaloberries that were planted by the bench had a much higher survival rate as three of the four had survived. The heights of the surviving plants were 29, 42, and 43 inches. Deer browsing was observed on the new growth, the surviving plants all looked healthy. However, the buffaloberry site was heavily infested with white top and survival for next year may be lowered.

Few willow whips were observed, but it was undeterminable if they were native or transplanted whips. The transplanting was determined a failure and whips need to be re-transplanted.

CONCLUSION

Further evaluations must be performed in the future on the Salt Creek site for both silver buffaloberries and willows. Additional willow whips and buffaloberries should be established to replace those lost in the previous years. However, if the white top continues to spread and becomes worse, the site may have to be abandoned.

Project No. COPMC-F-0803-RI
Project Report-2009
By: Terri Blanke

Beefsteak Riparian Planting

INTRODUCTION

With ongoing efforts to repair our riparian ecosystems from the damage done by invasion of Russian olive *Elaeagnus angustifolia L*. and tamarisk *Tamarix spp*. the need for restoration material is greater than ever. Upper Colorado Environmental Plant Center (UCEPC) and the Meeker Bureau of Land Management (BLM) have recognized this need and are working together to collect, propagate, increase, study, and implement the best suitable materials for these riparian restoration/enhancement projects. Silver buffaloberry *Shepherdia argentea* is a hearty shrub native to Colorado with many conservation attributes. UCEPC has recognized silver buffaloberry as a possible native woody riparian replacement material.

OBJECTIVE

To determine adaptation of buffaloberry accession 9008027 for riparian restoration plantings

METHODS

This is a non-replicated planting.

Silver buffaloberry, accession number 9008027, was planted in the UCEPC orchard in 1977. The shrub was selected for superior performance and isolated in the windbreak area in 1991. UCEPC staff continues to evaluate, maintain, and collect seed when available. Buffaloberry shrubs were successfully propagated in the greenhouse by seed for several years later. On June 9, 2008, fifteen potted silver buffaloberry plants of various size and age were planted in the BLM Beefsteak pasture between the White River and Highway 64, Meeker, Colorado. The location hosted a variety of riparian species including willow, alder, juniper, hackberry, skunkbush sumac, Gambel oak, and volunteer buffaloberry. The soil was mostly sand /silt with plenty of moisture. The public access is also a holding field for cattle that are being relocated. Melissa Kindall and Mary Taylor of the Meeker BLM office along with Heather Plumb and Terri Blanke of UCEPC used a portable 8″ auger for digging holes to place the shrubs in. The holes were filled with water and then backfilled as necessary. Planting locations varied to study survivability. Material was placed directly into the high water, at shoreline, higher up on the bank and out into the field. UCEPC employees watered the shrubs periodically through the summer. The buffaloberry shrubs were fenced for protection from wildlife browsing and cattle.

Project No. COPMC-F-0803-RI
Project Report-2009
By: Terri Blanke

RESULTS

July 7, 2009, UCEPC staff evaluated the buffaloberries for height and survivability. The shrubs were measured to the tallest new leader and photographs were taken. There is competition from grass and willows but the plants are thriving. The shrubs that were browsed and trampled by cattle are putting on new growth. Eleven shrubs from the original 15 were located. The table below shows the evaluation results.

Plant #		Height	Notes	Location	Protection
1	(1 of 2)	2”	Tiny but alive	Below Power lines	Fenced
2	(2 of 2)	40”	Tall & Healthy	Below Power lines	Fenced
3	(1 of 2)	44”	Healthy	Water line/willow zone	
4	(2 of 2)	31”		Water line/willow zone	None
5	(1 of 4)	40”	Upper Tier	Upper Tier/Frthst West	Fenced
6	(2 of 4)	31”	Upper Tier	2nd from west	Fenced
7	(3 of 4)	44”	Browsed	3rd from west	None
8	(4 of 4)	43”		Upper Tier 4th west	
9	(1 of 2)	41”	Dryer area	Top terrace/west	Fenced
10	(2 of 2)	45”	Dryer area	Top terrace /east	Fenced
11	(1)	28”	Willow competition	Waterline	None

CONCLUSION

The silver buffaloberry plants are proving to be very tolerable to a variety of environmental conditions. They have survived heavy browsing, drought and high water. The remaining shrubs will be fenced for protection and tagged for identification in 2010. UCEPC will continue to monitor the shrubs for berry production and a possible release to the general public for conservation practices.

Project: COPMC-F-0804-RI
Report- 2009
By: Heather Plumb

Silver Buffaloberry Field Planting

INTRODUCTION

Riparian ecosystems are extremely sensitive areas that are used by both humans and wildlife. Riparian areas are well known for major soil erosion problems because of natural and man induced practices. As a result, habitat can be severely degraded. Native plants are in constant demand to be used as soil and stream bank stabilizers to help eliminate or reduce soil erosion effects. Upper Colorado Environmental Plant Center (UCEPC) and the Gunnison NRCS Field Office are working cooperatively to rehabilitate known riparian ecosystems where soil erosion at high elevations has occurred and depleted riparian habitat. The plant specie chosen to be used in this field planting is Silver buffaloberry *Shepherdia argentea*. Silver buffaloberry is a deciduous, thorny shrub/tree that is well adapted to mid-level elevations, but is unknown how suited it is to elevations over 8000 feet. Plants at maturity can reach heights of 6 to 20 feet. Roots are shallow and are readily sprouting making them excellent at stabilizing eroding soils. Silver buffaloberries are very common along streams and on exposed moist hillsides.

OBJECTIVE

To determine adaptability of silver buffaloberry *Shepherdia argentea* selection for riparian plantings at high elevations in Colorado

METHODS

June 26, 2008, forty live silver buffaloberries were picked up and delivered to Jason Turner at the Gunnison Field Office in Gunnison, Colorado. Silver buffaloberry plants ranged in size and age. Plants delivered were as follows; one 1-gallon pot, one 3-gallon pot, two-6″ x 16″ tree pots, seven-2″ x 12″ cones, eighteen-2″ x 2″ x 11″ tree pots, and eleven-4″ x 4″ x 14″ tree pots.

RESULTS

The buffaloberries were all planted the day after the Gunnison field office received them in 2008. The buffaloberries were planted in a reclaimed reservoir site. The site presented a great opportunity to test the plants in various soils (clayey to sandy loam) and at various depths to the water table.

2008

The landowner working with the Gunnison field office reported that in late summer 2008, many of the silver buffaloberries were looking good and he was optimistic.

Project: COPMC-F-0804-RI
Report- 2009
By: Heather Plumb

2009

UCEPC staff contacted Elizabeth With, from the Gunnison field office, to see how the Silver buffaloberries were doing since the summer of 2008. Elizabeth observed that only four of the larger, hearty plans that were planted survived the harsh winter. When they were first planted they were each about 1.5 feet tall, except for one which was a little over two feet. During the 2009 evaluation performed by Elizabeth plants were measuring 1.5, 2, 2.5 and 3 feet tall. The smaller buffaloberries were not observed and were believed to be dead. Pictures of the site were provided by Elizabeth With showing elk browsing on the larger buffaloberry plants.

CONCLUSION

The plan for further follow-up is to go and visit the site in the summer of 2010. UCEPC staff and members from the Gunnison field office will visit the reclaimed reservoir site to evaluate how the larger buffaloberries survived over the winter and how they are doing at the high elevation. More buffaloberry plants may need to replace the smaller plants that did not make it through the 2008 and 2009 winter. Further evaluations on the reclaimed reservoir site are needed.

Project COPMC-F-0805-CR
Project Report - 2009
By: Steve Parr

Piceance Basin Evaluation Planting

INTRODUCTION

Successful revegetation of well pads, pipelines, roadsides, and other surface disturbances related to natural resource extraction is a critical aspect of long-term land stewardship. Energy extraction in Western Colorado and the associated activities has increased substantially since 2004. According to the U.S. Energy Information Administration, the nation's use of natural gas will increase by more than 50 percent by 2025. This is echoed by Joe Jaggers, vice president of exploration and production of Williams Energy Company, who said, "In a national sense, the Rocky Mountains have the most undeveloped potential that we can access".

This project addresses some of the most pressing natural resource conservation concerns that surface disturbing activities related to natural gas exploration, extraction, and transmission create. The construction of well pads, roads, and pipeline transmission corridors are all activities that, if left unchecked, result in loss of topsoil and invasion by annual or noxious weeds. Additionally, if revegetation activities utilize improper methods or materials that are not suited to the site, failure is the most common result. In order to reduce or minimize the ecological negative affects of natural gas extraction, soil surface disturbances must be successfully revegetated with products that are well suited to the site and that have long term environmental benefits.

Private landowners, conservation district members, and public land managers are directly and indirectly affected by pipeline and well pad disturbances. Annual and invasive weed spread, soil loss, reduced grazing opportunities, water quality degradation and loss of wildlife habitat, including critical mule deer and sage-grouse habitat, are some of the conservation challenges that landowners and land managers will be facing if surface disturbances occur without successful revegetation.

OBJECTIVE

The goal of this project is to identify practices and products that result in successful well pad revegetation. The principle objective is to identify which conservation plant materials will establish and persist on abandoned well pads, and secondarily, to compare how new releases and experimental products compare to current seed mix and source recommendations by the Natural Resource Conservation Service (NRCS) and Bureau of Land Management (BLM) field offices.

BACKGROUND

BLM, White River Field Office, Riata Energy Company, and Upper Colorado Environmental Plant Center (UCEPC) were original partners on the project. Likely additional partners included

NRCS, Colorado State University, and Colorado Division of Wildlife. However, no additional partners have contributed time or resources as of the date of this report. Riata had agreed to allow UCEPC to conduct this research on two well pads they had abandoned, and were to have fenced both sites to exclude livestock. In exchange, BLM was to release Riata's reclamation bond.

The two sites are typical of much of the Piceance Basin where extraction activities are being conducted. In addition, one site was identified as important sage-grouse habitat and both sites are important mule deer habitat components. This project specifically addresses which plant material product(s), out of 52 entries, replicated four times, shows promise for long-term revegetation success on well pads that are plugged and recontoured. Successful revegetation ensures conservation of topsoil, reduction of weed invasion, improved wildlife habitat, and livestock grazing opportunities, reduced fire hazards, and enhanced water quality. Additionally, it will help to demonstrate that successful revegetation is an expected outcome of surface disturbing activities in the Piceance Basin.

In order to simulate actual well pad revegetation activities, a well pad that had been constructed, and then abandoned and recontoured prior to revegetation, was necessary. This effort required the coordination of the White River Field Office of the BLM, and resource specialists for many of the major oil and gas companies operating in the Piceance Basin. After several site evaluation trips, one was selected that was permitted to Riata Energy Company. Riata Energy Company, who was an initial partner on the project, provided the site location, did the recontour work on the well pad, and was in the process of signing a long-term agreement that would allow the research to be done on the site. They were also agreeable to pay for the fencing of the site. However, they sold to Sand Ridge Energy before the agreement was signed, and ceased all operations in the area. An agreement could not be reached with Sand Ridge, so the BLM identified the site as a public research location which is off limits to any future permitting for oil and gas activities. This permit is presently owned by Williams. Both the frequency of permit sales and the length of commitment by a given energy company to a research site were concerns of UCEPC and BLM.

METHODS

Once the site was chosen, BLM acquired the necessary National Environmental Policy Act (NEPA) documentation to allow research on public lands. This permit allowed the use of herbicide and the construction of an exclosure fence around the research site. BLM sprayed herbicide (glyphosate) in the spring and fall of 2007 and 2008 to help control annual weeds. UCEPC personnel tilled the site with a vertical axis tiller prior to the last herbicide application. This was done to prepare a suitable seed bed and to germinate annual weeds before applying herbicide and installing the research project.

A draft species list was circulated within the local BLM office, the Meeker NRCS Field Office, NRCS State Plant Materials Specialist, and EnCana Oil and Gas (USA) Inc. (EnCana) field specialists. A final entry list was selected, and the materials were obtained. The project utilizes a randomized, complete block research design (included) for statistical analysis, and this, too, was

circulated for input. The materials were assembled by UCEPC personnel, and the project was installed on September 26, 29, and 30, 2008. On October 31, the site was sprayed with glyphosate to suppress or kill winter annual weeds that had germinated since the tilling operation on August 27.

The original NEPA permit, which allowed the construction of a livestock exclosure fence, was also determined to be acceptable to allow for the construction of a wildlife exclosure fence for the project. However, the correspondence confirming permission to construct a "wildlife exclosure" fence was not received until December 8, 2008. As a result, the fence was not constructed by the end of the calendar year, but the project was bid and a construction company has been selected to install the fence. EnCana had initially agreed to pay for the entire fencing project.

A written project description and two oral presentations were made to members of the Rio Blanco County Users Group. This group is an assembly of energy companies conducting oil and gas extraction activities in Rio Blanco and Garfield Counties. The interest in the project expressed by this group resulted in a tour of UCEPC facilities on September 10, prior to the monthly meeting.

A Matching Grant was provided by the Colorado State Conservation Board (CSCB) as the primary funding source for the project. This grant was a $25,000 cash award. The BLM provided coordination for the involvement of a cooperating energy company, and site selection that encompassed location and stage of development. The BLM also obtained the necessary NEPA documentation that allows for the establishment of a research site on public lands and the associated activities related to the research. The BLM has applied herbicide four times to the site and has agreed to assist with the monitoring of the project. This has all been provided as In-Kind contributions.

UCEPC provided tillage and seeding equipment and all staff time, travel, meetings, and coordination activities not covered by the CSCB Matching Grant as In-Kind contributions.

The NRCS provided species recommendations for the specific Major Land Resource Areas and soil types, seed of certain native species that were planted in the project, and assistance in entry selection and project installation. These services were all In-Kind contributions. The Board of Directors for White River and Douglas Creek Conservation Districts encouraged the development of the project and agreed to allow the use of UCEPC staffing and resources to initiate, coordinate, and establish the project, and to commit to long term monitoring and educational outreach.

The individual plots will be evaluated on at least three parameters; percent cover, vigor, and biomass production. If there is not adequate biomass to acquire from clipping plots, height, and width will be used for measurements instead.

The project will be monitored and results assessed, presented, and published. As described above, one or more commercially released plants may result from the project. These releases

will have substantial site documentation to show the attributes that they exhibit for use on similar sites in the Piceance Basin. Site tours for energy companies, public land management agencies, and private landowners will be conducted for educational purposes.

RESULTS

Over 50 native and introduced plant materials were planted in replicated plots and with plans for annual evaluations for five years to identify the products that are most successful at establishing and persisting on one of the abandoned well pad sites. This project represents one of the most comprehensive studies of released, experimental, and locally collected native plant materials assembled for performance comparison in the Piceance Basin. Because of the scope of the study and the long-term benefits, this project will be monitored annually through 2015. Data will be collected, analyzed, and summarized in annual reports to determine the most successful revegetation products for this site. Because the project utilizes the materials presently recommended for revegetation seed mixes on these ecological sites, and compares them to newly released commercial products, experimental products and locally collected Piceance Basin source products, the most successful products for revegetating similar sites will be identified.

Promotion of superior performers, whether old, established cultivars, or newly released products, will be done to increase industry awareness and contribute to enhanced revegetation success and conservation benefits. Experimental materials and local collections that show promise will be developed further for eventual release and commercial production.

If no releases result, the analysis of data will document the findings of the project. These results will show that the most suitable products, at the time of the installation of the study, already exist in the commercial market. Regardless, the study will provide confidence in the selection of the best revegetation materials for comparable sites. At the completion of this project, what to plant and how to plant for successful revegetation of well pads will be better understood. Both NRCS and BLM will have the most up to date information for specifications and recommendations for seeding mixes, individual plant material performance, and planting methods for the Piceance Basin.

2009

On an evaluation and weed removal trip to Piceance Basin, it was noted that livestock grazing had been and continued to be very concentrated on the new planting. The exclosure fence that was to be installed the fall of 2008 was put on hold because of budgetary considerations of the donor, EnCana for the construction of the fence. As a result and after inspecting the site, it was felt that the only truly meaningful scientific aspect of replicated plant materials trials on this site would be obtained from a project where both livestock and wildlife were excluded from the project.

Weeding and evaluations were suspended and efforts were focused on obtaining funds for the construction of an exclosure fence. The project was not re-evaluated until progress could be made on the fence construction. With persistence from Alvin Jones and Lannie Massey, both

with EnCana, funds were set aside for construction in 2009. The fence was completed on Friday, December 4, 2009, by Bolton Construction.

CONCLUSION

With much persistence, a wildlife exclosure has been installed on the Ryan Ridge site of Piceance Creek. To date, the project is considered a failure. At this time, there is no information that can be obtained from the evaluation of the planting, primarily because of two things; 1) poor weed and perennial plant control prior to planting and 2) no way to eliminate grazing from newly seeded plots. As a minimum, electric fencing or livestock (3 strand barbed wire) fencing should have been constructed to keep cattle off the seeded plots, and UCEPC should have been in charge of herbicide application/weed control on the site. A transfer of the BLM contact from the Meeker office to the Montrose office the year of planned seeding was a big blow to the timing and level of prioritization that BLM placed on the project. As a result, poor plant and weed control was obtained in the spring and summer of 2009. Concern was expressed from UCEPC staffers about the effectiveness of the herbicide treatment. Many plants remained green and apparently growing without appearing decadent or damaged from herbicide application.

Instead of UCEPC applying herbicide at that time and waiting two to three weeks to plant, the planting went in as scheduled. Weed control is critical to the success of any Field Evaluation Planting, as is the exclusion of livestock grazing. In retrospect, that was a mistake. UCEPC was under a time constraint with a grant that was received from the Colorado State Conservation Board, and the terms of completing the work were for the end of the fiscal year. Besides the challenges of working with a grant, biological and climatic variation, multiple partners, and change in personnel, the site is now fenced. Weeds and perennial plants will be controlled; the seed bank minimized and the planting conducted only when the timing and conditions are optimal for installation of plant materials that will help solve resource problems in the Piceance Basin for many years to come.

Project: COPMC-F-0806-RI
Report- 2009
By: Heather Plumb and Terri Blanke

Mack Field Evaluation Planting

INTRODUCTION

Salt Creek runs through Stan Young's property in Mack, Colorado. The creek is so named from the high concentration of salt that is in the area soil. The area receives minimal amounts of precipitation and is generally hot in the summer. Over the years tamarisk invasion has further depleted the riparian area's ability to support its native ecosystem. Several methods of removing the tamarisk have been applied to the infested areas along the creek. Upper Colorado Environmental Plant Center (UCEPC), Grand Junction NRCS field office, the Tamarisk Coalition, the Palisade Insectary, and the Young Ranch are working cooperatively to rehabilitate the once infested site. A field evaluation planting was placed on the ranch to help identify which grass and forbs species will thrive in a known salty soil site.

OBJECTIVE

To establish herbaceous plant materials on post treated tamarisk and Russian olive infested riparian sites.

METHODS

This planting consists of 25 entries replicated three times in a randomized block design.

The site was prepared with a spring application of herbicide, Roundup, on May 29, 2008, to eliminate existing weeds, cheatgrass, native forbs, and grasses. The site was then plowed and disked by the property owner. On August 12 and 13, 2008, UCEPC staff and Grand Junction field office personnel planted 25 entries consisting of 15 species. Twenty-three grasses and two forbs were seeded using a planet junior. The total plot size is 4275 square feet (62.5 feet wide and 70 feet long). A detailed list of entries and additional plot plan information can be found in the 2008 report, COPMC-F-0806-RI.

After the field planting was completed it was decided by UCEPC staff to create an observational seed broadcast trial with mulching. Five blocks were created to the south of the field planting. ′Sodar′ and ′Continental′ were the accessions chosen to be used for the seed broadcasting. The mulch, attained from a restoration company, was wood shavings ¼ inch in diameter and 4-12 inches long. All five blocks were hand raked. One block was broadcast with just ′Continental′ and one was broadcast with just ′Sodar′. The remaining blocks were broadcast with a blend of both species. After broadcasting was completed, mulch was applied at different rates, by hand, to the observational blocks (see Table 2).

Table 2. Plot plan for the observational seed broadcast and mulching blocks with evaluation notes taken in 2009.

North ↗

'Continental' No Mulch	**Notes:** Some emergence of grass seed, whitetop present, Kochia, mustard, halogeton
Control, Mix Seed No Mulch	Some emergence of grass seed, least amount of invasive from all plots
Light Mulch 2100 lbs/ac Mix Seed	Seed emergence is slight, Kochia is more prevalent than other plots
Heavy Mulch 13000 lbs/ac Mix Seed	Mustard is most prevalent here from all plots. Good seed emergence. Some Kochia.
'Sodar' No Mulch	Good seed emergence. Plot is heavy with Kochia.

RESULTS

On June 4, 2009, UCEPC staff evaluated the mulch plots. After evaluations, the plots were sprayed with the herbicide Banvel. A backpack sprayer was utilized with an application rate of 0.02 ounces of chemical to a gallon of water. The Kochia was visibly affected by the spray application during the course of the day. The Kochia was 12 inches high on average.

The UCEPC staff visited the site on March 21, 2009. It was noted that several of the entries showed signs of emergence but there was also signs of invasive emergence. The staff traveled back to the Stan Young ranch in early June for a full evaluation. The entire area was heavily infested with whitetop. Kochia, mustard, and tamarisk were also evident. The plot was evaluated, photographed, hand weeded and chemically treated. A back pack sprayer was utilized to apply the herbicide, Banvel, at an application rate of 0.02 ounces to a gallon of water. Table 3 below shows percent cover and vigor results for the first year.

Project: COPMC-F-0806-RI
Report- 2009
By: Heather Plumb and Terri Blanke

Table 3 : Young Ranch Initial Field Evaluation 2009

Species	Release/Accession	Entry #	Rep #1	Rep #2	Rep #3
Alkali muhly	9066232	1			
		% Stand	2	1	5
		Vigor	4	3	3
Alkali sacaton	Salado	2			
		% Stand	0	1	3
		Vigor	5	3	2
Basin wildrye	Continental	3			
		% Stand	45	5	45
		Vigor	2	3	3
Basin wildrye	Trailhead	4			
		% Stand	40	30	10
		Vigor	2	2	3
Bearless wildrye	Shoshone	5			
		% Stand	5	1	1
		Vigor	4	4	3
Bluebunch whtgrs	Secar	6			
		% Stand	25	5	2
		Vigor	3	3	3
Bottlebrush Sqrtl	Fish Creek	7			
		% Stand	45	20	15
		Vigor	3	3	3
Bottlebrush Sqrtl	Toe jam Creek	8			
		% Stand	30	15	25
		Vigor	3	2	2
Crested whtgrs	Hycrest	9			
		% Stand	30	15	60
		Vigor	3	2	2
Crested whtgrs	Hycrest-II	10			
		% Stand	55	5	40
		Vigor	2	2	2
Forage Kochia	Kochia	11			
		% Stand	0	0	0
		Vigor	5	5	5
Indian Ricegrass	661	12			
		% Stand	10	10	30
		Vigor	3	2	2
Indian Ricegrass	664	13			
		% Stand	20	12	15
		Vigor	3	2	2
Indian Ricegrass	735	14			
		% Stand	25	2	10
		Vigor	3	3	3

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Report- 2009
By: Heather Plumb and Terri Blanke

Species	Accession	Entry #	Rep #1	Rep #2	Rep #3
Indian Ricegrass	741	15			
		% Stand	10	3	10
		Vigor	3	3	3
Indian Ricegrass	Paloma	16			
		% Stand	10	3	25
		Vigor	4	3	2
Mammoth wildrye	Volga	17			
		% Stand	15	2	2
		Vigor	3	4	4
Penstemon	San Juan	18			
		% Stand	0	0	4
		Vigor	5	5	3*
Sand dropseed	VNS	19			
		% Stand	1	1	1
		Vigor	3	4	3
Siberian whtgrs	Vavilov	20			
		% Stand	65	12	35
		Vigor	2	2	2
Siberian whtgrs	Vavilov-II	21			
		% Stand	55	30	25
		Vigor	2	2	2
Streambank whtgrs	Bannock	22			
		% Stand	50	40	5
		Vigor	2	2	2
Streambank whtgrs	Sodar	23			
		% Stand	75	60	30
		Vigor	2	2	2
Tall whtgrs	Jose	24			
		% Stand	25	30	10
		Vigor	2	2	3
Thickspike	Critana	25			
		% Stand	65	65	50
		Vigor	2	2	2

Rating 1=excellent 2=good 3= fair 4=poor 5= no plant
* Spray damage

CONCLUSION

The decision to continue with the project will depend on the amount of whitetop that is present in the spring of 2010. Fencing, weeding the plot by hand, mowing, and continuing to use herbicide to combat invasives will be considered if the project remains. It is difficult to distinguish forage kochia from invasive kochia.

The plan for further follow-up is to go back and visit the site in the summer of 2010. UCEPC staff and members from the Grand Junction field office will revisit the treated tamarisk infested site. Evaluations, observations, and maintenance of the site will be conducted then.

Project COPMC-P-0301-RA
Report - 2009
By: Steve Parr

Advanced Evaluation of Indian Ricegrass *Achnatherum hymenoides* for Heavy Soils

INTRODUCTION

Indian ricegrass *Achnatherum hymenoides* is a native cool-season, perennial bunchgrass. It grows one to two feet tall and is often a major stand component of harsher, sandy sites throughout the western United States. It occurs in Canada from Manitoba to British Columbia, in the United States it is found in all states west of the Missouri River, and northern Mexico. While the species is best adapted to dry, sandy soils, it can also be found on clayey, silty, and shaley sites. It does well on southern exposures, especially at higher elevations. Indian ricegrass is found in the 6 to 18 inch precipitation zone at elevations ranging from 2000 to 10,000 feet. Stands tend to be short-lived (three to four years) and reproduction is primarily from seed. It is very drought tolerant and is often a pioneer species on open or disturbed sites. It tends not to compete well with other perennial grasses. Indian ricegrass moderately tolerates saline or alkaline soils, but does best under more mesic conditions. The species performs poorly under shade and high water tables.

Indian ricegrass is highly palatable and serves to provide nutritious forage for wildlife and livestock under harsh site conditions. It reaches peak production from mid-June through mid-July, holding its nutrient value at maturity. It also has strong potential for use with mined land reclamation, critical area stabilization, and as a standing winter feed.

Past releases of Indian ricegrass (′Nezpar′, ′Paloma′, ′Rimrock′, and Ribstone Germplasm) are more adapted to light or medium textured soils. As a consequence of its good nutrition, palatability, and establishment characteristics on critical areas, there is a need for a cultivar or selection of Indian ricegrass that is adapted to heavier (clayey) soil types.

OBJECTIVE

To find a selection of Indian ricegrass that is best adapted to clayey soils.

EXPERIMENTAL DESIGN

The experimental design for the advanced study is a randomized complete block with three replications.

Project COPMC-P-0301-RA
Report - 2009
By: Steve Parr

METHODS

In 1988, collections of Indian ricegrass ecotypes from heavy soils were made in Colorado, Wyoming, Utah, and Nevada. Starting in 1991 up to 1998, Upper Colorado Environmental Plant Center (UCEPC) conducted initial evaluations that led to ten superior selections for an advanced study.

On September 2003, preparations were made to plant the advanced study. However, due to unforeseen circumstances, the study was postponed until 2004. On July 29, 2004, the advanced study was planted at UCEPC with a hand pushed belt seeder.

Twelve entries; nine accessions, and three cultivars used as standards for comparison were planted. The rate of seeding was 30 pure live seeds per linear foot of row. The soil for the study site was identified by Charles Peacock, USDA-NRCS Soil Scientist, to contain 27 percent clay (texture class-silty clay loam) in the surface with an average of 40-50 percent clay (texture class-clay) in the subsoil. A plot plan for the study and a table with the entries and their collection site are presented below:

Indian Ricegrass
Plot Plan – Summer 2004
↑
North

Rep I				Rep II				Rep III			
741	Alley	735	Alley	818	Alley	Paloma	Alley	716	Alley	Rimrock	Alley
739		818		661		664		818		735	
Rimrock		661		749		Rimrock		749		741	
749		716		735		Nezpar		715		661	
664		Nezpar		739		741		Nezpar		664	
715		Paloma		715		716		Paloma		739	

Note: The last 3 digits of the accession numbers were used in the table.
Plot size: (20 x 12 ft) = 240 square feet
Rows/Plot = 4 (3 foot centers) **Number of entries** = 12 **Alley width** = 10 feet

Accessions/Cultivar	Collection Site
9024664	Moffat Co., CO
9024716	Colorado Springs, CO

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Report - 2009
By: Steve Parr

Accessions/Cultivar	Collection Site
9024818	unknown
9024715	Colorado Springs, CO
9024741	Pagosa, CO
9024661	Delta, CO
9024739	Pagosa, CO
9024735	Grand Junction, CO
9024749	Durango, CO
Nezpar	Whitebird, ID
Paloma	Pueblo, CO
Rimrock	Bridger, MT
A total of 12 entries were planted on July 29, 2004	

RESULTS

Year-2006

Results for 2006 are presented in the following table:

Table 1. Seed Yield and Other Parameters for 12 Entries of Indian Ricegrass. UCEPC-2006

Accession/ Release	Seed Yield (Lb/acre)	Forage (dry-wt) Ton/acre[1]	Plant Height[2] (cm)	Percent Plant Stand[3]	Re-growth[4]
9024741	**191.0**	0.76	71.0	93.3	2.0
Rimrock	165.5	0.76	70.0	**94.4**	**2.7**
9024739	165.2	0.68	67.4	90.0	**2.7**
9024715	119.9	**0.91**	70.0	91.7	2.0
9024661	113.8	0.83	69.4	89.3	1.3
9024735	103.9	0.87	59.7	**95.0**	1.3
9024749	95.7	0.83	65.6	90.0	1.7
Nezpar	83.7	0.65	77.5	90.7	2.0
9024664	68.2	**0.94**	58.2	91.7	1.7
9024716	58.4	0.68	65.2	91.0	1.3
Paloma	24.0	0.68	52.3	60.0	1.0
9024818	13.3	0.36	47.3	61.7	1.0
Mean	**100.3**	**0.75**	**64.5**	**86.5**	**1.7**
	S[5]	**NS**	**S**	**S**	**S**

1. Air-dry above ground biomass (cut four inches above soil surface)
2. Plant height measure in centimeters to top of seed panicle
3. Visual estimate per plot basis.
4. Visual rating taken 35 days after forage cutting, where 1 = Excellent re-growth, 2 = Moderate & 3 = poor.
5. Statistically Significant(S) or not significant (NS) at the five percent level of significance.

Note: All data is the average of three replications.

Data collection will continue for at least another two more years in order to conclude the project.

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Year-2007

Results for 2007 are presented in table 2. The performance of all entries for 2007 was not consistent with the results obtained for year-2006. Table 3 presents a comparison for seed yield for the year 2006 and 2007 and table 4 presents a comparison for forage production for both years.

Table 2. Seed Yield and Other Parameters for 12 Entries of Indian Ricegrass. UCEPC-2007

Accession/ Release	Seed Yield (Lb/acre)	Forage (dry-wt) Ton/acre[1]	Plant Height[2] (cm)	Percent Plant Stand[3]	Shatter[4]
9024749	**195.3**	**1.4**	76.8	92.3	2.7
9024661	180.7	1.3	76.8	92.0	2.7
9024715	160.7	1.3	71.5	95.0	2.3
9024664	155.0	1.1	77.6	**97.7**	2.3
Paloma	138.8	1.2	59.8	55.0	1.0
9024716	138.0	1.1	71.5	95.0	2.7
9024739	117.2	0.7	69.9	91.7	**3.0**
9024735	97.8	1.0	60.9	96.7	**3.0**
9024741	96.2	0.9	70.2	95.0	1.7
9024818	90.0	0.6	49.5	63.3	1.0
Rimrock	77.0	0.8	**79.0**	96.7	2.0
Nezpar	57.8	0.8	78.8	95.0	1.0
Mean	**125.4**	**1.0**	**70.2**	**88.8**	**2.1**
	S[5]	**NS**	**S**	**S**	**S**

1. Air-dry above ground biomass (cut four inches above soil surface)
2. Plant height measure in centimeters to top of seed panicle
3. Visual estimate per plot basis.
4. Visual rating taken on June 27, 2007, where 1 =No shatter, 2 = Moderate Shatter & 3 = Heavy Shatter
5. Statistically Significant(S) or not significant (NS) at the five percent level of significance.

Note: All data is the average of three replications.

Year -2008

This is the third year of production for this study. Overall seed production and forage production for the growing season of 2008 was about half as compared to growing seasons on 2006 and 2007. The frost-free growing season for 2008 was shorter than usual with 75 days as compared to 106 and 107 days for 2006 and 2007 respectively. The long-term average is 90 days.

Results for the 2008 growing season are presented in table 3. Summary tables for 2006 to 2008 for seed yield and forage production are presented in table 4 and 5.

Table 3. Seed Yield and Other Parameters for 12 Entries of Indian Ricegrass. UCEPC-2008

Accession/ Release	Seed Yield (Lb/acre)	Forage (dry-wt) Ton/acre[1]	Plant Height[2] (cm)	Percent Plant Stand[3]
9024741	**121.0**	0.41	63.6	95.3
9024739	66.6	0.39	54.9	88.3
Rimrock	66.1	0.39	74.8	96.0
9024661	58.1	**0.46**	59.4	92.3
9024749	51.2	**0.46**	60.6	91.0
9024735	51.2	0.31	53.2	94.3
9024715	40.5	0.31	57.2	91.0
Nezpar	38.4	0.39	71.9	93.3
Paloma	33.6	0.27	51.4	53.3
9024664	13.4	0.31	77.6	97.7
9024716	12.8	0.36	59.2	93.3
9024818	3.2	0.17	44.3	50.0
Mean	46.34	0.35	60.7	86.3
LSD (0.05)*	36.5	0.13	7.6	7.5

*Least Significant Difference at P<0.05

1. Air-dry above ground biomass (cut four inches above soil surface)
2. Plant height measure in centimeters to top of seed panicle
3. Visual estimate per plot basis.

Table 4. Seed Yield Comparison for 12 Entries of Indian Ricegrass *Achnatherum hymenoides* Grown at UCEPC (2006-2008).

Accession/ Release	**Seed Yield (Lb/acre) Year**			**Seed yield(lb/Acre) 3-year average**	**Collection Site**
	2006	**2007**	**2008**		
9024741	**191.0**	96.2	**121.0**	**136.1**	Pagosa, CO
902661	113.8	180.7	58.1	117.5	Delta, CO
9024739	165.2	117.3	66.6	116.4	Pagosa, CO
9024749	95.7	**195.3**	51.2	114.1	Durango, CO
9024715	119.9	160.7	40.5	107.0	CO Springs, CO
Rimrock	165.5	77.0	66.1	102.8	Bridger, MT
9024735	103.1	97.8	51.2	84.0	G. Junction, CO
9024664	68.2	155.1	13.4	78.9	Moffat, CO
9024716	58.4	138.6	12.8	70.0	CO-Springs, CO
Paloma	24.0	138.8	33.6	65.4	Pueblo, CO
Nezpar	83.7	57.8	38.4	60.0	Whitebird, ID
9024818	13.3	90.1	3.2	35.5	Unknown
Mean	100.15	125.45	46.34	(90.64)	
LSD (0.05)*	68.4	47.5	36.5	30.7	

*Least Significant Difference at P<0.05

Table 5. Forage Production Comparison for 12 Entries of Indian Ricegrass *Achnatherum hymenoides* Grown at UCEPC.

Accession/ Release	Forage production[1] (tons/acre) Year			Forage production (tons/acre) 3-year average	Collection Site
	2006	2007	2008		
9024749	0.82	**1.35**	**0.46**	**0.88**	Durango, CO
9024661	0.85	1.30	**0.46**	0.87	Delta, CO
9024715	0.90	1.30	0.31	0.83	CO-Springs, CO
9024664	**0.94**	1.06	0.31	0.77	Moffat, CO
9024735	0.87	1.02	0.31	0.73	G. Junction, CO
Paloma	0.70	1.16	0.27	0.71	Pueblo, CO
9024716	0.68	1.06	0.36	0.70	CO-Springs, CO
9024741	0.77	0.92	0.41	0.70	Pagosa, CO
Rimrock	0.77	0.82	0.39	0.66	Bridger, MT
Nezpar	0.68	0.77	0.39	0.61	Whitebird, ID
9024739	0.70	0.73	0.31	0.56	Pagosa, CO
9024818	0.36	0.63	0.17	0.39	Unknown
Mean	0.75	1.01	0.35	(0.70)	
LSD*	NS**	NS	0.13	0.23	

1. Forage dry weight of above ground biomass cut four inches above soil surface.

- *Least Significant Difference at P<0.05
- ** NS = Not significant at P<0.05

Year - 2009

Accession	Seed Yield (Total Grams)	Forage Production (Total pounds)	Plant Height (Average centimeter)	Percent Plant Stand	Vigor
9024661	1720	26.0	30.3	88.0	1.67
9024749	1689	28.8	31.3	88.3	2.00
9024716	1264	20.3	31.7	89.0	2.67
9024664	1213	22.6	31.3	91.3	1.67
9024715	1193	25.0	30.3	89.3	1.67
Rimrock	1150	18.0	31.0	88.7	2.00
9024735	1119	20.4	23.0	88.7	1.33
9024741	1119	16.6	28.8	87.3	2.33
9024739	1070	18.2	25.3	81.0	3.00
Paloma	692	9.6	21.7	31.7	2.33
Nezpar	621	12.1	31.3	84.3	3.33

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Accession	Seed Yield (Total Grams)	Forage Production (Total pounds)	Plant Height (Average centimeter)	Percent Plant Stand	Vigor
9024818	516	6.7	19.0	28.3	3.33
Average	**1,114**	**18.7**	**27.9**	**78.0**	**2.28**

The table above identifies the measured and observed parameters for 2009. Seed yield was the total weight of the cleaned seed of three plots of each accession completely clipped. Forage production was determined from the total weights of each accession from complete clipping of each plot. Each replication was clipped, bagged and allowed to cure to obtain the air dry weights of all three replications for each accession.

Percent plant stand and vigor were obtained from concurrence by two evaluators, and plant height was the average of no less than three measurements per plot. Plant height, with the exception of Nezpar, had a high correlation with overall plant performance as related to seed yield and forage production. Vigor was less reliable as an indicator of performance.

The table below breaks out yield into standard units that have been utilized in previous years. Total grams of clean seed and total air dry weight are further compared by pounds per acre for both seed and forage yield and for tons per acre for forage yield. Plot size is 12 x 20 ft times 3 replications for 720 square feet per accession.

Accession	Seed Yield (Total Grams)	Seed Yield (lb/Acre)	Forage Yield (Total lb)	Forage Yield (lb/Acre)	Forage Yield (Tons/Acre)
9024661	1720	229.21	26.0	1573.00	0.79
9024749	1689	225.08	28.8	1742.40	0.87
9024716	1264	168.44	20.3	1228.15	0.61
9024664	1213	161.64	22.6	1367.30	0.68
9024715	1193	158.98	25.0	1512.50	0.76
Rimrock	1150	153.25	18.0	1089.00	0.55
9024735	1119	149.12	20.4	1234.20	0.62
9024741	1119	149.12	16.6	1004.30	0.50
9024739	1070	142.59	18.2	1101.10	0.55
Paloma	692	92.22	9.6	580.80	0.29
Nezpar	621	82.75	12.1	732.05	0.37
9024818	516	68.76	6.7	405.35	0.20
Average	**1,114**	**148.69**	**18.7**	**1130.81**	**0.57**

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SUMMARY

The data indicates that there are at least five accessions from the advanced test that have potential for plant releases to be used in clayey soils sites. Accession 9024661, collected in Delta, Colorado, has the highest four year average for seed yield and is second for forage production while accession 9024749 from Durango, Colorado, has produced the greatest forage amounts for the last four years and is second in seed yield. Accession 9024741from Pagosa Springs, Colorado, has also been a superior performer. The best performing commercial variety, Rimrock, has been about the sixth best product in this trial over the four-year average.

This project will enter its final year of formal evaluations in 2010. One to four releases are likely to come out of this project.

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Initial Evaluation of Blue Wildrye

INTRODUCTION

There is a constant demand for plants that are ideal for revegetation work on critical land sites, mining lands, and forested lands. Upper Colorado Environmental Plant Center (UCEPC) and the Medicine Bow-Routt National Forest are working together to evaluate if blue wildrye *Elymus glaucus* is an ideal plant for revegetation in disturbed land sites.

OBJECTIVE

To evaluate different seed sources of blue wildrye *Elymus glaucus* for revegetation in critical areas, forest lands, and mining land in Medicine Bow-Routt National Forest.

EXPERIMENTAL DESIGN

The statistical design for the study is a randomized complete block with three replications

METHODS

Forty-two collection of blue wildrye were attained from Medicine Bow-Routt National Forest and cleaned at UCEPC. Twenty-seven collections from the forty-two original collections from Medicine Bow-Routt National Forest were used in the initial evaluation study as well as two plant material collections from the UCEPC. For comparison blue wildrye releases “Arlington” and “Elkton” from Corvallis Oregon and two potential blue wildrye releases from Pullman Washington were used in the evaluation. A total of thirty-three collections were used in the initial evaluation. Table 1 lists the accessions used in the evaluation. No PLS seed testing was preformed on the Medicine Bow-Routt National Forest seed collections or the two plant material collections from UCEPC, thus seed viability was assumed. Planting began on August 1, 2007, a total of forty-nine plots were planted due to high wind conditions, the remainder of the plots had to be planted on August 2, 2007. The plots were designed as 16 foot long rows, three rows per plot, three replications for each entry, 30 seeds per linear foot, 12 foot and six foot spacing’s between plantings for alleyways. Table 2 provides a visual for the plot plan design. This configuration allowed for 14.6 grams of seed per entry for a single test. This plot design was used due to the fact the collection grams made by the Medicine Bow-Routt National Forest were insufficient to have more replications and longer row lengths.

Plot locations were determined by using Excel. Random plot numbers were placed into the Excel randomization function and random plots were chosen. A belt seeder was used for the entire planting of the three replications. Prior to planting five grams of blue wildrye seed were measured out for each entry and placed in seed packets. These packets were spaced out evenly over the belt on the seeder for planting.

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After seeding no irrigation was needed for germination due to a thunderstorm shower that provided enough water for germination to occur.

2008

The three replications of blue wildrye from Medicine Bow-Routt National Forest were evaluated during the months of June and July, during the evaluations certain parameters were evaluated and photos were taking.

For the month of June, three parameters were evaluated; plant vigor, height, and seed head maturity (Appendix 1). Plant vigor was evaluated ocularly as: excellent, good, fair and poor. Heights for each accession were attained from the center row approximately five feet in. Seed head maturity was evaluated by ocular observation. Photos were then taking of the observed good performers.

For the month of July, four parameters were evaluated; plant vigor, percent stand cover, height, and width (Appendix 2). Plant vigor was evaluated as: excellent, good, fair, and poor. Heights and widths for each accession were attained from the center row approximately five feet in. Plant vigor and percent stand cover were both ocular observations. Photos were taken of the observed good performers.

2009

In 2009, the three replications of the Medicine Bow-Routt National Forest blue wildrye were evaluated in June. Parameters evaluated were percent plant stand, plant vigor, height and width. Plant vigor was evaluated as: excellent, good, fair, and poor. Heights and widths for each accession were attained from the center row approximately five feet in. Plant vigor and percent stand cover were both ocular observations (Appendix 3). Photos were taken of the observed good performers. A more in-depth percent plant stand was taken in 2009 compared to the 2008 evaluation.

Table 1. List of blue wildrye accessions used in the Initial Evaluation.

Number of Entries	Collection	I.D. in Plot Design
1	080106-A1	A
2	080106-A2	AA
3	073106-A2	AB
4	073106-A1	AC
5	072706-A3	AD
6	072006-A1	AE
7	214-03	AF
8	214-02	AG
9	221-03	AH
10	080406-A1	B
11	080106-A4	C
12	091406-A1	D
13	091406-A2	E

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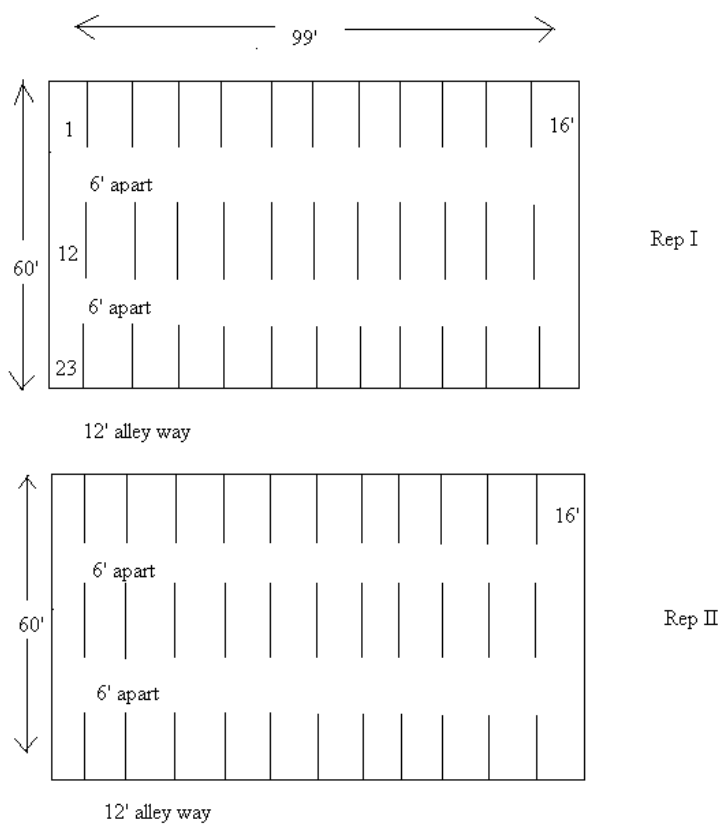
Number of Entries	Collection	I.D. in Plot Design
14	481-02	F
15	091206-A1	G
16	481-06	H
17	481-04	I
18	091206-A3	J
19	091206-A2	K
20	481-07	L
21	221-02	M
22	080306-A1	N
23	481-05	O
24	080106-A3	P
25	Marvine Creek	Q
26	Uncompaghre 04	R
27	080906-A1	S
28	214-01	T
29	221-01	V
30	SP05-1	W
31	BO5-1	X
32	SBR-06-Arling	Y
33	SBR-06-Elkton	Z

Table 2. The plot plan design for blue wildrye.



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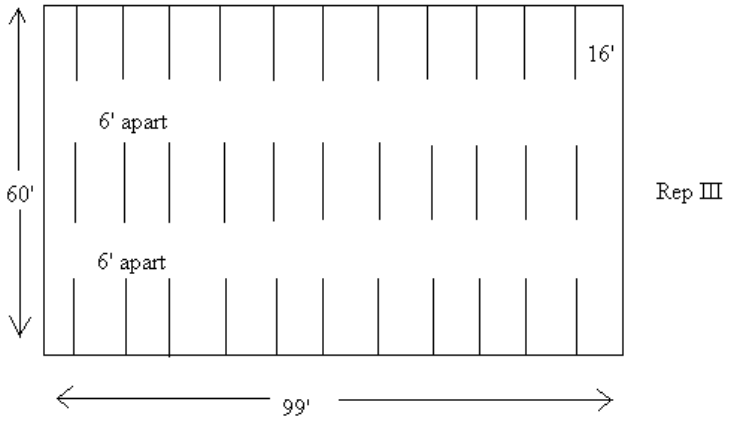

RESULTS

2008

In 2008, it was observed that accession 091406-A1 from seed zone 481 and accession 080406-A1 from seed zone 221 were overall good performers from two of the three different seed zones being evaluated for Medicine Bow-Routt National Forest. No single accession from seed zone 214 was observed as a good producer.

In June, it was observed that accession 481-05 from seed zone 481 was an early seed head producer, seed heads were completely headed out on June 12, 2008.

In both June and July 2008 evaluations, it was observed that accessions 080906-A1, 214-01, 221-01 and 221-02 consistently did poor in all three replications.

2009

On June 25, 2009, the initial evaluation of blue wildrye was evaluated by Terri Blanke and Heather Plumb. Data from the 2009 evaluation was statistically analyzed (see Table 3). From the statistical analysis none of the collections appear to be statistically different. However, collections “H” and “D” over three evaluations have surfaced as consistently good performers. Both “H” and “D” collections have above 95 percent stands and excellent to good plant vigor. On the 2009 evaluation sheet a side note stated that collection “H” was visually appealing in its appearance.

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Table 3. Statistical Analysis of Variance results from the 2009 evaluation of blue wildrye Initial Evaluation.

Accession Number	Collection	Percent Plant Stand *1	Plant Vigor *2
Y	SBR-06-Arling	100	1
Z	SBR-06-Elkton	100	1.6
H	481-06	99.33	2
Q	Marvine Creek	98.33	2.3
X	BO5-1	98.33	1.6
D	091406-A1	96.67	1.6
G	091206-A1	96.67	2.3
O	481-05	96.67	2
AC	073106-A1	95	1.3
B	080406-A1	95	2
C	080106-A4	95	2
F	481-02	95	3
J	091206-A3	95	2
L	481-07	95	2.3
P	080106-A3	95	2
W	SP05-1	95	1
AH	221-03	93.33	2
E	091406-A2	93.33	2
I	481-04	93.33	2
K	091206-A2	93.33	2.3
AE	072006-A1	93	1.6
AA	080106-A2	90	2.3
AF	214-03	88	2.6
A	080106-A1	86.67	2.3
AD	072706-A3	81	2.3
AG	214-02	81	2.6
AB	073106-A2	80	2.6
R	Uncompaghre 04	71.67	3
N	080306-A1	68.33	3.3
M	221-02	33.33	3.3
V	221-01	28.33	3.6
S	080906-A1	25	3.6
T	214-01	20.67	3.6
LSD (0.05)*3		14.73	1.17

1. Plant stand: Visual estimate per plot: Four complete rows = 100 percent
2. Plant vigor: Visual estimate per plot: 1 = Excellent; 2 = Good, 3 = Fair ; 4 = Poor
3. LSD =Least Significant Difference at $P<0.05$.

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CONCLUSION

After statistical data was evaluated it appears that no collections have surfaced as being statistically different. "H" and "D" collections over the past two evaluations have visually surfaced as good performers, but are not statistically different from the other collections. The 2009 growing season is only the second year of evaluation on the initial evaluation plot, further evaluations and statistical analyses in the future are needed to see if accessions will surface as top performers.

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Appendix 1. Plant vigor, height and seed head comments for June 2008 evaluation.

REP I	Plant Vigor	Height (Inch)	Comm.
A	1	16	NA
AA	1	20	NA
AB	2	15	NA
AC	1	15	NA
AD	3	11	NA
AE	2	17	NA
AF	1	16	H
AG	3	17	NA
AH	2	17	NA
B	1	21	NA
C	1	18	NA
D	1	18	BH
E	1	19	BH
F	2	13	BH
G	2	17	BH, H
H	2	13	BH
I	2	13	NA
J	3	14	BH
K	3	14	BH
L	3	15	BH, B
M	4	9	NA
N	3	15	BH
O	2	16	BH, H, *
P	1	12	BH
Q	2	16	NA
R	2	18	NA, S
S	4	8	NA, S
T	4	10	H, S
V	4	11	NA, S
W	1	10	even, thick
X	1	13	even, thick
Y	3	5	flat appernc.
Z	2	14	NA

REP II	Plant Vigor	Height (Inch)	Comm.
Z	2	17	BH
Q	1	17	BH
L	3	15	BH, B
AD	3	14	BH
V	4	10	NA
K	2	11	BH
B	1	15	BH
H	2	17	NA
AF	2	16	BH
AA	2	18	BH
S	4	11	NA
I	3	17	stemmy, BH
R	3	16	NA
E	2	13	NA
J	3	13	NA
AH	3	14	NA
AE	3	12	NA
AB	2	18	B
C	3	17	NA
M	4	7	NA
N	3	13	BH
A	2	17	NA
X	2	17	NA
G	1	18	BH, H
AG	3	13	NA
T	4	8	BH, H, S
P	2	18	BH
O	1	18	BH, H
D	1	19	BH
Y	1	12	flat appernc.
AC	1	16	B
F	2	17	BH
W	1	10	even, thick

REP III	Plant Vigor	Height (Inch)	Comm.
N	3	14	BH
X	1	13	NA
F	2	11	BH
H	2	16	BH
Y	1	9	NA
P	2	14	NA
O	1	17	BH, H, *
L	2	16	BH, B
J	2	17	BH
AH	3	15	NA
Z	1	14	thick
AF	2	16	H
D	2	15	NA
M	4	7	NA
V	4	12	NA
C	2	17	NA
K	2	17	BH
I	2	14	NA
G	1	19	BH
AC	3	16	BH, soil?
AA	2	15	NA
AD	3	16	H, S
AB	3	13	NA
T	4	8	H, **(BAD),** S
S	4	6	NA
AG	3	12	NA
Q	2	15	NA
AE	3	14	NA
E	4	12	NA
A	3	14	NA
R	4	12	NA
W	2	12	NA
B	2	14	BH

Plant Vigor
1- Excellent
2- Good
3- Fair
4- Poor

Comments (Comm.)	
brome=B	*=Good heads
possible sprayed= S	no heads = NA
headed=H	beginning to head=BH

Blue Wildrye Project
Evaluations

Date Evaluated: 6/12/2008

Person(s) Evaluating: Terri Blanke, Heather Plumb

24 DEGREES last night

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Appendix 2. Plant vigor, percent stand cover, height and width for July 2008 evaluation.

REP I	Plant Vigor	% Stand Cover	Height (Inch)	Width (Inch)
A	2	5	35	9
AA	2	5	38	10
AB	2	5	32	8
AC	2	5	34	12
AD	3	4	30	11
AE	2	4	31	8
AF	2	5	32	10
AG	3	4	30	7
AH	2	4	25	8
B	2	5	30	10
C	1	5	31	11
D	1	5	35	11
E	2	5	34	10
F	3	5	30	10
G	2	5	33	8
H	2	5	26	10
I	2	5	31	13
J	3	4	27	12
K	3	4	29	11
L	3	5	30	10
M	4	2	24	10
N	3	4	28	9
O	3	5	28	11
P	2	5	27	9
Q	2	5	34	9
R	2	3	29	10
S	4	1	16	6
T	4	2	11	4
V	4	2	17	7
W	2	5	29	9
X	2	5	30	6
Y	3	5	21	10
Z	2	5	24	8

REP II	Plant Vigor	% Stand Cover	Height (Inch)	Width (Inch)
Z	1	5	29	11
Q	1	5	31	9
L	2	5	31	9
AD	3	4	23	8
V	4	2	17	5
K	3	4	27	8
B	2	5	31	8
H	2	5	32	12
AF	3	5	28	9
AA	2	5	35	10
S	4	2	12	6
I	2	5	32	9
R	2	4	32	11
E	2	5	28	9
J	1	5	28	8
AH	2	5	28	9
AE	3	4	24	10
AB	2	4	34	11
C	2	5	21	8
M	4	1	15	7
N	3	4	25	9
A	1	5	35	10
X	2	5	32	8
G	3	5	32	7
AG	3	4	28	7
T	4	2	15	5
P	2	5	36	9
O	1	5	31	9
D	1	5	30	9
Y	1	5	20	10
AC	1	5	30	10
F	2	5	28	8
W	2	5	27	7

REP III	Plant Vigor	% Stand Cover	Height (Inch)	Width (Inch)
N	3	4	31	8
X	2	5	37	7
F	3	5	27	6
H	2	5	31	7
Y	1	5	20	8
P	2	5	36	6
O	2	5	31	9
L	2	5	31	8
J	2	5	32	9
AH	2	5	36	8
Z	2	5	26	7
AF	2	4	30	7
D	2	5	31	7
M	3	3	17	6
V	4	2	13	4
C	2	5	33	8
K	3	4	28	7
I	2	5	33	7
G	1	5	35	7
AC	3	5	31	4
AA	2	5	35	9
AD	3	4	30	8
AB	2	3	30	7
T	4	1	9	2
S	4	1	16	2
AG	3	4	24	5
Q	2	5	28	7
AE	2	4	30	7
E	3	3	29	5
A	3	4	32	5
R	3	3	26	5
W	2	5	28	6
B	2	5	31	8

Plant Vigor
4- Poor
3- Fair
2- Good
1- Excellent

Stand Cover	
1= 1-15%	**2**= 16-25%
3= 26-50%	**4**= 51-75%
5= 76-100%	

Blue Wildrye Project

Evaluations

Date Evaluated: 7/10/2008

Person(s) Evaluating: Terri Blanke and Heather Plumb

Project: COPMC-P-0701-CR
Report- 2009
By: Heather Plumb

Appendix 3. Plant vigor, percent plant stand, height and width for June 2009 evaluation.

REP I	Plant Vigor	% Stand Cover	Height (Inch)	Width (Inch)
A	4	75	33	23
AA	4	85	34	18
AB	3	90	37	21
AC	2	85	39	21
AD	2	90	41	21
AE	2	95	35	22
AF	3	95	31	19
AG	3	95	38	25
AH	2	95	42	27
B	2	95	36	24
C	2*	95	37	24
D	3	95	33	21
E	3	95	35	19
F	3	90	33	24
G	3	95	35	24
H	2	98	34	23
I	2	95	36	26
J	2	95	40	25
K	3	95	34	21
L	3	95	34	24
M	3	25	41	29
N	3	90	36	17
O	4	90	23	13
P	3	95	27	22
Q	2	100	34	22
R	3	85	19	20
S	4	20	18	20
T	4	30	25	16
V	4	35	26	23
W	1	100	31	17
X	1	100	32	19
Y	1	100	21	27
Z	1	100	34	27

REP II	Plant Vigor	% Stand Cover	Height (Inch)	Width (Inch)
Z	3	100	27	19
Q	3	95	29	20
L	2	95	33	25
AD	3	75	28	18
V	4	30	13	21
K	2	90	37	22
B	2*	100	33	20
H	2	100	35	24
AF	2	95	32	23
AA	2	95	35	24
S	4	30	19	23
I	3	90	27	19
R	3	85	26	25
E	1	95	40	22
J	2	90	35	22
AH	2	90	41	22
AE	1	90	36	25
AB	2	90	42	27
C	2	90	33	26
M	4	30	23	22
N	3	75	40	22
A	1	95	40	23
X	2	95	32	18
G	3	95	40	19
AG	2	75	34	24
T	3	30	33	14
P	2	95	37	25
O	1	95	44	23
D	1	95	37	26
Y	1	100	14	21
AC	1	100	34	25
F	3	95	36	22
W	1	100	36	16

REP III	Plant Vigor	% Stand Cover	Height (Inch)	Width (Inch)
N	4	40	26	25
X	2	100	35	14
F	3	100	31	25
H	2	100	40	21
Y	1	100	23	26
P	1	100	39	22
O	1	100	40	26
L	2	95	36	25
J	2	100	40	24
AH	2	95	42	24
Z	1	100	40	24
AF	3	75	25	22
D	1	100	35	20
M	3	45	34	20
V	3	20	30	27
C	2	100	29	23
K	2	95	36	19
I	1	95	40	24
G	1	100	40	24
AC	1	100	40	23
AA	1	90	40	22
AD	2	80	40	24
AB	3	60	28	22
T	4	2	27	13
S	3	25	20	21
AG	3	75	40	23
Q	2	100	33	20
AE	2	95	33	19
E	2	90	34	21
A	2	90	40	22
R	3	45	25	23
W	1	85	25	16
B	2	90	30	19

Plant Vigor
4- Poor
3- Fair
2- Good
1-Excellent

Blue Wildrye Project
Evaluations
Date Evaluated: June 25, 2009
Person(s) Evaluating: Terri Blanke and Heather Plumb

Project COPMC-P-0801-CP
Report-2009
By: Heather Plumb

Comparative Evaluation of Tall Wheatgrass

INTRODUCTION

Bio-fuels can be produced from any biological carbon source; although, the most common sources are plants. Biomass produced from plants is processed into liquid fuel such as ethanol and biodiesel. In order to be considered a bio-fuel the fuel must contain over 80 percent renewable materials. This study is a cooperative effort between various plant materials centers in the west and northeast to learn more about the potential of tall wheatgrass, a cool season grass, as a source for bio-fuel. The study is linked to the NRCS 2006 National Strategic Plan, 2006-2010 National PM Strategic Plan, and the FY-2007 West Region technology working group business plan.

OBJECTIVE

To comparatively evaluate three commercially available plant releases of tall wheatgrass *Thinopyrum ponticum* from the U.S. to an improved cultivar from Hungary for potential use as a bio-fuel crop in the cool season grass ecosystem of the west and northeast.

METHODS

Four entries of tall wheatgrass; ′Alkar′, ′Jose′, and ′Largo′ from the US and one from Hungary ′Szarvasi-1′ were seeded on November 20, 2007. The entries were seeded with a hand-pushed Planet- Jr.-drill at the rate of 24 seeds per linear foot or eight pounds per acre of pure live seed. The plot size is four feet wide by 20 feet long, with four rows per plot at one-foot centers. The planting was irrigated to get it established and herbicide was applied to control broadleaved weeds in the first growing season. Nitrogen fertilizer will be applied in the spring of the second growing season at the rate of 100 pounds of nitrogen per acre. Plots will be harvested at full maturity. Eighty inches (6.66 feet) of middle two rows will be harvested and dried for biomass production. Plots will also be evaluated for plant stand. Biomass samples will be sent to the lab to obtain a chemical analysis of bio-fuels parameters to compare the entries. The study will be conducted for three years. Below is the plot plan for the study.

Project COPMC-P-0801-CP
Report-2009
By: Heather Plumb

Plot Plan

N ↑

Rep I	Largo	Alkar	Szar	Jose
Rep II	Alkar	Largo	Jose	Szar
Rep III	Szar	Alkar	Largo	Jose
Rep IV	Jose	Szar	Largo	Alkar

RESULTS

The plots were evaluated for establishment on September 2, 2008, and harvested for biomass production on September 17, 2008.

2009

During the 2009 growing season the tall wheatgrass plot was evaluated once. On July 2, 2009, UCEPC staff evaluated the plot ocularly for percent cover. At that time it was observed that 'Largo' had the best percent stand cover. On September 24, 2009, the plot was harvested and heights were measured. After harvest wet weights were documented and samples were placed in bags to air dry. Dried samples for the study will be shipped to Cornell University for wet chemistry work.

CONCLUSION

On September 21, 2009, it was decided by Jim Briggs that 2009 would be the last year for the tall wheatgrass study. Samples will be sent out for wet chemistry work in 2010 to Cornell University. Dry weights of all the samples will be documented before being shipped to Cornell.

Project COPMC-P-0802-RA
Report-2009
By: Manuel Rosales & Terri Blanke

Observational Planting of Canada Milkvetch

INTRODUCTION

Canada milkvetch *Astragalus canadensis* is a native legume widely distributed throughout the United States. It is commonly found in dry prairies, moist shores, marshy grounds, and open or partly shaded habitats. Canadian milkvetch is propagated by seed. This is an inter-center strain observational trial in cooperation with the Washington (Pullman) Plant Materials Center. Information obtained from the observation will aid in collecting agronomic information for technology development and plant releases.

OBJECTIVE

To determine suitability and performance of an accession of Canada milkvetch from the Pullman Plant Materials Center under the environmental conditions at Meeker.

METHODS

This is a non replicated trial for observational purposes.

Seed sent from the Pullman Plant Material Center was planted at Upper Colorado Environmental Plant Center (UCEPC) in the demonstrational planting site. A hand-pushed belt seeder was used to plant the seed. Two rows 20 feet long at three-foot centers were seeded in November 20, 2007, at the rate of two grams per 20 feet of row.

RESULTS

For establishment results and evaluation see COPMC-P-0802-RA, 2008 report.

In May of 2009, the Canada milkvetch plot received damage from the tractor and disc while weeding an adjacent field. Seventy-five percent of the stand was eliminated. The largest plant was fenced for protection. The milkvetch plot was weeded and photographed in June. It was noted the largest plant was blooming and smaller sprouts were beginning to re-appear in the original rows. The plot was evaluated on July 2, 2009. See the worksheet below. The first seed was collected on July 22, and a final collection was made in early August. The seed was cleaned in September and produced 25.5 grams. That seed will be stored by UCEPC and is available upon request.

Project COPMC-P-0802-Ra
Report-2009
By: Manuel Rosales & Terri Blanke

Observational Plantings Evaluation Worksheet				**Establishment year:2008** **Evaluation year: 2009**
Releasing PMC	**WAPMC**	**Contact person for originating PMC**		**Mark E. Stannard PMCM**
Testing PMC	**COPMC**	**Contact Person for Participating PMC**		**Terri Blanke**
Study Title: Observational Planting of Canada Milkvetch		**Study Purpose**		**To determine suitability and performance of accession at UCEPC**
Study Number: COPMC-P-0802-RA		**Study Duration : 2007-2010**		
Precipitation During Growing Season (in.): 8.25 (April-August)		**Irrigation Applied During Growing Season (in)** NA		
	2			
Scientific Name	*Astragalus Canadensis*			
Accession #				
Release Name				
Evaluation Date 1	May 16, 2009			
% Stand [1]	25% **			
Vigor*	5			
Evaluation Date 2	July 2, 2009	Photos taken		
% Stand	35%			
Vigor	5			
Drought Tolerance	Irrigated			
Insect Problems	None observed			
Disease Problems	None observed			
Seed Production	25.5 grams			
Plant Height (in.)	14 " Lrgst plnt 4" Mltple sml plnts			
Notes: **** Damage to both rows from tractor and disc**				

* Vigor; where 1 = excellent; 3 = good; 5 = average; 7 = fair; 10 = none

1. Plant stand: visual estimated per plot (two complete rows = 100 percent)

CONCLUSION

The Canadian milkvetch grew rapidly after a wet spring and sustaining damage twice. It appears to be tolerable of our dry climate and short growing season. We will continue to monitor and evaluate the milkvetch through 2010 for performance under environmental conditions at Meeker.

Project COPMC-P-0803-WI
Report-2009
By: Manuel Rosales & Terri Blanke

Observational Planting of Bismarck Shrubs

INTRODUCTION

This is an Inter-Center Strain Trial (ICST) for observational purposes. These types of plantings are intended to determine basic adaptability and performance of the materials at different localities to spread out their suitability. In addition, the plantings should serve to demonstrate and educate the Upper Colorado Environmental Plant Center (UCEPC) staff as well as visitors to UCEPC on recent plant releases or potential candidates for future plant releases.

OBJECTIVE

To determine suitability and performance of four shrub accessions from Bismarck's Plant Materials Center

METHODS

This is a non-replicated trial for observational purposes

Four shrubs were received from Bismarck's Plant Materials Center on May 22, 2008. The table below identifies the shrubs:

Table 1. Bismarck's Shrubs for Observational Planting

Accession No./ Name	Common Name	Scientific name	Lot No.	Plants Shipped
323957	Black chokecherry	*Photinia melanocarpa*	VCE-07-BIGSIOU	5
9047203/Prarie Red	Plum	*Prunus*	VCE-07-BIGSIOU	5
9076686	Fireberry hawthorn	*Crataegus chysocarpa*	VCO-07- BIGSIOU	5
9082687	American black currant	*Ribes americanum*	VCE-07-BIGSIOU	5

The shrubs were shipped bare-root then transferred to 14″ x 4″ x 4″ tree pots until they were transplanted into the field. On June 25, 2008, in the windbreak demonstrational planting site at UCEPC, nineteen shrubs were planted. Planting holes were dug with a post-hole digger, eight feet apart. A basin was prepared around each hole to retain water. Shrubs were hand watered immediately after transplanting. Black plastic weed barrier was placed around the stem to help retain moisture and combat invasive weeds. On August 8, a new one inch drip line irrigation system was installed to provide water to all windbreak species. Irrigation was applied bi-weekly for approximately four hours.

Project COPMC-P-0803-WI
Report-2009
By: Manuel Rosales & Terri Blanke

An initial evaluation of the shrubs was taken after planting in 2008 and on May 21, 2009. See the table below.

Table 2. Initial Evaluation of Bismarck's Shrubs

Accession/ Common Name	Shrub Number (North-South)	Height [1] 2008	Height [1] 2009	Stem Diameter[2] (inches) 2008	Stem Diameter[2] (inches) 2009	
9047203	1	25	18	0.25	0.25	
Praire Red plum	2	26	16	0.37	0.37	
	3	24	14	0.25	0.25	
	4	26	15	0.20	0.20	
	5	15	19	0.13	0.13	Vigor 3
323957	1	25	18.5	0.13	0.13	
Black chokecherry	2	21	6	0.13	0.13	
	3	27	21	0.25	0.25	
	4	26	16	0.25	0.25	
	5	26	23	0.25	0.25	Vigor 3
9076686	1	21	Na	Na	Na	
Fireberry	2	18	19.5	0.15	0.15	
hawthorn	3	6	4	0.25	0.25	
	4	19	Na	Na	Na	
	5(dead)		Na	Na	Na	Vigor 2
9082687	1	14	14	0.25	0.25	
American black	2	21	21	0.30	0.30	
currant	3	16	15	0.20	0.20	
	4	18	19.5	0.20	0.20	
	5	16	13	0.20	0.20	Vigor 4

1. Height in inches of tallest stem.
2. Stem diameter taken at the base (root collar) of thickest stem.
3. Vigor for stand: 1=Poor 2=Fair 3=Good 4=Excellent

On May 21, 2009, a second evaluation was conducted to measure growth, survivability and vigor. Photographs were taken at that time. Roundup herbicide was applied around the shrubs to help fight invasive competition. Hand weeding and irrigation continued through the summer as needed.

RESULTS

Upon arrival to the UCEPC, it was noted that the fireberry hawthorn appeared to be very dry. After transplanting to a potted container, one died. The following spring, two more hawthorns died. It appeared that some of the plants sustained damage from herbicide overspray. We will monitor those plants for future outcome. In the fall, wildlife browsed the shrubs heavily; this along with the herbicide overspray could have contributed to the lack of establishment of two hawthorns.

CONCLUSION

The UCEPC staff will continue to monitor the shrubs for performance and suitability at Upper Colorado Plant Material Center. The shrubs will be evaluated, measured, and fenced for wildlife protection in 2010. A copy of this report will be sent to the Bismarck Plant Material Center

Project: COPMC-S-0101-RI
Project Report-2009
By: Terri Blanke

Seed Production of Thinleaf Alders

INTRODUCTION

Thinleaf alder *Alnus tenuifolia* is a large shrub or small tree found in riparian areas from Alaska and the Yukon south into New Mexico and Utah. In Colorado, thinleaf alder occurs along mountain streams, rivers and in canyon floors at from 5,000 to 10,000 feet in elevation. Thinleaf alder has gray, smooth bark with conspicuous white lenticels. The male and female flowers are borne separately, but on the same plant. Male spikes are slender and drooping, up to 3 inches long. Female spikes are upright and up to 0.5 inch long. Flowers open in the spring before the leaves unfold. The fruit ripens from August through September. Nodules found on the roots of thinleaf alders contain *Frankia* that are important in nitrogen fixation. Thinleaf alder could have potential for riparian habitat improvement.

OBJECTIVE

Develop techniques to promote viable seed production from a selection of thinleaf alder for riparian revegetation.

METHODS

This is a non-replicated planting.

In 1983, three collections of thinleaf alder *Alnus tenuifolia* were made in the eastern corner of Rio Blanco County, Meeker, Colorado. Seedlings were started in the greenhouse at Upper Colorado Environmental Plant Center (UCEPC) and transferred into a single row on the south side of Field 3, approximately 20 feet to the north of the *Amelanchier alnifolia*, Long Ridge, Utah serviceberry. Information on planting, establishment, and evaluation results can be found in progress reports 08I160 dated 1987 – 1999, by Dr. Gary L. Noller.

In October 2000, the three local collections from Rio Blanco County were chosen to be kept for seed production for a blended release. A new accession number was assigned to the blend, 9070975. There was no significant difference detected between the three collections and the increased number of plants would provide ample amounts of seed for the release.

In the summer of 2008, the UCEPC staff applied the herbicide Roundup to the Field 3 for weed control. The alders were pruned and thinned.

The thinleaf alders received no supplemental irrigation until the summer of 2009. A small irrigation ditch was dug along the single row of alders. Irrigation water was applied three times throughout the growing season. Roundup was applied again with an ATV sprayer and pruning was needed to remove broken branches. Seed was harvested in late November.

RESULTS

Twenty-two thinleaf alder *Alnus tenuifolia* remain in Field 3 at UCEPC. It was noted in all the previous reports that there were signs of wildlife use, but very light. Seed was harvested from the alders in 2000, 2001, and 2009. Table 1 below shows years of seed production and quantities collected.

Table 1. Thinleaf alder seed production.

Scientific name	Accession #	Year	Acres	Harvest Date	Field #	Cleaned Amnt
Alnus tenuifolia	9070975	1992-99	0.25	-	3	0
		2000	0.25	10/04	3	558 g
		2001	0.25	10/2-10/3	3	2.13 lb
		2002-08	0.25	-	3	0
		2009	0.25	11/25	3	82 g

CONCLUSION

The alders produced seed in 2009, after six years of little or no production. With supplemental water, those results may increase. The branches seem to be very brittle, possibly from the herbicide or lack of water. There appears to be some insect damage to the alders but it has not been identified at this time. UCEPC will continue to monitor, evaluate, and research the shrubs for successful propagation methods.

Project: COPMC-S-0103-UR
Project Report-2009
By: Terri Blanke

Aphid Resistant Utah Honeysuckle

INTRODUCTION

On August 8, 1977, a planting of 179 accessions of woody tubling species was completed. This project (081020J - Orchard) was initiated to evaluate the survival and performance of those materials at Upper Colorado Environmental Plant Center (UCEPC) in Meeker, Colorado. Included in this project were four accessions of *Lonicera utahensis,* Utah honeysuckle. The information for these four accessions can be found in the 1998 progress report by Dr. Gary Noller. Witches broom aphids *Hyadaphis tartaricae,* were first noted in the orchard in 1986. These aphids are found on the tips of branches of Utah honeysuckle and produce a growth called a witches broom. It was noted that two of the accessions had no infection. Those plants were marked and monitored from 1987 to 1992. In 1996, new accession numbers were given to the plants that were sent to Dr. Whitney Cranshaw at Colorado State University. Dr. Cranshaw conducted experiments at the university greenhouse for witches broom aphid resistance. The information received from Dr. Cranshaw in 2000 indicated that two plants (#3 and #15) were highly resistant to witches broom aphids. Plant 3 from accession 9070920 and plant 15 from accession 9070921 were then selected for cutting block material. In August of 2001, cuttings were taken from these two shrubs. The honeysuckle cuttings were rooted and potted in the greenhouse for a future field planting.

OBJECTIVE

This project was created to produce cutting stock for use in xeriscape and landscape horticulture, windbreaks, and urban beautification. The duration of the project is 2001 – 2011.

METHODS

This is a non-replicated planting.

Utah honeysuckle plant 3 of accession 9070920 and plant 15 of accession 9070921 are both located in field 14 – West (orchard) at the COPMC. The orchard diagram below shows their location.

Project: COPMC-S-0103-UR
Project Report-2009
By: Terri Blanke

UCEPC Map **N ↑**

Field 14 – Shrub Orchard abbreviated diagram

Row	Accession Group	Accession Group	Accession Group	Accession Group
1	Mtn. Mahogany		Ash	Maples
2	Serviceberry	Serviceberry	Serviceberry	Serviceberry
******				
10	Golden Currant	Wax Currant	Mtn. Mahogany	
11	Twinberry Honeysuckle 2*	Utah Honeysuckle 9070920 22* Plant *3* in group	Utah Honeysuckle 9070921 22* Plant *15* in group	Gooseberry

* Number of plants in this accession
****** Rows 3 through 9 not shown in diagram

In March of 2007, the 23 remaining honeysuckle cuttings that had been rooted in 2001 were transplanted into two-gallon containers. They were pruned, fertilized, photographed, and transferred outside to the UCEPC lathhouse in June to be hardened off. On August 21, 2007, twenty-one Utah honeysuckles were transplanted by hand in a single row (North-South) with 8-feet spacing between each shrub. The honeysuckles were watered by hand immediately after planting. They were weeded, watered, and monitored through the fall. The planting is on the west side of UCEPC and serves as a demonstration for the use of woody materials in a windbreak/shelterbelt.

RESULTS

Growing season of 2008

On June 25, 2008, the honeysuckles were evaluated for survival, height, and browse. The plant height was measured to the tallest branch and recorded in inches. The north end of the row is plant number 1. Photos were taken. Weed barrier fabric was placed at the base of each shrub to help fight weeds. A new one-inch drip line irrigation system was installed during the summer. The system provides water to all windbreak species. Irrigation is applied once a week at four hours per setting. Aphids were noted on several of the honeysuckles but no sign of the disease witches broom.

In spring of 2009, the honeysuckles were evaluated and photographed. The shrubs were pruned heavily to promote a denser trunk. They were watered throughout the summer and herbicide was applied near the base to suppress invasive. It was noted that several of the shrubs had a different berry color. Those shrubs were tagged and will be monitored in the future. There was no sign of witches broom. Wildlife browsed the shrubs heavily in the fall. The COPMC staff placed protective fencing around seven shrubs.

Project: COPMC-S-0103-UR
Project Report-2009
By: Terri Blanke

The table below shows the growth results since the honeysuckle were planted in the windbreak.

Aphid Resistant Utah Honeysuckle Evaluation Results

Plant No. *	2008 Height **	2009 Height **	2009 Comments
1	31	34	
2	24	31.5	
3	18	24	
4	19	22	
5	21	29	Blooms
6	24	26	
7	16	21	
8	18	22	
9	21	27	Buds
10	26	29	
11	21	25	
12	26	29.5	
13	20	22.5	
14	21.5	27	Buds
15	23	29	Buds
16	20	26.5	Buds
17	18	26	Flowers
18	21	24	
19	23	25.5	
20	20.5	25	
21	19	25	
22	14	21	

* Evaluated from North to South
** Recorded in inches

CONCLUSION

The overall vigor for the Utah honeysuckle stand was very good. The heavy pruning did not seem to inhibit growth what so ever. Evaluations will be conducted yearly to determine survivability, xeriscape, landscape horticulture, windbreak, wildlife, and urban beautification value. Greenhouse test results concluded that the honeysuckle can be propagated by old growth stem cuttings. UCEPC will continue to monitor the shrubs for resistance from disease caused by the aphids.

Project COPMC-S-0401-CR
Project Report 2009
By Steve Parr

Seed Increase for Fire Rehabilitation Needs
Bureau of Land Management-Colorado

INTRODUCTION

The Bureau of Land Management (BLM) has re-seeded over fifty 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.

OBJECTIVE

Develop seed sources of western Colorado native plant species important in post –fire revegetation on BLM lands.

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, UCEPC 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 Natural Resource Conservation Service (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 UCEPC, 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.

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By Steve Parr

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.

RESULTS

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 June 8, 2007 June 8, 2007 July 23, 2007 Undated	20 g 5 g 3 g 16 g 15 g	Moffat Cty. Rd. 61 Gypsum drainage Gypsum radio tower Ryan Ridge R. Blanco Cty. Rd.73
Utah sweetvetch	Undated July 18, 2007 July 23, 2007	2 g 23 g 22 g	Blair Mesa " " " "
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.

2008

Seed collections from native stands were excellent in 2008. A total of 15 separate collections were obtained, 11 of which were for the five targeted species. These collections will be tested against the products that are presently in production for the BLM project. Presently, the bluebunch, western, and bottlebrush fields are producing seed, while the sweetvetch and Sandberg's are just coming into production. The added collection of sweetvetch will be particularly important as the field has been established on a spaced planting basis, and individual "hills" can be seeded with this new collection to add to the diversity of the crop. This has been the intent of this project with each product from the inception. The table below identifies the collections.

Species	Date	Collected Amount	Location
Basin wildrye		6.9 lb	Yellow Creek
Bluebunch wheatgrass	7/15	721 g	Piceance Creek County Road 22
Bluebunch wheatgrass	7/24	418 g	Rio Blanco County Road 20
Blue flax	7/15	299 g	Piceance Creek
Bottlebrush squirreltail	6/27 & 7/9	31 g	Deserado Mine
Prairie Junegrass	7/29	18 g	Pinto Mesa
Prairie Junegrass	8/7	17 g	County Road 1509
Sandberg's bluegrass	6/27	106 g	County Road 73
Sandberg's bluegrass	7/11	63 g	County Road 1509
Sandberg's bluegrass	7/21	19 g	Irish Canyon
Sandberg's bluegrass	7/9	47 g	Deserado
Sandberg's bluegrass	7/24	76 g	Pinto Mesa
Utah sweetvetch	6/27	95 g	Blair Mesa
Utah sweetvetch	7/29	354 g	Pinto Mesa
Western wheatgrass	8/11	80 g	Ryan Ridge

Production in 2008 was down from the previous year for all products. Because of the apparent reduction in productivity, a new western wheatgrass field was established. Commonly, rhizomatous species tend to put more energy into lateral vegetative spread than seed production, so older stands need to be reestablished with greater frequency than bunch grasses. A typical stand life for western is four years. Additional work continues with the Utah sweetvetch field and the Sandberg bluegrass field.

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2009

There were no collections conducted in 2009 for the project, as all fields are established. Some additional work was done to fill voids in the Utah sweetvetch field and the bluebunch field. Twelve sweetvetch hills were re-seeded on September 9, and 71 bluebunch tublings were planted on September 2. A new western wheatgrass field was planted on August 26, 2008, with previously produced seed, but did not produce seed in 2009. A recap of the production of each product is provided below.

SPECIES	UCEPC FIELD #	ACREAGE	PLANTING DATE	HARVEST DATE	YIELD
Bluebunch	6	0.87	Aug.13, 2004	6/29/2006	32.00 lb
				7/6/2007	61.00 lb
				7/14/2008	50.00 lb
				7/15/2009	63.00 lb
Bottlebrush	17	0.80	Aug. 13, 2004	7/13/2006	45.00 lb
				7/20/2007	55.00 lb
				7/28/2008	27.50 lb
				7/24/2009	72.00 lb
Sandberg's bluegrass	12	1.00	Aug. 8, 2005 Aug. 9, 2007	No harvest	
				7/17/2008	1.86 lb
				6/29/2009	89.00 lb
Utah sweetvetch	12	1.00	Sept. 15, 2005	No harvest	
			Intra-seeded June 6, 2007		
			Transplanted June 2007		
			Transplanted and seeded three times in 2008; June 19, July 30 and August 19		
			Seeded 12 hills 9/9/2009		
Western wheatgrass	7A	0.80	Aug. 13, 2004	8/2/2007	212.00 lb
			Aug. 26, 2008	8/6/2008	43.00 lb
			2009	No harvest	

Additional activities that occurred in 2009 were the completion of a seed grower agreement form between UCEPC and growers of BLM source products, advertisement, and solicitation through the Colorado Seed Growers Organization for growers of interest and the confirmation of growers for three species; bottlebrush squirreltail, bluebunch wheatgrass, and western wheatgrass. Interest has also been expressed in Sandberg's bluegrass production. Distribution of bottlebrush squirreltail seed was provided to Walter Henes, Southwest Seeds in Dolores, Colorado, and Brian Duyck, Powell, Wyoming. Forty PLS pounds were supplied to Southwest Seeds on July 22, 2009, and 30 PLS pounds were sent to Brian Duyck on July 7, 2009.

The BLM western, Sandberg's, bluebunch, and bottlebrush have been included in a Field Evaluation Planting near Snowmass, Colorado, and the bottlebrush and bluebunch are also being tested west of Roosevelt, Utah. Results of these off-center evaluations will help determine the range of adaptation of these products. Additionally, an Inter-Center Strain Trial for bottlebrush squirreltail is being conducted with five commercially available releases, Toe Jam Creek, Tusas, Fish Creek, Wapiti, and the BLM source at five NRCS Plant Materials Centers. The information from this coordinated study will add substantially to the known attributes and range of adaptation for the releases of the bottlebrush squirreltail complex.

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. This effort continued in 2009. However, a very good harvest was obtained from the Sandberg's bluegrass in 2009, so limited efforts are anticipated in 2010 to supplement the stand. The Utah sweetvetch field is believed at the time of this writing, to be complete with the exception of the September plantings. This year should yield the first crop of this product.

Seed production in quantities large enough for large-scale increase has been successful for four of the five species. This year represents the final year of the agreement. The production from this year should serve as a bit of a reserve for future distribution to growers and for testing against like materials for suitability. Only the Utah sweetvetch is not ready for distribution, but this year's production could contribute to some seed allocations for this species as well. Four species, bluebunch wheatgrass, western wheatgrass, and bottlebrush squirreltail, and finally, Sandberg's bluegrass, all have excellent stands and appear to be good producers. Again, the Utah sweetvetch has been more difficult to establish a field of mature plants from which to harvest viable seed. Colorado State University Extension Entomologist Bob Hammon brought some leafcutter bees to UCEPC in 2007 in an effort to assure the presence of pollinators for the crop. However, UCEPC continues to have a challenge keeping deer out of the sweetvetch, and as a result, there was no production. This year, the perimeter fence was fixed in areas where it appeared deer were getting into UCEPC. However, deer were able to get in when the irrigation ditch was turned off, and they immediately went to the sweetvetch field for grazing. UCEPC

experimented with a small electric fence around a small penstemon field with excellent results. If deer are again successful in breeching our perimeter fence, we will use electric fencing to try to keep them out of the field.

A coordinated plan for seed dispersal will need to be finalized so that seed increase efforts on a large scale are coordinated, efficient and manageable. Coordination partners include UCEPC, Colorado Seed Growers Association, and BLM.

This year represents the final year of this agreement. It would be mutually beneficial to maintain these products until a full assessment of their performance and adaptability can be compared against commercially available products, much like the Inter Center Strain Trial being conducted for the bottlebrush squirreltail. The information that is acquired from such tests is what will be used to sustain the products in the free market. Each of the products is potentially worthy of a formal release, but replicated plots at multiple locations will help substantiate what is known and how each product compares to “standards”.

Additional native species, which may be represented by products of distant origin or manipulated genetic tracking, or are not available, should also be developed for use within Colorado BLM managed lands and to some extent, on the eastern portion of the Colorado Plateau. Indian ricegrass, salina wildrye, basin wildrye, muttongrass, Junegrass, galleta grass, and needle-and-thread grass are all very important products that exist as variety not stated, VNS, or from products with distant or manipulated genetic origins. UCEPC recommends an extension of the existing agreement or the creation of a new cooperative effort for product development, testing , release, and maintenance.

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Project Report 2009
By Steve Parr

Seed Increase for Uncompahgre Restoration Project

INTRODUCTION

Years of noticeable mule deer declines in areas that once held healthy populations prompted a series of studies by Colorado Division of Wildlife to determine the cause(s) for these dramatic population declines. What was discovered was not specific to mule deer, but rather was much more widespread. It was apparent that many of the problems related to mule deer declines were shared by other species, including plants. Because of the recognition of declining habitat on the Uncompahgre Plateau (UP), and the ramifications that unchecked decline would have on mule deer and other species, a collaborative, community based effort was formulated to address the concerns. As a result, the Public Lands Partnership (PLP) was created. Upper Colorado Environmental Plant Center (UCEPC) was contacted by Rick Sherman in 2001. A series of meetings were held at UCEPC and BLM and Forest Service offices in Delta and Montrose in 2001 and 2002. Correspondence was received from UCEPC in May 2002 from Rick Sherman that a large grant had been obtained by the Uncompahgre Restoration Plateau project, and from that point, UCEPC was included in the project.

METHODS

Collections

UCEPC was contracted to collect and increase seed of selected species in 2002. Because of substantial and prevalent drought conditions throughout much of western Colorado, collectible populations were very isolated and it was deemed uneconomical to continue to attempt collections on such a poor year.

Collections the following year, and on several years since, were much more productive. To date, UCEPC has collected four grass species, three shrubs, and two forbs that can be utilized for seed increase or containerized production. Table 1 outlines the clean seed quantities collected during the 2002, 2003, and 2004 field seasons. A total of five collection days were used to obtain the seed. The six materials collected in 2002 were from two trips. The first trip on July 1 was conducted south and east of Montrose and the second trip, July 19, was done on the UP. In 2003, a collection was conducted June 23 on Sims Mesa and on July 30, the entire staff again collected on the Plateau. A single trip, August 12, was taken to the UP in 2004. All of these materials remain on inventory at UCEPC.

UCEPC has not collected from the UP since most of the seed collection and program coordination was turned over to Steve Monsen in 2003. Each of the collected grass species represent products that have practical application for use in the Pinion-Juniper zone, which is where most of the emphasis for the project originated. Since the early planning meetings, many more species represented by most habitats have been added to the project.

Table 1
Uncompahgre Restoration Project
UCEPC Collections

Species	Scientific name	2002	2003	2004
Blue wildrye	*Elymus glaucus*	---	---	308 g
Bluestem penstemon*	*Penstemon cyanocaulis*	11 g	76 g	
Bottlebrush squirreltail	*Elymus elymoides*	47 g	361 g	
Indian ricegrass	*Achnatherum hymenoides*	---	361 g	
Lewis flax*	*Linum lewisii*	23 g	---	
Mexican cliffrose	*Cowania mexicana*	2 g	---	
Mountain mahogany	*Cercocarpus montanus*	18 g	566 g	
Needle and thread	*Hesperostipa comata*	---	169 g	
Utah serviceberry*	*Amelanchier utahensis*	13 g	87 g (rust)	
Utah serviceberry*	*Amelanchier utahensis*		120 g	

* Positive identification pending

The blue wildrye was included in an initial evaluation planting at UCEPC for comparison against 32 other collections, including two released products, Arlington and Elkton. The data compiled from this project will help support the decisions about the use of this selection of blue wildrye for potential development. Bottlebrush squirreltail will be added to a trial in 2009 to compare the UP collection to six other products, including the releases, Wapiti, Pueblo, Toe Jam Creek, Fish Creek, and Tusas.

Plantings

2004

The project plans had originally called for the use of seed from collections rather than greenhouse grown stock. However, region-wide drought conditions did not provide good collectible populations of target materials. Steve Monsen, Native Plant Coordinator for the UP Project, provided seed to greenhouses for container production. In 2004, three species were provided to UCPEC for field increase as containerized stock. These materials were placed in production fields with the use of two Holland Old Faithful model transplanters. On June 16, 2004, a crew of eight people planted six rows (0.2 acre) of yarrow plugs that were grown in cone type containers. The crew started preparing the plugs for planting at 10:30 a.m. and by 3:30 p.m. the yarrow transplanting was done. The following day, 0.27 acre of muttongrass was

transplanted by 12:30 p.m. and on the 18th of June, 0.27 acre of Junegrass was done. A crew of seven transplanted the muttongrass and six people transplanted the Junegrass.

Two transplanters were placed on a toolbar, each with seating for two. This allowed four people to transplant into two rows, alternating the placement of plugs. Depth adjustments were made on the planting shoe for the size of the rooted stock. As the shoe opened the furrow, the plugs were placed at a slight angle in the furrow, held in place until the packer wheels approached the planting spot, and then released as the packer wheels pressed the soil around the plug. The second person would have the next plug in place while the first person closely observed and adjusted the placement of the plug being planted. Alternating in this way with two people planting per row provided excellent placement. Two people followed on foot, one for each row, to adjust planting depths on the transplants as necessary. Hand move sprinklers were set immediately after the plantings were completed each day. Survival and stand establishment were excellent on all three products utilizing these methods.

2005
An additional material was planted in UCEPC Field 3A. Approximately 1800 "Conetainer" type transplants of *Senecio multilobatus* were planted the first of July 2005 in the same manner the other materials were planted.

2006
No plantings were done in 2006.

2007
One additional material was provided to UCEPC for seed increase from direct seeding. A planting of 0.2 acre of bluestem penstemon was completed on August 17, 2007. Germination and establishment success will be evaluated in the spring of 2008 to determine the potential for this species.

2008
No plantings were done in 2008.

2009
No plantings were done in 2009.

Harvests
Each product was harvested with the Hege plot combine in 2005 and 2006. All materials except the Senecio were harvested in 2007 with a pull-type swather. The swathed windrows were then picked up with pitchforks and transported to seed drying areas in buildings. After the material was dry, it was run through the Hege combine repeatedly until no appreciable seed recovery was obtained.

A small amount of Senecio was harvested by hand in 2007. It is apparent that the product is either a biennial or a short lived perennial. The Senecio was planted in 2005, harvested in 2006,

and the vast majority of plants died after harvest. During the spring of 2007, however, it was noted that a large number of seedlings were emerging. Jim Free, UP Technical Committee, viewed the fields, including the Senecio seedlings, on a visit June 21, 2007. From appearances in the fall of 2007, there should be a crop in 2008.

2008
Seed from the muttongrass, Junegrass, and multi-lobed senecio were harvested in June and July. It was mutually determined by UP and UCEPC to discontinue funded production of yarrow. Bluestem penstemon did not produce a seed crop in 2008.

2009
Seed was harvested from muttongrass, Junegrass, multi-lobed senecio, yarrow, and bluestem penstemon. However, the only contracted species with UP for production was the bluestem penstemon. Funding for yarrow, multi-lobed senecio, muttongrass, and Junegrass has been discontinued. As per the work plan, harvests would be conducted as time and resources allowed on established plots of UP products. Produced seed will be used for additional testing.

RESULTS

Below, a summary of planting dates, acreage, harvest dates, and harvest amounts is provided as a table.

Species	Accession	Year Established	Acreage	Harvest Amount	Harvest Date
Bluestem penstemon	9092290	8/17/2007	0.20 acre	68 lb	8/12/2009
Junegrass	9092273	6/18/2004	0.27 acre	-0-	NA
				15 lb	7/26/2005
				10.4 lb	7/12/2006
				9.0 lb	7/12/2007
				9.6 lb	7/23/2008
				1.4 lb	7/22/2009
Muttongrass	9092272	6/17/2004	0.27 acre	-0-	NA
				2 lb	6/8/2005
				16.5 lb	5/30/2006
				5.0	5/30/2007
				15.0	6/13/2008
				3.5 lb	6/1/2009
Senecio	9092280	7/1/2005	0.13 acre	-0-	NA
				15 lb	6/21/2006

Species	Accession	Year Established	Acreage	Harvest Amount	Harvest Date
				292 g	7/5/2007
				23 lb	7/04/2008
				98 g	7/13/2009
Yarrow	9092271	6/16/2004	0.20 acre	43 g	11/2/2004
				17.5 lb	8/6/2005
				14 lb	8/2/2006
				10 lb	7/27/2007
				No harvest	2008
				2.0 lb	8/19/2009

A formalized work plan was developed for 2009. This plan identified only the harvest of bluestem penstemon that was planted in 2007. Although harvests were conducted on all the UP products, only the penstemon produced well this year. Seed test results showed very low viability on the other products, and removal of the grasses and yarrow is recommended. There is still interest in the multi-lobed senecio as a reclamation forb.

Interest has been expressed in the installation of a Field Evaluation Planting at one of the UP exclosures in or near the Montrose area.

CONCLUSION

UCEPC will coordinate with the UP Technical Committee about a work plan for 2010 and 2011 and beyond, but the general operating agreement ends in December of 2011. Besides bluestem penstemon, a native collection of Lewis flax had been verbally agreed upon to be produced at UCEPC. It is anticipated that other materials will be planted or tested at UCEPC and results and products delivered to UP growers.

A formal agreement between UCEPC, NRCS, and the PLP was ratified in August of 2007 and extends through 2011. An annual work plan will be developed between the three parties prior to the field season of each fiscal year for the life of the agreement.

Project: COPMC-S-0701-CR
Report- 2009
By: Heather Plumb

Seed Increase of Blue Wildrye for Medicine Bow-Routt National Forest

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC) and Medicine Bow-Routt National Forest formally entered Cooperative Agreement 06-CS-11020604-042 in August of 2006. The agreement called for an increase of a single specie, blue wildrye *Elymus glaucus*, collected within the boundaries of Medicine Bow-Routt National Forest. Collection ELGL-080106-A1 from California Park was selected to be used in the 1/3 acre field planting. The field planting will increase seed from seed zone 215, one of the four seed zones Medicine Bow-Routt would like to have seed increased for. This agreement will run through the fiscal year of 2010.

OBJECTIVES

Increase a selection of blue wildrye for eventual release and use by Medicine Bow-Routt National Forest.

METHODS

In 2007, a seed increase field of 1/3 acre, was planted using material from Seed Zone 215, accession number ELGL080106-A1. Seed was harvested from the field for the first time in 2008. The second harvest on the field was conducted on July 16, 2009. Seed was sent to the Colorado Seed Laboratory for blue wildrye seed analysis.

RESULTS

2008

Staff members from UCEPC evaluated blue wildrye seed increase field, 080106-A1, on June 26, 2008. It was observed that the blue wildrye plants were in the head stage and were flowering. Seed heads on the plants were abundant and healthy. Foliage was robust and was a dark green. Bare spots within the filed were minimal, blue wildrye plant vigor and percent stand cover were excellent. There were no signs of water stress, bug damage or heavy infestation of weeds. Weeds were present, but were not abundant. Squirreltail and mountain brome were mixed in with some of the blue wildrye plants, but were removed manually by the staff as the field was evaluated.

Seed harvested from the field was cleaned December 12, 2008, resulting in 44.5 pounds of blue wildrye. Seed was sent out to the Colorado State Seed Lab for analysis and PLS came back as 29.83%.

Project: COPMC-S-0701-CR
Report- 2009
By: Heather Plumb

2009

During the 2009 growing season, it was observed by the UCEPC staff that the field of blue wildrye was unhealthy in its appearance. Bob Hammon, an entomologist for Mesa County, was called and asked to inspect the field. He concluded that the field was infested by flea beetles and perhaps should be sprayed. However, the UCEPC staff was worried that if the field was sprayed the seed could potentially carry the chemical with it, so the field was not sprayed.

Seed harvested from the field was cleaned December 22, 2009, resulting in 22 pounds of blue wildrye. Seed was sent out to the Colorado State Seed Lab for analysis and PLS came back as 69.88%.

CONCLUSION

Collection 080106-A1 for Medicine Bow-Routt National Forest is going into its third year of production in 2010. The 2009 seed production on collection 080106-A1 had exactly half the seed production of what it produced last year, but the PLS of the material increased by almost 40%. Further evaluations should still be conducted in the future to assess if this collection maintains its vigor, percent cover, and seed production. The status of the bug infestation will be monitored to help insure the infestation does not further damage seed production in the future. The Colorado Seed Laboratory report is available upon request for the blue wildrye.

Project COPMC-S-0702-CR
Project Report 2009
By: Steve Parr

Evaluation of Griffith's Wheatgrass and Poverty Oatgrass for Seed Increase Potential

INTRODUCTION

Interest in the use of native seed for revegetation and restoration activities has increased substantially in the last decade. Moreover, the use of more localized, site specific sources of native seed for specific revegetation needs has also gained favor among many land management agencies. Traditional concepts of desirable traits for materials used in revegetation included the potential for the product to prevent or reduce soil loss, the value as a grazeable product to livestock, most often cattle, the ease of establishment, availability of seed, and the persistence of the material on the site once established. Often, materials were chosen without regard to their affect on surrounding plant communities or ecosystems or the origin of the selected material, whether identified as native or introduced.

In contrast, the National Park Service, which is charged with genetic resource preservation, used native, site indigenous materials where practical for revegetation uses, especially since the late 1980's. In fact, seed of the same species, if not from the same site or one in close proximity to the revegetation site, is considered alien. This concept has gained considerable favor with many other public land management entities, and is used more widely in decisions about material selection for revegetation.

Boulder County, Colorado, has acquired many thousands of acres of farm and ranch lands for the preservation of open space. Some of the land uses today on those properties are consistent with historic uses. However, in some cases it is more desirable, if not appropriate, to accelerate the conversion of some agricultural lands to native rangelands. In addition, planned disturbances within the county could utilize a native seed source for revegetation if such an activity met the goals of Boulder County. In order to accomplish this, sustained seed sources of localized, native Boulder County materials were needed and desired. From this identified need, a seed increase project has been initiated between Boulder County and Upper Colorado Environmental Plant Center (UCEPC).

OBJECTIVE

This project will evaluate the cultural aspects of seed increase efforts of two indigenous, native grass species from Boulder County for use in revegetation projects by Boulder County Parks and Open Space.

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METHODS

Personnel from Boulder County Parks and Open Space collected seed from several sources of big bluestem, Griffith's wheatgrass and poverty oatgrass over several years. Correspondence between David Hirt, Plant Ecologist for Boulder County, and Steve Parr, UCEPC Manager, led to decisions to attempt seed increase for Griffith's wheatgrass and poverty oatgrass. Seed tests were conducted for each of the seed lots, and decisions were made on seed quantities and seed lots to be used for the increase. While both lots chosen had good germination, off type species in each collection presented a concern. Kentucky bluegrass was present in the poverty oatgrass, but proper management should successfully reduce or potentially eliminate those plants from an increase field. The Griffith's wheatgrass, however, had high amounts of contaminants in the form of Japanese brome and downy brome.

The only practical way to manage for the amount of contaminant in the Griffith's wheatgrass collection was to plant late enough in the summer to germinate the annual bromes without presenting an additional seed contamination problem (the annual bromes would not produce seed during the establishment year). By establishing the target material early enough to reach adequate maturity during the establishment year, but late enough to eliminate annual brome seed formation, seed production should be accomplished the following year. However, in order to reduce the hand rouging necessary to remove the bromes, establishment timing had to incorporate the application of herbicide for annual brome control in the fall. We believe this was successfully accomplished. Spring evaluations will determine the level of success for this project.

Because the use of Plateau herbicide on Griffith's wheatgrass is not known, a split planting was done as a dormant seeding. Two methods and two timings were done for the initial planting of Griffith's wheatgrass.

A literature search in the Plants Database indicated that poverty oatgrass was tolerant of frost heaving. We conducted one half of the planting in August to compare against a dormant planting. To our surprise, the poverty oatgrass was being lifted in early October, roots and all. The dormant fall planting will be used to compare to the summer planting. From observations, it was also noted that the poverty oatgrass went dormant quite early in the fall compared to other 'cool season' grasses. As a seedling crop, often there is photosynthetic activity until snow cover to induce dormancy. The poverty oatgrass did not follow that pattern, and suspended growth well before snow cover.

POVERTY OATGRASS

2007

The planting of poverty oatgrass was also conducted as a split application. One-third acre was planted on August 10, 2007, and 1/3 acre was planted as a dormant planting on October 11, 2007. Buctril herbicide was used on November 2 to control winter annual broadleaf weeds. Eight tenths of one pound of 2004 Heil Valley Ranch was used in the planting with the target again being 30 PLS seeds per linear foot of row.

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2008

Spring observations showed the poverty oatgrass nearly a complete loss. Because of severe frost heaving, most of the planted crop was lost during the winter of 2007. As a result, 0.57 acre was reseeded on June 28, 2008. Sprouting was good, and a well established field noted two weeks later. However, as was noted the previous year, the growth was very minimal with the crop and concerns about the increase potential of this product were becoming evident. There was approximately 0.17 acre of the dormant planting that remained a bit more robust than the new planting, but no seed heads were produced from this portion of the planting either.

2009

In July of 2009, it was determined that the increase of poverty oatgrass by UCEPC for Boulder County was not an economically viable option. While there were plants and a fair to poor stand established, the plants with seed has little amounts and the individual plant vigor was not good. It is suspected without confirmation that our soils are too heavy and that perhaps, our pH is too high for seed production of this species which tends to occur in granitically derived soils along the foothills of the front range of the Rocky Mountains. At any rate, production efforts for this species were suspended and a new increase species, mountain muhly, was planted as a replacement. A ⅔-acre field was planted on August 21, 2009 with 400 grams of seed that had been tested by Bend Seed Extractory.

GRIFFITH'S WHEATGRASS

2007

A ⅓-acre planting was done on August 10, 2007, with a hand-pushed Plant Junior seeder. Calibration targeted 30 pls seeds-per-foot of row. The field was irrigated for establishment, and an excellent stand resulted. The annual bromes also germinated as anticipated. On November 2, 2007, six ounces of Plateau per acre was applied to the August planting for annual brome control.

On October 11, 2007, a separate dormant planting of ⅓-acre was conducted. This planting will compare planting methods and plant response to Plateau herbicide effects. A total of 1.5 pounds of the 2003 Rabbit Mountain seed lot was used for both plantings. Approximately two pounds of the original collection remain on inventory.

2008

The Griffith's wheatgrass established nicely and remained healthy coming out of the winter in 2007-2008. No re-seeding was necessary in 2008, and the plants continued to mature. There was a minimal amount of seed produced, 144 grams, that was hand harvested on August 5.

2009

On July 8, 2009, Claire DeLeo, Plant Ecologist for Boulder County Parks and Open Space, visited UCEPC and viewed the poverty oatgrass and Griffith's wheatgrass fields as well as a quick tour of the facility. Some concern was expressed over the robust nature of the Griffith's field, and it was requested that a specimen be sent to Boulder County for taxonomic identification. This was done, but the results, if confirmed, have not been relayed to UCEPC at the time of this report.

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RESULTS

The initial establishment of both materials was very good. Both products responded well to irrigation and germinated readily after a single irrigation of a two 12-hour set from overhead sprinkling. While the Griffith's continued to produce above and below ground biomass late into the season, the growth of poverty oatgrass stopped or nearly stopped by early October. The plants also started to change color and go dormant by mid October. Additionally, we noted substantial frost heave damage to the oatgrass field established in August. A planting of poverty oatgrass in June of 2008 still did not establish well after wintering and no appreciable harvest would be obtained in 2009 after three plantings. Poverty oatgrass seed increase efforts were suspended in July 2009.

A substitute species, mountain muhly, was planted in place of the poverty oatgrass on August 21, 2009. This has been a slow to establish species from previous increase plantings, so additional inner-seeding and plugging is anticipated in 2010.

Griffith's wheatgrass has performed very well to date. A minimal seed harvest was completed in 2008, but in 2009, thirty-six pounds of clean seed was produced. There is room within the rows for the species to fill in and become more productive in the next one to two years.

CONCLUSION

The Griffith's wheatgrass has shown good increase potential utilizing standard cultural methods at UCEPC. We are optimistic about its future seed production. Boulder County has been very patient with the development of the crop, which has contributed to the potential for success with this product.

In addition, Boulder County, has expressed interest in doing an increase with mountain muhly as a replacement product, which has been initiated. Further cooperative work is anticipated for the development of these materials.

Project: COPMC-S-0806-CR
Report- 2009
By: Heather Plumb

Native Seed Increase for Medicine Bow-Routt National Forest

INTRODUCTION

In August of 2006, Upper Colorado Environmental Plant Center (UCEPC) and Medicine Bow-Routt National Forest formally entered Cooperative Agreement 06-CS-11020604-042. On May 22, 2008, the agreement was modified to include more plant species to be increased in the future by UCEPC. Arapaho Roosevelt National Forests, a third party with common interests, was additionally introduced in the modification. The modified agreement calls for the increase of three additional 1/3 acre plantings of blue wildrye *Elymus glaucus*, one 1/3-acre seed increase of each of the following: western wheatgrass *Pascopyrum smithii*, bluebunch wheatgrass *Pseudoroegneria spicata*, and mountain muhly *Muhlenbergia montana.* All seed increase fields will contain materials that were collected within the boundaries of Medicine Bow-Routt National Forest.

OBJECTIVE

The objectives of this project are outlined as follows:

1. UCEPC will provide a four man seed collection crew for one full field day to collect accessions of bluebunch wheatgrass.
2. Medicine Bow-Routt National Forest personnel will provide up to 100 collections of blue wildrye, bluebunch wheatgrass, or other plant species.
3. UCEPC will clean up to 100 Forest Service collections.
4. UCEPC will increase three 1/3-acre plantings of single accessions of Medicine Bow-Routt collected blue wildrye.
5. Plant two 1/3 acre seed increaser plots of slender wheatgrass, seed zones 214 and 221
6. Plant two 1/3 acre seed increaser plots of bluegrass specie, seed zone 214 and 481
7. Medicine Bow-Routt National Forest and UCEPC will provide technical assistance to agriculture science faculty and students at North Park High School.

METHODS

Medicine Bow-Routt National Forest and Arapaho-Roosevelt National Forests seed collection crews harvested slender wheatgrass, bluebunch wheatgrass, oniongrass, blue wildrye, and a *Poa* spp. The seed collections were delivered to UCEPC in August and September 2008. The seed was cleaned in 2009 by the UCEPC staff.

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RESULTS

2008

Five grass species were collected by the Medicine Bow-Routt National Forest and Arapaho-Roosevelt National Forests crews in 2008. Collection crews were unable to find sufficient amounts of western wheatgrass and mountain muhly for the project. In a verbal agreement, it was decided in place of western wheatgrass and mountain muhly, a *Poa* spp. and slender wheatgrass were to be collected instead. These two grass species will replace western wheatgrass and mountain muhly in future seed increase fields.

2009

As per agreement 06-CS-11020604-042 Modification 1 for 2008, three 1/3 acre fields of blue wildrye were planted at UCEPC in the spring of 2009. Several collections for seed zones 214, 221 and 481 were blended to achieve proper seed rates for 1/3 acres fields.

In 2009, the original agreement was modified to incorporate a change in seed increase fields and to integrate a partnership with Arapaho-Roosevelt National Forest. In 2008, insufficient amounts of western wheatgrass and mountain muhly were collected. As a result, seed increase fields of slender wheatgrass and a bluegrass species were to be substituted in their place. Modification 2 called for two 1/3 acre fields of slender wheatgrass and two 1/3 acre fields of bluegrass to be planted in spring 2009 at UCEPC.

Several seed zones had to have blends created to achieve proper field seeding rates. Table 2 lists the seven different plantings for Medicine Bow-Routt National Forest and shows what collections were blended for each seed zone. As an example for blue wildrye seed zone 214 collections; elgl_214_8202008, elgl_214_8202008 Three Island and elgl_214_8192008, were blended together to create a 1/3 acre field of blue wildrye.

As part of the integrated partnership Arapaho-Roosevelt National Forest wanted a 1/3 acre field of wooly brome and a 1/3 acre of mountain muhly. These two fields were planted on August 8, 2009.

On September 10, 2009, Barbara Vasquez visited UCEPC to deliver 12 different native plant collections made by Medicine Bow-Routt National Forest during the summer of 2009. The collections were weighed to get a dry weight prior to them being cleaned by UCEPC staff. Table 3 lists the dry weighs for the 2009 field collections.

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Table 2. The spring 2009 plantings for Medicine Bow-Routt National Forest.

Number of plantings	Collection	Species	Sample Wt. gms	Current Wt. gms	Collected	Collector	Zone	Northing	Easting	Location
1	elgl_214_8202008	elgl	584	409	8/20/2008	kkovacs	214	4516098	554622	Slavonia
	elgl_214_8202008	elgl	229	54	8/20/2008	kkovacs	214	4514273	352641	Three Island Trail
	elgl_214_8192008	elgl	997	822	8/19/2008	kkovacs	214	4482623	363754	Grizzly Creek, CO
2	elgl_221_080406-A1	elgl	267G	0	8/4/2006	M. Barmann	221	4453976	317047	Dunkley Pass
	221-03	elgl	136G	0	8/15/2006	J. Proctor	221	4438723	330958	Bear Creek at forest boundary
	elgl_221_080306-A1	elgl	177G	0	8/3/2006	M Barmann	221	4448040	318386	Sheriff Reservoir Rd.
3	elgl_481_82122008	elgl	247G	112	8/21/2008	kkovacs	481	4443993	348574	Muddy Slide
	481-06-81106	elgl	128G	0	8/11/2006	Landis	481	4963142	380410	Along FDR 103-2A in open with aspen 1 mile E.from FDR 103
	481-091206-A3	elgl	91G	0	9/12/2006	M. Brown	481	4435109	364592	W. of Gore Pass, Blacktail Creek
	481-091406-A2	elgl	100G	0	9/14/2006	M. Brown	481	44443538	348689	Muddy Slide area, E. end of rd. 285.20 below
	481-02	elgl	82G	0	8/14/2006	Landis	481	4471678	404186	Along FDR 106
	481-04	elgl	130G	0	8/17/2006	Landis	481	4963142	380410	Along FDR 103.2A in open with aspen 1 mile E. from FDR 103 jct.
4	eltr_214_08112008	eltr	246	46	7/28/2008	mlandis	214	4490828	364100	Jackson County
	eltr_214_862008	eltr	82	38	8/6/2008	kkovacs	214	4528813	338992	Big Red Park, CO
	eltr_214_882008	eltr	330	115	8/8/2008	kkovacs	214	4472878	363846	Rabbit Ears, CO
5	eltr_221_8122008	eltr	795	335	8/12/2008	kkovacs	221	4453790	316755	Dunkley Pass, CO
6	poa sp_214_07232008	poa	335	0	7/23/2008	mlandis	214	4495057	364133	Jackson, Teal Lake
7	poa sp_481_07242008	poa	17	0	7/24/2008	mlandis	481	4435562	363486	Gore Pass
	poa sp_481_07252008	poa	164	0	7/25/2008	mlandis	481	4472098	403366	Jackson, Willow Creek

Blue wildrye Plantings (1,2,3)
Slender wheatgrass Plantings (4,5)
Poa spp. Plantings (6,7)

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Table 3. Dry weighs of collections made by Medicine Bow-Routt National Forest in 2009.

	bag4	2.2	
9000	BRMA-481-08/06/09		17
	bag 1	1	
	bag 2	1.4	
	bag 3	1	
	bag 4	2.6	
	bag 5	2	
	bag 6	1	
	bag 7	1.5	
	bag 8	1.2	
	bag 9	1	
	bag 10	1	
	bag 11	1.6	
	bag 12	1.5	
	bag 13	1.4	
	bag 14	1.6	
	bag 15	1.6	
	bag 16	412 Grams	
	bag 17	2	
8600	BRMA-481-080709		7
	bag 1	1.2	
	bag 2	1.6	
	bag 3	1.4	
	bag 4	2	
	bag 5	1.2	
	bag 6	1.4	
	bag 7	1.6	
9000	FETH-481-8/8/09		7
	bag 1	1	
	bag 2	3.4	
	bag 3	1	
	bag 4	2.8	
	bag 5	1.6	
	bag 6	1	
	bag 7	1.2	
8800	PASM-214-080609		2
	bag 1	290 Grams	
	bag 2	1.3	
8800	PSSP-214-080609		2
	bag 1	0.6	
	bag2	1	
8400	PSSP-214-8/4/09		1
	bag 1	0.2	
8800	ELEL-214-080609		2
	bag 1	65 Grams	
	bag2	1	
8700	TRSP-481-8/8/09		3
	bag1	200 Grams	
	bag2	207 Grams	
	bag3	240 Grams	
8400	KOMA-214-8/4/09		1
	bag 1	229 Grams	

CONCLUSION

UCEPC will provide a compiled accessions list of total grams of cleaned materials to Medicine Bow-Routt National Forest. Future grass specie seed increase fields must be determined by Medicine Bow-Routt National Forest and Arapahoe Roosevelt National Forest.

In 2009, because of time constraints, UCEPC was not able to meet with Medicine Bow-Routt National Forest staff as specified in the modified agreement. In 2010, a four man crew will meet with the Medicine Bow-Routt National Forest to provide a full field day to help collect accessions of bluebunch wheatgrass. Further seed collections from the four seed zones within the forest boundaries are still suggested.

Project: COPMC-S-0902-RI
Report- 2009
By: Terri Blanke

Carson National Forest Native Plant Production

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC) and Carson National Forest (CNF) formally entered Cooperative Agreement 08-IA-11071600-013 in November of 2007. The agreement called for UCEPC to clean, process, propagate, and increase the plant materials collected from CNF for their use in restoration of abandoned mine land projects. This agreement will run through the fiscal year of 2009.

OBJECTIVES

Propagate native riparian plants for revegetation projects within Carson National Forest, New Mexico.

METHODS

In 2007, a list was created of potential species for restoration at the abandoned mine sites around Taos, New Mexico. In September, CNF employees made two trips to collect seed from within five areas of the national forest. The first box of seed was received at UCEPC on January 15, 2008. In late September 2008, a second shipment of seed was received at UCEPC. That seed was cleaned in February of 2009. Table 1 below shows seed collections and cleaned quantities. Thinleaf alder *Alnus incana*, Woods' rose *Rosa woodsii*, geum *Geum aleppicum*, Nebraska sedge *Carex nebrascensis*, and smallwing sedge *Carex microptera*, were all placed into cold stratification.

Tufted hairgrass *Deschampsia cespitosa* and swordleaf rush *Juncus ensifolius* were tested for germination in the greenhouse. The tufted hairgrass was planted directly into 1″ x 9″ cones. The swordleaf rush had no germination.

Table 1. Carson National Forest seed collections and cleaned quantities.

Common Name	Specie	2007 Qty	2008 Qty
Black elderberry	*Sambucus nigra*	3 g	-
Fender's bluegrass	*Poa fendleriana*	137 g	-
Fringed brome	*Bromus ciliatus*	112 g	53 g
Geum	*Geum aleppicum*	50 g	31 g
Geum	*Geum diversifolia*	-	1 g
Gooseberry currant	*Ribes montigenum*	-	4 g
Mountain muhly	*Muhlenbergia montana*	-	3 g
Mountain snowberry	*Symphoricarpos oreophilus*	-	60 g
Nebraska sedge	*Carex nebrascensis*	28 g	59 g

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Common Name	Specie	2007 Qty	2008 Qty
Parry's oatgrass	*Danthonia parryi*	1 g	-
Red baneberry	*Actaea rubra*	-	46 g
Red elderberry	*Sambucus racemosa*	-	24 g
Rosy pussytoes	*Antennaria rosea*	-	>1 g
Roundleaf snowberry	*Symphoricarpos rotundifolius*	21 g	5 g
Shrubby cinquefoil	*Pentaphylloides floribunda*	18 g	29 g
Smallwing sedge	*Carex microptera*	55 g	6 g
Swordleaf rush	*Juncus ensifolius*	25 g	14 g
Thinleaf alder	*Alnus incana*	67 g	100 g
Tufted hairgrass	*Deschampsia cespitosa*	30 g	-
Twinberry honeysuckle	*Lonicera involucrata*	-	6 g
Varileaf cinquefoil	*Potentilla diversifolia*	2 g	4 g
Whitebark raspberry	*Rubus leucodermis*		21 g
Wolf's currant	*Ribes wolfii*	-	16 g
Woods' rose	*Rosa woodsii*	53 g	115 g

RESULTS

UCEPC received the final list of plants requested for the La Jara project on June 25, 2008. On March 4, 2009, UCEPC staff planted seeds for the tufted hairgrass *Deschampsia caespitosa* in 1″ x 9″ cones. There was 94% germination and plants were delivered to CNF in July of 2009. The thinleaf alder *Alnus incana* was cold stratified for 180 days and planted directly into 1″ x 9″ cones. The seed did not germinate. Seed of *Carex microptera* and *nebrascensis* was also cold stratified and planted directly into 1″ x 9″ cones. There was 50% germination on the sedges. The *Geum aleppicum* was cold stratified for 60 days and had 95% germination. The geum was planted into 2″ x 12″ number one treepots. The Wood's rose *Rosa woodsii* was cold stratified for 120 days and had very poor germination. Only three plants remain. Swordleaf rush *Juncus ensifolius* was planting directly into 1″ x 9″ cones. Poor germination resulted. Three *Juncus'* survived. UCEPC staff contacted the Bridger Plant Materials Center in Montana for further information on germinating techniques for the alder and swordleaf rush. UCEPC still had no results.

Table 2. La Jara Project. Targeted species, quantities requested, and amount delivered

Common Name	Species	Target Qty	'09 Delivery	'10 Delivery
Geum	*Geum aleppicum*	100	123	50
Nebraska sedge	*Carex Nebrascensis*	200		122
Smallwing sedge	*Carex microptera*	200		75
Swordleaf rush	*Juncus ensifolius*	200	Poor germ	3
Thinleaf alder	*Alnus incana*	200	No germ	-
Tufted hairgrass	*Deschampsia caespitosa*	300	294	-
Woods' rose	*Rosa woodsii*	50	Poor germ	3
	Total	**1250**	**417**	**203**

CONCLUSION

With the poor germination results of the alder, Woods' rose, and swordleaf rush, UCEPC has a shortfall for delivery of woody products scheduled in 2010. The herbaceous material is ready for delivery upon request from CNF. UCEPC could replace the shrubs with materials from the previous collections if CNF is in agreement. UCEPC will continue to propagate the material for CNF that are in the greenhouse. This is the final year for this contract.

Project No. COPMC-S-9104-WL
Project Report-2009
By: Terri Blanke

Clark Source Serviceberry Seeds Increase

INTRODUCTION

Saskatoon serviceberry *Amelanchier alnifolia* is a native shrub found in the North Central United States, Northern Great Plains, Central and Rocky Mountain states. It is a cool season, clump forming deciduous shrub or small tree that will grow from three to ten feet. Stems will be numerous, branching and erect with a dark grey to reddish brown bark. Leaves are alternate, simple oblong to nearly rounded and grow one to two inches is size. They will be toothed above the middle and somewhat hairy beneath. Flowers are white, bell shaped, and clustered with red to purple diminutive apple-like pome fruit. The fruit contains four to ten dark seeds and is covered with a leathery seed coat. Roots will be well branched and both deep and superficial. This plant can reproduce by sprout suckers as well as seeds. Seed for the accession 9021442 was collected in 1975 from Clark (thus its name) in Routt County, Colorado. The estimated elevation was 7200 feet. The plant is winter hardy, moderately drought tolerant, and has good fire tolerance of native and established stands. It has proven itself extremely tolerant of close wildlife browsing or defoliation.

OBJECTIVE

Release root sprouting selection of Saskatoon serviceberry accession 9021441.

METHODS

This study is a non-replicated test.

Clark's serviceberry was planted in the Upper Colorado Environmental Plant Center (UCEPC) orchard on August 8, 1977. Fourteen years later and due to superior performance, it along with two other shrubs, silver Buffaloberry, and chokecherry were chosen for isolation and further evaluation.

On May 24, 1991, twenty-two serviceberry sprouts were dug by hand. A channel was plowed and the sprouts were planted in one row on ten-foot spacings next to the channel. The shrubs were evaluated, hand watered, and weeded through the summer on an as needed basis. Only seven plants remained in September.

In June of 1992, twenty-two new sprouts were added to the original seven. Sixteen of those perished. An additional 30 sprouts were dug, potted, and grown out in the lathhouse to increase survival in the field.

In May of 1993, only five plants remained. Eight of the potted shrubs from the lathhouse were planted in the isolated field with the original five.

In April of 1994, seven more serviceberry shrubs were added. Multiple stems were placed into each hole. The holes were filled with water and the tops were pruned back after planting.

RESULTS

The serviceberry shrubs continued to survive for the next 12 years but due to heavy wildlife browsing, they never grew or produced seed.

In 2006, fifteen small serviceberry shrubs were still surviving in the isolated planting. The shrubs were evaluated, fenced, photographed, and herbicide was applied to fight competition from weeds.

Clark's source serviceberry was evaluated two times in 2007. There was very little new growth. Herbicide, pruning, and hand weeding applications continued through the summer.

On August 26, 2008, seed was collected from two plants. There was significant new leader growth. The shrubs were again evaluated, pruned, photographed, and treated with herbicide to suppress invasive. The wildlife continued to browse anything that emerged through the cages.

In May of 2009, the cages were removed for evaluating and photos. Fourteen of the Clark's source serviceberry continue to flourish aided by the protection from wildlife browsing. A small ditch was dug alongside the row of serviceberry. Water is channeled from a nearby irrigation ditch and applied to the shrubs three or four times during the growing season. This planting received no supplemental water until this time. All the shrubs produced berries in 2009 but because of the cold and wet spring, disease hindered the plants from producing viable seed. The herbicide, Roundup, was applied around the base of the shrubs to help suppress invasives.

The table below shows how the serviceberry has performed since 2006.

Clark's Serviceberry Performance

Shrub No.	2006 Height	2007 Growth	2008 Growth	2009 Growth	Leader Growth	Vigor*
1	27″	54″x 46″	63″x 46″	74″x 46″	11″	3
2	21″	24″ x 23″	43″x 24″	49″x 31″	6″	5
3	18″	22″x 36″	36″x 39″	51″x 41″	15″	3
4	16″	23″x 19″	33″x 19″	39″x 24″	6″	5
5	18″	34″x 36″	33″x 41″	49″x 31″	16″	3
6	21″	36″x 36″	54″x 39″	69″x 29″	15″	3
7	13″	25″x 20″	28″x 18″	43″x 22″	15″	5
8	14″	23″x 22″	38″x 28″	45″x 18″	7″	5
9	9″	8″x 3″	NA	NA	NA	NA
10	15″	28″x 17″	36″x 19 “	38″x 18″	2″	5
11	16″	20″x 24″	35″x 27″	41″x 23″	6″	5
12	12″	16″x 10″	19″x 18″	25″x 8″	6″	7
13	15″	16″x 8″	17″x 9″	14″x 3″	0″ **	7
14	14″	18″x 10″	26″x 14″	25″x 15″	0″ **	5
15	15″	18″x 14″	22″x 9″	21″x 16″	0″ **	5

*Ratings: 1-excellent, 3-good, 5-fair, 7-poor
** Browsing damage

CONCLUSION

Serviceberry is a valuable plant for wildlife habitat, providing both food and cover for many species. Its leaves and twigs are readily consumed by big game animals, and its berries are relished by many species of birds, wildlife**,** and livestock. Its massive root system is beneficial in reducing erosion in rangeland and mined land plantings, and its growth form and showy white flowers are an attractive addition in natural landscape and urban xeriscapes. As a result, it is used in wildlife habitat, pollinator enhancement plantings, range, and mined land reclamation plantings, shelterbelts, windbreaks, and other native landscape plantings. The serviceberry has cultural significance to the Native American as well. UCEPC will continue with efforts towards releasing the Clark's source serviceberry for public use.

Project COPMC-S-9105-RI
Report-2009
By: Terri Blanke

Silver Buffaloberry Seed Increase

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC) has identified the native Colorado shrub, silver buffaloberry *Shepherdia argentea* as a species with many conservation attributes. Adapted to elevations below 7500 feet and requiring 13 to 21 inches of precipitation, the silver buffaloberry offers wildlife habitat improvement, windbreak potential, landscaping, riparian enhancement, and erosion control. The plant is a deciduous, thorny shrub, or small tree reaching 6 to 20 feet in height. The leaves are silver gray in color on top and bottom and are 1 to 2 inches long, 3/8 inches wide. The thin bark becomes grayish-brown and will begin peeling as the plant matures. The plant has opposite branching. Fruit is drupe-like, ovoid, about ¼ inch long, mostly reddish orange. Rarely, yellow fruit can be seen. Roots are shallow and much branched; readily sprouting. Silver buffaloberry can be found growing along streams, in coulees and on exposed, moist hillsides. The plants are winter hardy and alkaline tolerant. Silver buffaloberry is capable of fixing nitrogen in root nodules that contain bacteria.

OBJECTIVE

Pre-cultivar release, seed increase.

METHODS

Accession 9008027 was planted into the UCEPC orchard on August 8, 1977. Fourteen years later this accession was chosen for its superior performance and was relocated to field 18 for further evaluation.

On May 24, 1991, a channel was plowed and holes were dug beside the channel on ten-foot spacing. Twenty silver buffaloberry sprouts were planted and hand watered through the summer. Five sprouts had to be replaced by 1993. No further evaluations were conducted.

In January of 2006, three native shrub seeding trials were conducted at UCEPC. The trials included the germination rate of non-stratified seed from native shrubs, relative success of direct seeding of native shrubs for conservation use and seeding success of our better performing native shrubs in field conditions. Results from those trials can be found in the COPMC-T-0601-UR, COPMC-T-0602-UR, and COPMC-T-0702-UR, 2006-2009 reports.

In the fall of 2007, a field crew heavily pruned the original shrubs and sprayed around the trunks for weed control. That winter, wildlife browsed them heavily. The damaged shrubs were pruned again in the fall of 2008.

Three off-site riparian studies began in 2008 incorporating the silver buffaloberry.

Project COPMC-S-9105-RI
Report-2009
By: Terri Blanke

Study COPMC-F-0802-IN will determine if silver buffaloberry is suitable and effective in replacing post treated tamarisk sites. Study COPMC-F-0803-RI will determine adaptation of silver buffaloberry selection for riparian restoration plantings. Study COPMC-F-0804-RI will determine adaptation of the buffaloberry for riparian restoration plantings at high elevations.

In March 2009, UCEPC sent silver buffaloberry bareroot stock to Kaycee, Wyoming. The United States Department of Agriculture / Natural Resources Conservation District along with local cooperators are implementing the buffaloberries in a field planting for a windbreak/tree establishment.

In 2009, a small ditch was dug alongside the row of silver buffaloberry. Water was channeled and applied three to four times during the growing season from a nearby irrigation ditch. Round-up herbicide was applied beneath the buffaloberries in the spring to help suppress invasives. Some pruning was needed as wildlife browsing had damaged lower branches. Wire cages were placed around the lower part of the shrubs for protection from the wildlife. Seed was harvested from four of the shrubs in mid August. The table below shows the years of seed production and amounts.

RESULTS

Silver buffaloberry shrubs remain in field 19 at UCEPC. The shrubs have multiple trunks and have grown from 8 to10 feet tall. They are evaluated, maintained and photographed yearly. The first seed was harvested from the shrubs seven years after isolating the sprouts.

Year Harvested	Clean Seed Wt.
1998	13 g
2003	238 g
2007	751 g
2008	**2.6 lb**
2009	117 g

The silver buffaloberry planting is evaluated, maintained, and photographed yearly. Buffaloberry seed is easily germinated in the greenhouse and propagation of the shrub continues for further testing, off-site projects and numerous requests. Some of the shrubs showed signs of stress on outer branches possibly due to overspray from the herbicide or to wildlife browsing. We will continue to monitor those individual plants for future outcome. It was noted that several specie of wildlife were seen utilizing the silver buffaloberry.

Off-site project information and results can be found in the individual reports listed above.

CONCLUSION

The silver buffaloberry shrubs have potential for being released for conservation use by the general public. Further evaluations and propagation techniques will be continued. As tamarisk and Russian olive abatement projects throughout the southwestern United States continue to be successful and gather momentum for large scale implementation, suitable native woody riparian replacement materials will be in high demand. This selection of silver buffaloberry may help satisfy this anticipated conservation need.

Project COPMC-S-9106-WL
Project Report-2009
By: Terri Blanke

Chokecherry Seed Increase

INTRODUCTION

Chokecherry *Prunus virginiana* is a native shrub which grows in a large geographic range in North America. The shrub grows abundantly in many habitat types and plant associations. Chokecherry occurs naturally in a wide range of soil types and textures making it key in restoration/reclamation projects. Chokecherry is found growing in precipitation ranges from 13 to 65 inches annually and the shrub prefers low to mostly mid-elevations. Chokecherry is perennial, deciduous, woody, and thicket-forming. They are a large erect shrub or small tree, rarely reaching 30 feet. The stems are numerous and slender with a root network of rhizomes. The bark of young trees may vary from gray to reddish brown. With age it will become darker, almost brownish-black and noticeably furrowed. Leaves of this shrub are alternate, simple, glabrous, and oval to broadly elliptic in shape, 1 to 4 inches long and ¾ to 2 inches wide. The leaves are dark green and glossy above, paler and lighter beneath. The margins are toothed with closely-spaced sharp teeth pointing outward to form a serrated edge. They will turn yellow in autumn. Flowers are arranged in cylindrical racemes 3 to 6 inches long, ¼ to ⅜ inch in diameter with five white petals. The fruits are spherical drupes, globose, ¼ to ⅜ inch in diameter. Small ripe cherries range in color from dark red to purple or almost black. Limiting factors in the chokecherry's habitat are poor drainage, frequent flooding, or soil with large amounts of clay and shade. Chokecherry is well adapted to fire disturbance. Seed for accession 9024060 was collected in 1975 at the Meeker Jr. High School in Rio Blanco County, Colorado.

OBJECTIVE

Pre-cultivar release, seed increase

METHODS

This study is a non-replicated test.

Accession 9020640 was planted in the Upper Colorado Environmental Plant Center (UCEPC) orchard on August 8, 1977. Fourteen years later, due to superior performance, it along with two other shrubs, silver buffaloberry and Clark's serviceberry, were chosen for isolation and further evaluation.

On May 24, 1991, twenty-one chokecherry sprouts were hand dug from the UCEPC orchard and planted in field 18. A channel was plowed and the sprouts were planted in one row on ten foot spacing next to the channel. They were watered by hand weekly and weeded through the summer.

In 1992 and 1993, new sprouts were dug to replace those that perished. The planting received no supplemental water.

In January, 2006, accession number 9024060 was incorporated into four native shrub seeding trials. The trials included the germination rate of non-stratified seed from native shrubs, relative success of direct seeding of native shrubs for conservation use, seeding success of our better performing native shrubs in field conditions and establishment of accession number 9024060 from various seed lots. For information on those trials see study numbers COPMC-T-0601-UR, COPMC-0602-UR, COPMC-T-0702-UR, and COPMC-T-0801-WL, 2006-2009 reports.

In September of 2007, the chokecherry shrubs were pruned and the ground beneath them was treated with an herbicide to help fight invasive plants.

The following summer, 2008, lower branches had to be pruned off again due to damage sustained from wildlife browsing. The shrubs were fenced to help protect the trunks from any further damage. Herbicide was applied around the trunks for weed control.

In March of 2009, UCEPC sent bare-root stock of accession number 9024060 to Kaycee, Wyoming, Soda Springs and Lewiston, Idaho. The United States Department of Agriculture/Natural Resources Conservation Service along with local cooperators is implementing the chokecherry in field plantings for a variety of uses. No project information has been reported at this time.

In later spring 2009, a small ditch was dug alongside the row of chokecherry. Water was channeled and applied three to four times during the growing season from a nearby irrigation ditch. Roundup herbicide was applied to help suppress invasive plants. Seed was collected in August. The seed collected was dried in two separate methods to later determine if extreme heat increases seed dormancy.

RESULTS

The chokecherry planting in field 18 was evaluated from 1991 to 1994. In August of 1998, seven years after original planting, the first seed harvest was made from the chokecherry shrubs. The shrubs are currently 12 to 14 feet tall. Some of the shrubs showed signs of stress on various branches possibly from overspray of the herbicide or wildlife use. We will continue to monitor those individual plants for future occurrences. It has been noted that various specie of wildlife have been seen utilizing the chokecherry shrub. Due to its aromatic flowers, accession number 9024060 was also named on a list of potential plant specie that UCEPC could provide to enhance pollinator conservation projects. The shrubs continue to be maintained at UCEPC.

Project COPMC-S-9106-WL
Project Report-2009
By: Terri Blanke

UCEPC completed all necessary components to release accession number 9024060 *Prunus virginiana*. Colorow Germplasm, black chokecherry, became available for public use in the summer of 2009. A notice of release article was published in the 2010 spring Native Plants Journal.

Table 1 below shows the years that seed has been harvested and the amount of cleaned seed produced.

Table 1. Accession number 9024060 seed production from UCEPC.

Year of Harvest	Amount of Cleaned Seed
1998	106.0 lb
1999	9.0 lb
2000	30.5 lb
2001	21.92 lb
2003	4.80 lb
2007	47.0 lb
2008	36.5 lb
2009	90.5lb (un-cleaned)

CONCLUSION

Colorow Germplasm black chokecherry has been sent to other plant material centers and outside cooperators to further determine it's suitability in a variety of conservation settings. It has proven itself useful in urban landscaping, range and mined land reclamation, shelterbelts, windbreaks, and reducing and controlling soil erosion. It is a plant of cultural significance and is a valuable specie for wildlife and pollinators. This will be the final report for this study.

Project COPMC-S-9601-OT
Progress Report - 2009
By: Terri Blanke

High Altitude Sweetgrass-Seed and Plant Increase

INTRODUCTION

Sweetgrass, *Hierochloe odorata* is a native perennial grass with creeping rhizomes that grows in wet mountain meadows, bogs, and springs. Sweetgrass is an early flowering plant, found in mid-successional communities among other grasses and shrubs, usually occurring in wet valleys and along steams. Accession (9039770) was collected in 1977 from Independence Pass, Colorado, at an elevation of 12,095 ft.

OBJECTIVE

Develop techniques for the establishment and uses of this culturally significant plant. Observe growth habits and performance of the accession under managed conditions at Upper Colorado Environmental Plant Center (UCEPC). Increase vegetative material for distribution to other regions.

METHODS

Three of the remaining five seeds from the 1977 collection packet were germinated and placed in ½ gallon pots in 1996. In 1997, the rhizomes from the three pots were separated and placed into large flats to spread. The flats were hardened off in the lathhouse for six weeks before the study area was established.

From 4″ x 4″ pieces of rooted sod produced in the greenhouse, a small 4′ x 5′ plot was established at the south end of the greenhouse in the UCEPC headquarters in July 1998.

There has been no supplemental irrigation to the plot. Minimal weeding has been done, mainly to combat invasive specie. On May12, 2009, several sprigs of the sweetgrass were hand dug and are being maintained in the greenhouse. This material will be used to reestablish a new plot and in further studies.

There was a request for plants in April 2003, by David Sanford for a trial planting on the Pine River in the Southern Ute Reservation. This was to be a 4-H project to provide a local source of sweetgrass for ceremonial blessings.

Due to the lack of seed production, the plot has been maintained for requests of either rhizomes or potted plants.

Project COPMC-S-9601-OT
Progress Report - 2009
By: Terri Blanke

RESULTS

Plants that had been produced in 2002 were shipped out in cone-tainers to Mr. Sanford. They were well rooted and healthy. In order to increase the material, Mr. Sanford reported back in the fall that he transplanted the plants from the cone-tainers into tubs. He also shipped us some grass seed, possibly an exotic fescue that had gone to seed in the tubs. He indicated he was having problems identifying the sweetgrass. No testing was conducted on the sample.

CONCLUSION

There has been no further information received about performance of the sweetgrass that was sent to Southern Ute reservation.

Sweetgrass accession 9039770 has been easily propagated by dividing rhizomes and grows rapidly without much supplemental water. The potential for the rhizomes to be moderately invasive might make this hearty accession a good species for wetlands and riparian restoration or erosion control on steep mountain slopes.

Along with the above, the cultural importance of the sweetgrass to the Native Americans, and susceptibility to overgrazing give us all the more reason to continue evaluating establishment methods and develop propagation protocols for seed production and restoration.

Some good illustrations or pictures of sweetgrass rhizomes would be helpful in identifying the plant when people are working with it for the first time. This will be the final report for this study.

Project COPMC-S-9901-CR
Report 2009
Report by: Steve Parr

Bigelow's Groundsel

INTRODUCTION

Native high elevation species that are available for revegetation are relatively few in number and seed availability is inconsistent. Additionally, commercial seed availability of high elevation forbs is very limited. One forb that responds well to disturbance at high elevations, has the potential to produces good seed quantities and grows large enough to be harvested with conventional equipment is *Senecio bigelovii*, nodding or Bigelow's senecio. High elevation parks and meadows in the southern Rocky Mountains with ground disturbance promote the occurrence of this species. Bigelow's senecio is a fibrous rooted perennial with erect stems 30-80 cm tall. Stems and leaves have tufts of loose, cobwebby hairs, especially higher up on the stem. Leaves are alternate and become gradually reduced upward, with those near the base of the stem having a petiole. The leaves are 7-20 cm long and 0.6-5 cm wide, with oblong to elliptic blades and finely serrated to entire margins. The terminal, raceme-like inflorescence consists of one to eight nodding heads consisting only of yellow disk flowers. Fruits are glabrous achenes (Cronquist 1994; Dorn 1992; Harrington 1954; Welsh et al. 1993).

In 1998, revegetation activities for the Summitville Superfund Site in South-Central Colorado started with seed collection, and a cooperative agreement between Colorado State University (CSU) and Upper Colorado Environmental Plant Center (UCEPC) was signed that identified the target species and quantities needed for site revegetation. Bigelow's senecio was one of five species collected by CSU crews for establishment at UCEPC. After the completion of the Summitville Project, the senecio field remained in production at UCEPC. However, because of other priorities, the senecio field was maintained but not irrigated, fertilized, or harvested; yet maintained its presence. Because of the low maintenance required for the product and its potential value in high elevation revegetation projects, efforts to produce seed were again initiated in 2009.

OBJECTIVE

Develop, test, and release a commercial source of a native forb for very high altitude revegetation and reclamation.

Project COPMC-S-9901-CR
Report 2009
Report by: Steve Parr

METHODS

Seed collected by CSU was provided to UCEPC in 1999. Weed barrier was used for the production field of 2.5 acres, and seeding was done by hand October 28, 1999. Intra-seeding was done on August 11 and September 13 and 14, 2000, to improve the stand to over 90%. The stand has since declined because of lack of attention, and in 2009, weed control was conducted between the rows of weed barrier and within the blank spots. Some consolidation of the field was done, and fewer rows and a smaller field resulted.

Seed germination trials were conducted in the greenhouse and seed that had been produced in 2001 and 2002 did not germinate, so no intra-seeding was done.

RESULTS

In 2009, there were 6.5 pounds of seed hand harvested from the original field. This seed will be used to inner-seed the blank spots in the field and for testing on high elevation sites.

CONCLUSION

Seed production of Bigelow's groundsel will continue in 2010 in an attempt to acquire adequate seed for testing and small plot increase. If cultural aspects and performance of this native forb are conducive to commercial production, UCEPC will work toward a release.

Project COPMC-T-0203-RA
Project Report 2009
By: Steve Parr

Cultural Techniques for the Establishment of Thurber's Fescue

INTRODUCTION

Commercial sources of native plant materials available for revegetation and reclamation uses at elevations above 10,500 feet are very limited. Five native grass species, slender wheatgrass, tufted hairgrass, blue wildrye, Idaho fescue, and big bluegrass are the only released sources for very high elevation revegetation and conservation uses. Sources of commercial forbs are even less abundant with Rocky Mountain penstemon being one of the very few species to occur above this elevation. One important grass species that is often dominant in open parks at elevations above 10,000 is Thurber's fescue. This species is a cool season, perennial, large, densely tufted bunchgrass. It grows up to 90 cm tall in Colorado, with narrow, involute leaf blades 10-20 cm long. Thurber's fescue has an extensive root system with a high percentage of a mycorrhizal association reported from one source. Rapid vegetative plant growth by tiller production has also been reported for Thurber's fescue. Additionally, the plants are considered to be long lived and useful for reseeding rangelands.

Because there are few native species available for revegetation of high elevation sites in the central and southern Rocky Mountains and because of the desirable characteristics of the plant for long-term range seedings, Upper Colorado Environmental Plant Center (UCEPC) is investigating the potential of this species for a commercial release.

OBJECTIVE

To determine the cultural techniques and management practices necessary to develop a source of Thurber's fescue for commercial release.

METHODS

In July, 1998, Hal Pearce and Tom McClure of the White River National Forest, Meeker Field office approached UCEPC about producing a seed increase of Thurber's fescue because of its apparent tolerance to herbicide use and invasion by noxious weeds; particularly yellow toadflax. An agreement was drawn up where UCEPC would attempt to produce seed in a one-acre planting. The seeding was done by Hal Pearce of the U.S. Forest Service, and Rodney Dunham

and Steve Parr of UCEPC on July 17, 2002, with accession number 9024002 collected in the Hiner Springs area on the Buford-New Castle Road, Rio Blanco County, Colorado.

Although the seeding was irrigated, it did not establish well and the project was discontinued after one year. In 2006, plugs of the same seed source were produced in the greenhouse and transplanted to field 20 into a plot approximately 10 by 20 feet. This plot is presently producing seed.

On October 3, 2007, a Field Evaluation Planting was installed above old Snowmass, Colorado, that included Thurber's fescue. The site should support entry from slope, aspect, precipitation and elevational factors, but the accession has performed poorly there. The soils are derived from Mancos shale, and may not be conducive to Thurber's establishment. A seed germination test was done at the UCEPC greenhouse prior to the planting and the seed lot used had about 32% germination. Other products, both released and experimental, have done well on the site.

RESULTS

The following table represents the seed yield from this plot.

Thurber's Fescue Seed Production Yr	Yield
2007	190 g
2008	1.95 lb
2009	390 g

The source has not done well in its initial attempt at increase at UCEPC, nor has it performed as well as expected at the Snowmass Field Evaluation Planting, but we will continue to develop a source at UCEPC. The seed produced in the small plot will serve as the source seed for an increase effort. This seed has not been tested, but viability should be adequate enough to install a second planting.

CONCLUSION

The source has not done well in its initial attempt at increase at UCEPC, nor has it performed as well as expected at the Snowmass Field Evaluation Planting, but we will continue to develop a source at UCEPC. The seed produced in the small plot will serve as the source seed for an increase effort. This seed has not been tested, but viability should be adequate enough to install a second planting.

Project COPMC-T-0505-WL
Annual Report- 2009
By: Terri Blanke

Fringed Sage Seed Increase

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC) identified a number of native shrub species with different conservation attributes such as wildlife habitat improvement, windbreaks, restoration, landscaping, riparian enhancement, etc., since its inception in 1975. Fringed sage *Artemisia frigida* is a native half shrub recognized by UCEPC with potential for conservation practices and possibly a release. Fringed sage is a spreading shrublet 4 to 15 inches tall, pleasantly fragrant, with whitish or grayish tomentose stems which rise from a tough, woody crown. Tomentose means having dense, velvety, fuzzy hairs. The leaves are also tomentose and abundant, clustered toward the base, and scattered along the stem. The lower leaves are petiolate and upper leaves become sessile. The inflorescence is a panicle with small, greenish flower heads. Fringed sage flowers from July to August. Fringed sage grows in the open high plains, prairies and semi-disturbed sites. It has been found growing on some very dry harsh range sites.

OBJECTIVE

Determine capabilities for direct seeding; evaluate establishment success, seed production, and potential benefit in range and disturbed sited revegetation.

METHODS

Fringed sage *Artemisia frigida*, accession number 9021474, was collected from the Piceance Creek area of Rio Blanco County, Colorado. In 1994, a 0.01-acre field was planted with tublings that had been previously established in the UCEPC greenhouse. For additional information on that project see Dr. Gary Noller's project report 08S222 for 1995. The fringed sage field produced 1.80 pounds of cleaned seed that year. Total seed produced in the next six years was 26.80 pounds cleaned seed. The small field was plowed in 2001.

July 7, 2005, another 0.01-acre field of fringed sage was established. Seed previously harvested from UCEPC was used to produce tublings in the greenhouse. The fringed sage plugs were transferred to field 20 and seed was harvested in the fall of 2006.

On November 6, 2006, fringed sage, accession number 9021474, was entered into study number COPMC-T-0702-UR. This study was to determine the success of direct seeding some better performing shrubs under field conditions at UCEPC. Sixteen native shrubs were implemented into the study. The fringed sage seed that was used in this study had been previously harvested at UCEPC. For a complete list of species entered in the study, sources, plot plan, and results, see project report COPMC-T-0702-UR, 2007 and 2008.

Project COPMC-T-0505-WL
Annual Report-2009
By: Terri Blanke

RESULTS

The new 0.01-acre plot in field 20 produced seed for the 2007 and 2008 growing seasons. Table 1 below shows those results.

In spring of 2009, the 0.01-acre fringed sage plot was weeded by hand to control broadleaf invasives. Seed was harvested by hand in September and the pre emergent, Pendulum, was applied in October with a Scott's fertilizer spreader. This plot receives no supplemental irrigation.

Table 1. Fringed sage harvested seed amounts.

Forb	Scientific Name	Accession	Year	Acres	Harvest Date	Clean Amt
Fringed sage	*Artemisia frigida*	9021471	2006	0.01	09/26/06	2.45 lb
			2007	0.01	09/27/07	539 g
			2008	0.01	09/16/08	277 g
			2009	0.01	09/22/09	1.8 lb

CONCLUSION

Fringed sage accession number 9021471 has continually been one of the better performers in all plantings. The shrub has been tested in many off-site projects as well, Energy Fuels Coal Mine, Colowyo Coal Company, H and G Coal Mine, Coyote Draw Field Planting in Utah, and Pinedale Field Evaluations in Wyoming. The shrub has been easily propagated by seed or division of rootstock. The small bush provides valuable cover and serves as a major food source for the sage grouse. Fringed sage has many culturally significant purposes. UCEPC staff will continue to monitor, harvest, evaluate, and develop fringed sage to complete a release for use by the general public.

Project COPMC-T-0801-WL
Report-2009
By: Heather Plumb

Establishment of Chokecherry (9024060) from Direct Seeding

INTRODUCTION

Chokecherry is a woody, native perennial, deciduous, large erect shrub or small tree. Chokecherries have many uses including food for human consumption, wildlife food and habitat as well as for conservation plants. Accession 9024060 was collected in Rio Blanco County, Colorado, and has been growing at Upper Colorado Environmental Plant Center (UCEPC) since 1977.

OBJECTIVE

To determine establishment of chokecherry *Prunus virginiana* var. *melanocarpa*, accession 9024060, from direct seeding of various seed lots.

METHODS

Eight different seed lots of seeds collected at the UCEPC orchard were direct seeded on October 11, 2007. The plot size is 3 feet by 20 feet long. The seeds were planted with a hand operated one-row belt seeder at the rate of 18 seeds per linear feet of row. All seed lots used had the dry fruit pulp still attached. The following is the plot plan for the study. The years were abbreviated into two digits.

Plot Plan
West-↑

	Lot Nos.							
Block-III	97*	03	02	98	07	00	01	99
Block-II	99	07	00	02	03	01	98	97
Block I	02	98	99	00	01	97	03	07

RESULTS

2008

The study was evaluated in July 30, 2008. Most of the seed lots performed well except for the seed lot from year 2002 which had no seed germination (Table 1).

Table 1. Establishment of Chokecherry, Accession 9024060, from direct seeding.

Seed Lot (year)	Percent Plant Stand
2007	45
2000	43.3
2001	38.3
1999	35
2003	23.3
1997	15.7
1998	11.3
2002	0

2009

In 2009, accession 9024060 was released as Colorow Germplasm. No evaluation was performed on the direct seeding study in 2009. However, in early spring 2009 plants were hand dug from the plot to be shipped as bareroot stock to various NRCS field offices. Fifteen chokecherries were sent to Kaycee, Wyoming. Twenty were sent to Soda Springs, Idaho, and ten were shipped to Lewiston, Idaho.

CONCLUSION

Since this test was only evaluated one year information learned on this project is limited. However, UCEPC did establish that black chokecherry seed can be viable for up to almost ten years and direct seeding can be successfully accomplished. Future follow up on how the bareroot stock performed at the NRCS field office locations will be needed in the future. Since bareroot stock was dug from the plot, the project ended at the end of the 2009 growing season. This report will be the final report for this project.

Project COPMC-T-0802-RA
Report-2009
By: Terri Blanke and Heather Plumb

Space Planting of Salina Wildrye (9043501) *Leymus salinus*

INTRODUCTION

Salina wildrye has been identified as one of the most important grasses native to the Upper Colorado Region. It has been rated by the Upper Colorado Environmental Plant Center (UCEPC) Advisory Committee as a high priority for coal mined lands, roadside stabilization, surface disturbed areas, and areas of heavy use.

In 1993, vegetative samples for the accession 9043501 were sent to Utah State University for species confirmation. It was determined that accession 9043501 represents *Leymus salinus.*

Accession 9043501 has been under study at UCEPC for the past 20 years. It performed well in initial evaluations as well as in advanced evaluations; however, seed production in seed increase fields has been poor. Several studies have been conducted at UCEPC to enhance seed production but none have proven to solve the problem in order to release the accession. This study is another attempt to identify cultural practices that improve seed production of accession 9043501.

OBJECTIVE

To determine the effects of plant spacing or density on seed yield of salina wildrye accession number 9043501

METHODS

2008

On May 22, 2008, seed of accession 9043501 was started in plugs in the UCEPC greenhouse to later be transplanted in the space planting. Seven density treatments were planted on September 15-16, 2008. Single plots for the study consist of two rows on three-foot centers by 20 feet long. Table 1 presents the densities for the study.

Table1. Space Planting of Salina Wildrye (9043501)

Treatment(density)	Distance between Rows in feet	Distance within Rows in feet	Total Number of Plants/plot[1]	Plants/Acre
Density-1	3	1	40	14,520
Density-2	3	2	20	7,260
Density-3	3	3	14	5,082
Density-4	3	4	12	4,356
Density-5	3	5	10	3,630
Density-6	3	6	8	2,904
Density-7(Control)	3	30 PLS/foot*	1200	435,600

1. Plots are 6 x 20 feet with two rows/plot at three-foot centers

*Traditional way of seeding native seed for seed production; 30 Pure Live Seed/foot of row

Project COPMC-P-0802-RA
Report-2009
By: Terri Blanke and Heather Plumb

Following is the plot plan for the study:

Block-IV	**1**	**7**	**2**	**5**	**4**	**6**	**3**
Block -III	**2**	**1**	**7**	**4**	**6**	**3**	**5**
Block-II	**2**	**3**	**4**	**6**	**5**	**1**	**7**
Block I	**4**	**5**	**2**	**7**	**1**	**3**	**6**

North ↑

2009

The plot was heavily infested with purple mustard weed at the beginning of May 2009. The plot was brush hogged, sprayed with herbicide, and hand weeded until the purple mustard was under control. An evaluation in July was conducted on how the plugs were establishing. More plugs for the plot were started in the greenhouse in September of 2009.

RESULTS

On May 15, 2009, UCEPC staff observed that the weed, purple mustard, had taken over the salina wildrye plot. Although the plot seemed a failure, the plugs of salina were still alive. On May 18, 2009, the plot was sprayed with 4oz to the acre of Pursuit. Within a few days the purple mustard showed signs of herbicide damage. It was then decided to use a brush hog on the plot to cut down the purple mustard to give the salina plugs sunlight. On May 28, 2009, a sprinkler was placed in the plot for irrigation.

July 31, 2009, the plot was evaluated to see how the plot was after spraying and mowing. Some purple mustard remained, but was hand weeded and thrown out of the plot. Some of the treatments were damaged from the tractor, so no official evaluation was conducted. Instead, a plant count was taken to determine how many plugs needed to be replaced. A total of 72 plugs were necessary to replace those lost during establishment. On September 2, 2009, 100 plugs were started in the UCEPC greenhouse.

CONCLUSION

In the spring of 2010 additional plugs of salina wildrye will be planted into the plot and irrigation will be applied to the plot to help with establishment. The weeds will be monitored early on to help prevent an infestation again. The first evaluation will be conducted next year during the 2010 growing season.

Project COPMC-T-0803-RI
Report-2009
By: Terri Blanke

Native Shrub Propagation for Rawlins, Wyoming BLM

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC) has been in partnership with the Rawlins, Wyoming, Bureau of Land Management (BLM) for many years. Through this partnership, UCEPC and Rawlins, BLM, have met common objectives of helping to bring conservation, development and wise use to the land water and related resources. In September 2007, a one year informal purchase agreement was drafted between UCEPC and Rawlins, BLM. This agreement was for UCEPC to produce 500 containerized riparian shrubs for wildlife habitat restoration and riparian enhancement projects. The shrubs were to be ready for delivery in the fall of 2008. This report covers the activities by UCEPC for the collection, cleaning, and propagating four species of native riparian shrubs.

OBJECTIVE

Produce native riparian shrubs for restoration work, demonstration field planting trials, cutthroat trout habitat enhancement and propagation protocol development**.**

METHODS

Four materials were selected by Rawlins, BLM, for propagation dogwood *Cornus sericea*, water birch *Betula occidentalis*, golden currant *Ribes aureum*, and bearberry honeysuckle *Lonicera involucrata*. Andy Warren of Rawlins, BLM, committed to collecting water birch seed. UCEPC would collect honeysuckle seed from a local source in Rio Blanco County. Cuttings could be taken from dogwood growing at UCEPC and seed for the currant had been previously produced at the plant center.

November 8, 2007, Bob Lange, Rawlins, BLM, delivered water birch seed to UCEPC. The seed was cleaned in December and a germination trial was conducted in the greenhouse. Additional seed was placed into cold stratification.

Dogwood cuttings were taken late in the fall of 2007. They were treated with the rooting hormone, Hormex, for 30 seconds and inserted into a medium of three parts perlite and ¾ part vermiculite and ¼ potting soil. The cuttings were misted every eight hours for one minute.

Golden currant seed was stratified for 60 days and directly planted into 1″ x 9″ cones.

Bearberry honeysuckle seed was collected from the South Fork campground in Rio Blanco County. The fresh seed was pulverized in a blender and the pulp drained from the top. Fresh seeds were directly planted into 1″ x 9″ cones.

RESULTS

Water birch germination trial results were poor. Additional seed was placed into cold stratification. In March of 2008, 50% germination finally occurred. The water birch was picked-up in September of 2008.

The dogwood propagated by cuttings survived at about 60%. The first sign of leaves occurred about 1 month after cuttings were taken. The dogwood shrubs were from 12″ to 24″ when they were picked up in September 2008.

There was a possibility of a seed viability problem with the golden currant. An older lot was chosen for propagation and after several attempts, targeted numbers were reached. Currant was picked up by BLM staff in September of 2008 and May of 2009.

The bearberry honeysuckle had nearly 100% germination from fresh seed. Those plants were picked up by the staff from Rawlins, BLM, in May of 2009. Table 1 below shows specie and quantities produced for Rawlins, BLM.

Table 1. Native Riparian Shrub Production for Rawlins, BLM.

Common Name	Scientific Name	Target Qty	Delivered Qty	Adjusted Amt
Golden currant	*Ribes aureum*	100	103	+3
Honeysuckle	*Lonicera involucrata*	100	180	+80
R. dogwood	*Cornus sericea*	100	133	+33
Water birch	*Betula occidentalis*	200	125	-75
	Total	**500**	**541**	**41 additional**

CONCLUSION

UCEPC looks forward to the future production of native materials for various projects conducted by Rawlins, BLM. These projects enable UCEPC to continue the technology development studies needed to propagate and provide a continuous supply of native plant materials to the public.

Project: COPMC-T-0902-CP
Report- 2009
By: Heather Plumb

Adaptability of Tropic Sun Sunn Hemp

INTRODUCTION

'Tropic Sun' sunn hemp is a tropical or sub-tropical plant that was released by the Natural Resource Conservation Service and the College of Tropical Agriculture and Human Resources, University of Hawaii in 1982. Sunn Hemp has proven to be an excellent green manure and cover crop that greatly improves soil quality. As a cover crop, sunn hemp can produce between 5000 to 6000 pounds of biomass per acre and 120 to 140 pounds of nitrogen in 60 to 90 days. In an attempt to determine areas of the country that can utilize sunn hemp a nationwide study was set up to test the material at the 27 plant materials centers located throughout the country.

OBJECTIVE

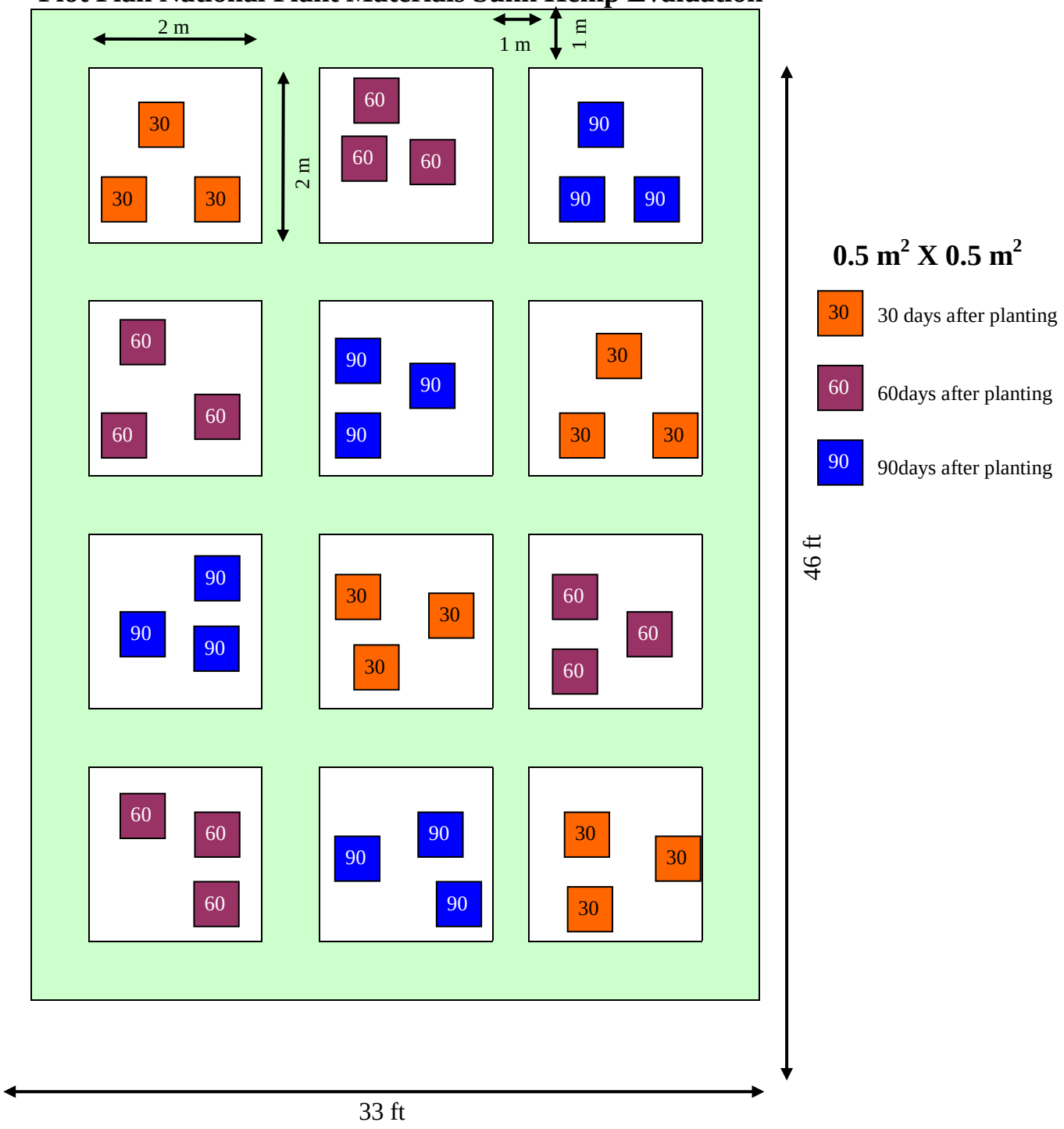
To determine biomass production of a tropical legume on a national scale as well as to determine the areas of the country with the potential to use sunn hemp for green manure and a cover crop.

METHODS

UCEPC was provided enough seed to plant a 33 x 46 foot planting block. Within the block sunn hemp seed was planted in twelve different 2 x 2 meter plots. The twelve plots were divided into three different growth periods that were replicated four times. Within each of the twelve plots three $0.5m^2$ x $0.5m^2$ samples were to be clipped. The following is a plot plan for the National Plant Materials sunn hemp project.

Project: COPMC-T-0902-CP
Report- 2009
By: Heather Plumb

Plot Plan National Plant Materials Sunn Hemp Evaluation



The block was laid out, prepared and sprayed with Roundup to help eliminate any weeds. Planting was to occur after the last chance of frost, but was delayed because of wet spring soil conditions. The block was planted using a belt seeder at a seeding rate of 50 lbs/acre on 8-inch row spacing's that were marked before planting occurred.

Twenty-four hours prior to planting, the sunn hemp seed was covered with inoculum, *Bradyrhizobium* sp. to help with germination. After planting a natural light rain shower occurred so irrigation of the plot took place several days after planting. Approximately every five days a sprinkler was placed in the block until germination occurred then irrigation became less frequent.

Clipping on the block was to occur 30 days, 60 days, and 90 days after planting date. These represented the three growth periods. One final harvest after the first frost occurred. Clipped materials were to be measured for height, weight, and were air dried.

RESULTS

The block was planted on July 30, 2009 with two attempts to plant the sunn hemp. UCEPC staff began planting in the morning, but the soil was too moist and the belt seeder kept clogging up with soil, so it was decided to make another attempt in the early afternoon. The afternoon planting was successful and the entire block was planted.

Sunn hemp plants began to emerge on August 8, 2009. The first clipping of the 30 day growth occurred on August 31, 2009. UCEPC staff measured, clipped, and took pictures of what few plants that had emerged. Clipped materials were weighed out, recorded, and placed in lunch paper sacks to dry. Average plant heights in the block for the 30 day clipping were 2.3 inches. The 60-day and 90-day clippings were not achieved. The first frost was recorded on September 22, 2009. On September 30, 2009, UCEPC staff clipped the plot for the after frost harvest. The average height for the block was 3.4 inches. The materials were weighed, pictures were taken, and samples were placed in lunch paper sacks. All data collected was sent to Ramona Garner for national data queries on the study.

CONCLUSION

The UCEPC during the months of May (2.13 inches) and June (3.64 inches) in 2009 received substantially above average precipitation for those months. The frost-free growing season in 2009 was 129 days as compared to the normal 90 day growing season. However, during this time 7.14 inches of precipitation was recorded. The 7.14 inches represented 43.8 percent of the total precipitation for the year. During the most crucial growing time UCEPC received more rain than normal. Because of this, it wasn't until the middle of July before staff was able to get into the field to plant. Perhaps getting such a late start on the planting put the plant far enough behind it could not catch up.

An additional reason for poor establishment might be the fluctuation in temperatures that UCEPC receives during the summer months. Average summer temperature during the day can reach into the high eighties sometimes low nineties, but at night temperatures can get down into the low forties. Tropical plants are not adapted to such fluctuating hot and cold temperatures, so establishment may have been hindered as a result.

The sunn hemp project was set up as a one year study. Results from the study will reflect data gathered for only one year and this is the only report on the UCEPC study.

Project: COPMC-T-0904-WL
Report- 2009
By: Heather Plumb

Germination, Establishment, and Production of Plants for Sage-Grouse

INTRODUCTION

Conserving what remains of greater sage-grouse populations has been and still remains a major challenge for the 11 Western states. Greater sage-grouse are found in California, Oregon, Washington, Idaho, Montana, Nevada, Utah, Colorado, North Dakota, South Dakota, Wyoming, and the Canadian provinces of Alberta and Saskatchewan. They currently occupy approximately 56 percent of their historical range. Sage-grouse inhabit a complex sagebrush ecosystem, which is home to a multitude of plant species. In an effort to aid in this conservation act Upper Colorado Environmental Plant Center (UCEPC) began, in the growing season of 2008, collecting known preferred sage-grouse plant materials.

OBJECTIVE

To determine commercial production potential of important components of sage-grouse habitat

METHODS

In the growing season of 2008, UCEPC began collecting known preferred sage-grouse plant materials. Plants collected were based off of observed sage-grouse diet habits and shelter needs. Materials that were concentrated on by the UCEPC collection team were; Lewis flax *Linum lewisii*, false dandelion *Agoseris glauca*, sego lily *Calochortus nuttallii*, sulfur buckwheat *Eriogonum umbellatum*, wild onion *Allium ascalonicum*, bluebunch wheatgrass *Pseudoroegneria spicata*, Sandberg's bluegrass *Poa secunda*, and basin wildrye *Leymus cinereus*.

In September 2008, a germination test was performed on all the collected material by UCEPC staff to be used in the sage-grouse study. The germination test results for all materials were excellent. In July 2009, UCEPC staff made the final decisions on what plant materials were going to be used in the small scale plot planting. The staff decided to use shrubs, grasses, and forbs; big sagebrush, silver sagebrush, basin wildrye, bluebunch wheatgrass, Sandberg's bluegrass, Utah sweetvetch Lewis flax, sulfur buckwheat, and wild onion.

During the first week of August 2009, the plot was measured out and sprayed with Roundup to kill any living weeds around the plot. On August 13, 2009, the 15 by 54 foot plot was planted with the nine plant materials. Each material had two rows that were five-feet long and three-feet wide. Irrigation was applied directly after planting to help with germination. The grasses were the first observed materials to germinate followed by a few of the forbs.

Project: COPMC-T-0904-WL
Report- 2009
By: Heather Plumb

RESULTS

On October 22, 2009, Terri Blanke and Heather Plumb evaluated the plot, measured and took pictures of the materials. All grasses had established as well as the sweetvetch and flax. The other four plant materials had no plants visible during the fall evaluation. The sages prior to planting were known species that would not germinate until the following year so their lack of presence was expected.

CONCLUSION

Further evaluations must be performed and planting protocols for the selected plant materials must be conducted in the future. Any materials that have not established by next year should be replanted or plugged into the plot. The greater sage-grouse is not listed on the endangered species list as of today; however it is on the candidates list for future action. Additional materials may be added to the project at a later time after the status of the greater sage-grouse has been re-evaluated.

Project COPMC-S-0802-CR
Annual Report – December 2009
By: Terri Blanke

BRYCE CANYON NATIONAL PARK
COOPERATIVE AGREEMENT

Project COPMC-S-0802-CR
Annual Report 2009

INTRODUCTION - Upper Colorado Environmental Plant Center (UCEPC) signed Interagency Agreement 1211-08-010 with Bryce Canyon National Park (BCNP), USDA Natural Resources Conservation Service, Colorado, and NPS Denver Service Center, in July 2008. The agreement calls for the establishment of a 0.5 acre field of nodding brome grass *Bromus anomalus* with production through September 30 of 2011. The agreement includes maintenance, harvest, processing, testing, storage, and shipment upon request of the resulting seed.

OBJECTIVE - The intent of the agreement is for UCEPC to produce seed of native, indigenous species for revegetation purposes on disturbances within Bryce Canyon National Park.

ACTIVITIES - In July 2008, Russ Haas hand delivered 35 lb of nodding brome *Bromus anomalus* seed to UCEPC. This seed had been previously grown by UCEPC in the year 2004. Three pounds of nodding brome seed was pre-treated in a slurry mixture of water and 1.8 to 2 ml Difenoconazole (Dividend). The treatment was applied to help protect against smut. On August 21, 2008, sixteen rows were planted with the three pounds of nodding brome seed to establish a 0.5 acre field. Planting was accomplished by hand with the use of a Planet Jr. at a rate of thirty seeds per linear foot. The fall planting was agreed upon by both BCNP and UCEPC in order for the plants to be established and produce seed in 2009. On July 16, 2009, five northern rows in the brome field were treated with Metsulfuron (Escort) for prostrate pigweed. July 29, 2009, the field was swathed as a harvest method and produced 25 lb of nodding brome grass seed (10.8 PLS). Seed samples were hand collected from five rows treated with the herbicide, Escort, and collections were taken from areas that were left un-treated. The samples were tested for germination in the UCEPC greenhouse. Tests results showed that the Escort treated seed had 45% germination and the non-treated seed had 90% germination. Colorado Seed Laboratory results indicated 45% germination for the entire seed lot.

PLANT PRODUCTION - UCEPC currently has twenty two shrubs that are available for delivery to BCNP. The production and delivery of these shrubs, antelope bitterbrush, black sagebrush, and Parry's rabbitbrush will complete all components of agreement 1211-04-004.

SEED PRODUCTION -The following quantities of seed have been produced for Bryce Canyon:

Species	**Scientific Name**	**Fiscal Year**	**Bulk lb**	**PLS lb**
Nodding brome	*Bromus anomalus*	1999-2005	409.4	186
	(0.5 acre new field)	2009	25	11
Slender wheatgrass	*Elymus trachycaulus*	1999-2005	2258.5	1598

DISCUSSION - There is a possibility that the application of the herbicide, Metsulfuron (Escort) has some effect on the seed's germination process. The test results from Colorado Seed Laboratory were comparable to those discovered in the UCEPC greenhouse. Seed of prostate pigweed, treated with Escort from the nodding brome field, was also tested. No germination occurred, whatsoever. Bryce Canyon's current seed inventory, delivery and Laboratory Analysis reports are available upon request.

Project COPMC-S-0803-CR
(IA No. 1211-08-003)
Annual Report 2009
By: Heather Plumb

CANYON DE CHELLY NATIONAL MONUMENT
COOPERATIVE AGREEMENT

Project COPMC-S-0803-CR
(IA No. 1211-08-003)
Annual Report 2009
By: Heather Plumb

INTRODUCTION - In February of 2008, an interagency agreement was signed between the National Park Service, Canyon de Chelly National Monument (CDCNM) of the U. S. Department of Interior and the Natural Resources Conservation Service (NRCS). The Interagency Project Number IA1211-08-003 calls for NRCS Upper Colorado Environmental Plant Center (UCEPC) to produce seed of two native plant species, Indian ricegrass *Achnatherum hymenoides*, and western wheatgrass *Pascopyrum smithii*. Seed used to establish the production fields came from native seed stock collected at the monument. The agreement stipulates that that UCEPC will produce 50 pounds of pure live seed (PLS) of Indian ricegrass and 50 PLS pounds of western wheatgrass. This agreement will remain in effect until September 30, 2010.

ACCOMPLISHMENTS - Seed collections of western wheatgrass from CDCNM in 2007 were insufficient to meet the required amounts necessary for direct seeding a production field. However, for the 2009 growing season it was decided to plug the field of western wheatgrass using the 91 grams of seed collected by CDCNM in 2007. A total of 7000 plugs were grown in the UCEPC greenhouse and were transplanted into the field on June 30, 2009. Water was applied as needed to help ensure plug establishment. During the summer of 2009 additional western wheatgrass seed was collected by CDCNM and was sent to UCEPC to be cleaned. From the collection UCEPC cleaned 6.4 pounds of seed. On November 6, 2009, sixteen additional rows of western were directly seeded in the established field using 1.17 pounds of the 2009 collected material. A total of 1.27 acres of western wheatgrass is currently in production.

The Indian ricegrass field that was planted on October 8, 2008, had poor establishment and was reseeded using additional seed collected by CDCNM during the 2009 growing season, resulting in 1.73 acres. Currently there are three acres total in production for the monument.

PLANT PRODUCTION - On April 9, 2009, UCEPC staff weighed out and calculated precisely the seeding rate to achieve seven thousand plugs of western wheatgrass. Using the 2007 seed collection of 91 grams, it was determined that each container would be planted with three seeds each. Trays of material were reseeded several times until the desired amount of plugs was achieved. Plugs were transplanted into the field using a transplanter designed to be pulled behind a tractor. The transplanter dug furrows approximately six inches in depth allowing adequate room for plugs to be placed into the furrows. As the transplanter moved down the field, two back wheels covered the open furrows and plugs. The western wheatgrass field had established well at the end of the 2009 growing season.

No seed was harvested from the western wheatgrass or the Indian ricegrass fields during the 2009 growing season due to summer field establishment.

Project COPMC-S-0804-IN
(IA No. F739008005)
Annual Report 2009

CANYON DE CHELLY NATIONAL MONUMENT
COOPERATIVE AGREEMENT

Project COPMC-S-0804-IN
(IA No. F739008005)
Annual Report 2009

INTRODUCTION - This report is in reference to sub agreement IA No-F739008005.
In June of 2008, an interagency agreement was signed between the National Park Service, Canyon de Chelly National Monument (CDCNM) of the U. S. Department of Interior and the Natural Resources Conservation Service (NRCS). The agreement calls for Upper Colorado Environmental Plant Center (UCEPC) to produce seed of two native species; Indian ricegrass *Achnatherum hymenoides*, and western wheatgrass *Pascopyrum smithii* from native seed stock collected at the monument. The agreement stipulates that UCEPC will establish two acres of Indian ricegrass and one acre of western wheatgrass. This agreement will remain in effect until September 30, 2011.

OBJECTIVE - The intent of the agreement is for UCEPC to produce seed for revegetation purposes within Canyon de Chelly National Monument.

ACCOMPLISHMENTS - In 2009, a field of western wheatgrass for CDCNM was established using a collection made by CDCNM in 2007. The collection of western wheatgrass was only 91 grams making direct seeding the field impossible, so it was decided to grow plugs and establish the field by transplanting. Seven thousand plugs were grown in the UCEPC greenhouse and were transplanted into the field on June 30, 2009. During the summer of 2009 additional western wheatgrass seed was collected by CDCNM and was sent to UCEPC to be cleaned. From the collection UCEPC cleaned 6.4 pounds of seed. On November 6, 2009, sixteen additional rows of western were directly seeded next to the established plugged field using 1.17 pounds of the 2009 collected material. Currently 1.27 acres of western wheatgrass is in production at UCEPC.

The Indian ricegrass field that was planted in the fall of 2008 had poor establishment. The field was reseeded in October 2009 and 14 rows were added to the field resulting in 1.73 acres of Indian ricegrass. Additional seed of Indian ricegrass was also collected during the summer of 2009 by CDCNM and was used to increase field production of the existing field.

PLANT PRODUCTION – On April 9, 2009, UCEPC staff weighed out and calculated precisely the seeding rate to achieve seven thousand plugs of western wheatgrass. Using the 2007 seed collection of 91 grams, it was determined that each container would be planted with three seeds each. Trays of material were reseeded several times until the desired amount of plugs was achieved. Plugs were transplanted into the field using a transplanter designed to be pulled behind a tractor. The transplanter dug furrows approximately six inches in depth allowing for adequate room for the plugs to be placed into the furrows. As the transplanter moved, two back wheels covered the furrows and the plugs.

No seed was harvested from the western wheatgrass or the Indian ricegrass fields during the 2009 growing season.

Project COPMC-S-0801-IN
Annual Report – December 2009
By: Steve Parr

DINOSAUR NATIONAL MONUMENT
COOPERATIVE AGREEMENT

Project COPMC-S-0801-IN
Annual Report – December 2009

INTRODUCTION - This report covers the activities conducted by Upper Colorado Environmental Plant Center (UCEPC) for the Dinosaur National Monument (Dinosaur) Plant Materials Agreement in 2009. The agreement was initiated in September of 1996 and was most recently amended in 2008. These agreements involve collecting and increasing grass species native to Dinosaur. One grass seed field (western wheatgrass 9070955) was removed in 1999 and a new planting of the same species (9092278) was planted in 2008. These grasses will be used for restoration and to prevent non-indigenous weedy plants from invading. Personnel from Dinosaur came to the UCEPC in 2009. Seed fields were observed and the seed stored for Dinosaur was reviewed. Seed was harvested from all seed fields except western wheatgrass in 2009. Some seed was provided in 2009 to Dinosaur for experimental work.

TARGETED SPECIES OF GRASS

Common Name	**Number**	**Scientific Name** (Old)
Alkali sacaton	9070954	*Sporobolus airoides*
Bluebunch wheatgrass	9070952	*Pseudoroegneria spicata ssp. spicata* (*Agropyron spicatum)*
Great basin wildrye	9070951	*Leymus cinereus* (*Elymus cinereus)*
Indian ricegrass	9070953	*Oryzopsis hymenoides*
Western wheatgrass	9070955 9092278 (2008)	*Pascopyrum smithii* (*Agropyron smithii*)

ACTIVITIES - Seed fields were planted on November 5 and 6, 1997, and one additional field was added on July 20, 1998. In addition, one seed field (western wheatgrass) was removed in 1999, reducing the number of seed fields to four. Two seed fields (Indian ricegrass and alkali sacaton) were interseeded in 1999, to improve stands. An additional planting of bluebunch wheatgrass was planted in 2001 due to the poor appearance of the field and no seed production in 2001. The original planting of bluebunch wheatgrass was removed after harvest in 2005. A new planting of western wheatgrass (9092278) was planted in 2008. Table 1 lists the seed from Dinosaur stored at the UCEPC. The following updates the seed fields through 2009.

1. Indian ricegrass - November 5, 1997 - planted 8 rows (0.24 acre) - field 4 - planted at rate of about 30 seeds per foot of row - total seed lot (1.42 lb) used. Harvested light seed crop (52.0 g), September 8, 1998 - moderate to good stand November 20, 1998. Harvested July 14, 1999, produced 1.24 lb clean seed. Harvested July 3, 2000, produced 0.97 lb clean seed. Harvested July 9, 2001, produced 0.97 lb clean seed. Harvested July 2, 2002, produced 3.6 lb clean seed. Harvested July 11, 2003, produced 8.0 lb of clean seed. Harvested July 8, 2004, produced 10.0 lb of clean seed. Harvested July 12, 2005, produced 12.0 lb clean seed. Harvested July 3, 2006, produced 5.6 lb of clean seed.

Harvested June 28 – July 13, 2007, produced 8.0 lb of clean seed. Harvested July 10, 2008, produced 6.6 lb clean seed. Harvested July 8, 2009, produced 39 lb clean seed.

2. Bluebunch wheatgrass - November 5, 1997 - planted 8 rows (0.24 acre) - field 1 - planted at rate of about 30 seeds per foot of row - had few seed heads 1998, no harvest - good stand November 20, 1998. Harvested July 20, 1999, produced 16.5 lb clean seed. Harvested July 12, 2000, produced 1.4 lb clean seed. Not harvested in 2001. November 16, 2001, planted 6 rows (0.18 acre) at a rate of about 30 seeds per foot of row (0.35 lb planted), field 1, just south of original planting. New planting had good stand 2002, no harvest. Harvested old stand July 12, 2002, produced 300 g clean seed. Harvested both plantings July 16, 2003, produced 32.0 lb clean seed. Harvested July 14, 2004, produced 25.5 lb clean seed. Harvested July 20 and 21, 2005, produced 13.0 lb of clean seed. The original 8 rows of this planting were removed after 2005 harvest due to off types. Field now 0.18 ac – Harvested July 5, 2006, produced 10.8 lb of clean seed. Harvested July 9 – 13, 2007, produced 18.0 lb of clean seed. Harvested July 16, 2008, produced 18.5 lb clean seed. Harvested July 20, 2009, produced 14 lb clean seed.

3. Western wheatgrass - November 6, 1997 - planted 8 rows (0.24 acre) - field 6A - planted at rate of about 20 seeds per foot of row, due to small quantity of seed and rhizomatous habit of species. Noted some off-type plants in 1998, will rouge these out in 1999 - few seed heads 1998, no harvest - excellent stand with numerous sprouts November 20, 1998. Field had numerous off type plants 1999, field plowed. New field, 0.3 acre, planted September 8, 2008. No production in 2009.

4. Basin wildrye - November 6, 1997 - planted 8 rows (0.24 acre) - field 8A - planted at rate of about 30 seeds per foot of row. Few seed heads fall 1998, no harvest - excellent stand November 20, 1998. Harvested August 5, 1999, produced 29.0 lb clean seed. Harvested July 25, 2000, produced 5.5 lb of clean seed. Harvested July 17, 2001, produced 10.8 lb of clean seed. Harvested July 23, 2002, produces 25.0 lb. clean seed. Harvested July 25, 2003, produced 52.0 lb clean seed. Harvested July 28, 2004, produced 43.0 lb of clean seed. Harvested August 4 and 5, 2005, produced 37.0 lb of clean seed. Harvested July 24, 2006, produced 74.0 lb of clean seed. Harvested July 21, 2007, produced 83.0 lb of clean seed. Harvested July 28, 2008, produced 36.0 lb of clean seed. Harvested July 31, 2009, produced 54.0 lb of clean seed.

5. Alkali sacaton - July 20, 1998 - planted 6 rows (0.18 acre) - field 4 - planted at a rate of about 30 seeds per foot of row - noted seedlings on September 2, 1998 - fair stand November 20, 1998. Harvested September 1, 1999, produced 99 g of clean seed. Harvested two seed crops in 2000 (July 12 and September 11), produced 2.4 lb clean seed. Harvested two seed crops in 2001 (July 18 and September 14), produced 13.0 lb of clean seed. Harvested two seed crops 2002 (July 17 and September 10), produced 6.2 lb clean seed. Harvested only once on August 4, 2003, produced 6.0 lb clean seed. Harvested two seed crops July 16 and September 10, 2004, produced 8.0 lb clean seed. Harvested August 9, 2005, produced 2.0 lb of clean seed. Harvested July 18, 2006, produced 88.0 g of clean seed. Harvested July 13 – 19, 2007, produced 354.0 g of clean seed. Harvested July 18, 2008, produced 160.0 g of clean seed. Field removed.

6. Western wheatgrass (9092278) – September 8, 2008, planted 12 rows (0.30 acre) – field 7 – 7A, planted at a rate of approximately 30 seeds per foot of row.

SEED SHIPMENTS

The following seed was provided to Dinosaur in 2009:

SPECIES	LOT NUMBER	POUNDS OF SEED
Alkali sacaton	SCO-04-UC4 Dino	0.39
Bluebunch wheatgrass	SCO-08-UC1 Dino	2.28
Indian ricegrass	SCO-04-UC4 Dino	2.18
TOTAL:		**4.85**

SUMMARY

1. A cooperative agreement between Dinosaur and UCEPC was initiated in September of 1996 and most recently amended in 2008.

2. The agreement involved the collection, evaluation, and increase of grasses native to Dinosaur. Four seed fields are now grown for seed production.

3. Seed fields were planted in November 1997 for four contract species and the final seed field (alkali sacaton) was added in July 1998.

4. The western wheatgrass seed field was plowed in 1999, due to numerous off type plants.

5. Two seed fields (Indian ricegrass and alkali sacaton) were interseeded in 1999, to improve stands.

6. A new planting of bluebunch wheatgrass was planted in 2001, and had a good stand in 2002, but was not harvested. The original planting did produce seed in 2002. Both plantings were harvested in 2003, 2004, and 2005. The original eight rows were removed after the 2005 harvest. The planting now has 0.18 ac.

7. Dinosaur personnel came to the UCEPC in 2009. Seed fields and seed stored for Dinosaur were reviewed.

8. Seed crops were harvested from three seed production fields in 2009.

Table 1. A listing of seed from Dinosaur by species and year of harvest stored at the UCEPC. * Germination was updated on these materials in 2008.

SPECIES	YEAR	BULK	PLS
Alkali Sacaton	1999 harvest	99.00 g	no test
	2000 2-harvests	2.40 lb	0.70 lb
	2001 " "	13.00 lb	1.50 lb
	2002 " "	6.20 lb	4.50 lb
	2003 1-harvest	6.00 lb	2.40 lb
*	2004 2-harvests	8.00 lb	2.92 lb
	2005 1-harvest	2.00 lb	0.08 lb
	2006- " "	88.00 g	no test
	2007- " "	354.00 g	no test
	2008- " "	160.00 g	no test
	Field Plowed		
Basin wildrye	1997 (park collected)	10.69 lb	8.60 lb
	1999 harvest	29.00 lb	25.70 lb
	2000 "	5.50 lb	4.00 lb
	2001 "	10.80 lb	7.40 lb
	2002 "	25.00 lb	17.60 lb
	2003 "	52.00 lb	42.60 lb
	2004 "	43.00 lb	31.10 lb
*	2005 "	37.00 lb	24.36 lb
	2006 "	74.00 lb	30.30 lb
	2007 "	83.00 lb	55.00 lb
	2008 "	36.00 lb	no test
	2009	54.00 lb	28.62 lb
Bluebunch wheatgrass	1997 (park collected)	0.46 lb	no test
	1999 harvest lot 1	10.50 lb	8.40 lb
	lot 2	6.00 lb	3.60 lb
	2000 harvest	1.40 lb	0.80 lb
	2002 (old planting)	300.00 g	215.00 g
	2003 (both plantings)	32.00 lb	25.90 lb
	2004 (both plantings)	25.50 lb	21.62 lb
	2005 (both plantings)	13.00 lb	9.50 1b
	2006 (new planting)	10.80 lb	9.10 lb
	2007 (new planting)	18.00 lb	15.32
	2008 (new planting)	18.50 lb	no test
	2009	14.0 lb	8.54 lb
Indian ricegrass	1997 (park collected)	8.00 g	no test
	1999 harvest	1.24 lb	0.80 lb
	2000 "	0.97 lb	0.30 lb
	2001 "	0.97 lb	0.50 lb
	2002 "	3.60 lb	1.15 lb
	2003 "	8.00 lb	3.60 lb
	2004 "	10.00 lb	3.80 lb
*	2005 "	12.00 lb	5.23 lb
	2006 "	5.60 lb	3.80 lb
	2007 "	8.00 lb	4.97 lb
	2008 "	6.60 lb	no test
	2009	39.00 lb	4.13 lb

Project COPMC-S-0704-CR
Annual Report 2009
By: Steve Parr

GRAND TETON NATIONAL PARK
COOPERATIVE AGREEMENT

Project COPMC-S-0704-CR
Annual Report 2009

INTRODUCTION - This report covers the activities related to the cooperative agreement between Upper Colorado Environmental Plant Center (UCEPC) and Grand Teton National Park (Teton). The fully executed agreement, Interagency Agreement 1211-07-002, was formally signed in April of 2007 and then amended in April of 2009 for the continued production of a single species, slender wheatgrass.

ACTIVITIES - A field was established on August 23, 2005, as part of a previous agreement. After completing the previous agreement, it was decided to extend the production of the crop through the execution of a new agreement, which is referenced above. This field produced 617 clean pounds of seed in 2007, then 449 clean pounds in 2008 and 167 pounds in 2009. The field is past its production life and will be removed.

On July 30, 2009, seed was delivered by Steve Parr and Heather Plumb to John Money at Teton in Moose, Wyoming. In all, 896 pounds of seed were delivered for revegetation projects within Teton. The table below identifies the delivered seed.

SPECIES	LOT NUMBER	POUNDS OF SEED
Basin wildrye	SCO-03	151.0
	SCO-04	60.0
Blue wildrye	SCO-03	8.50
	SCO-04	15.5
	SCO-05	70.0
Bluebunch wheatgrass	SCO-03	25.0
	SCO-04	30.0
	SCO-01	12.2
Slender wheatgrass	SCO-04	231.0
	SCO-05	293.0
TOTAL:		**896.2**

CONCLUSION - There has been no discussion on new production of this or any other material for Teton in the future by UCEPC. The completion of this agreement ends a relationship of seed and plant production, with few interruptions, by UCEPC for Teton that has existed since 1988.

After touring several of the project sites within Teton where UCEPC produced products have been seeded, and seeing the establishment and growth of these materials as intended, brings to view the benefits of this long established cooperative agreement for plant material production from park collected seed.

From UCEPC's perspective, this has been a very good relationship. There remains on inventory seed of five previously produced species under separate agreements. The mountain brome seed is the oldest, being produced in 2000. The remainder of the materials was produced from 2001 through 2009 and should be used before substantial loss of germination occurs. Since UCEPC is no longer engaged in an agreement with Teton, seed will be stored at no cost until September 30, 2012. Beginning fiscal year 2013, storage fees will apply if a new agreement is not initiated.

Project COPMC-S-0307-CR
Annual Report 2009
By: Heather Plumb

GREAT SAND DUNES NATIONAL PARK AND PRESERVE COOPERATIVE AGREEMENT

Project COPMC-S-0307-CR
Annual Report 2009

INTRODUCTION - This report updates the activities of Upper Colorado Environmental Plant Center (UCEPC) for the growing season of 2009, as they relate to Interagency Project Number IA1211-09-004 for the production of seed materials for Great Sand Dunes National Park and Preserve (GSD). This agreement was signed into effect in April 2009 and will remain in effect until September 2011. The agreement calls for the production of two plant materials, ring muhly *Muhlenbergia torreyi* and Indian ricegrass *Achnatherum hymenoides* for revegetation uses within the park.

OBJECTIVE - The intent of the agreement is for UCEPC to produce seed for revegetation purposes within Great Sand Dunes National Park and Preserve.

ACCOMPLISHMENTS - At the end of the 2008 growing season, it was decided to discontinue the *Bouteloua gracilis* blue grama field that was in production at UCEPC. However, GSD wanted to salvage some of the plants to be used in a revegetation planting at the new visitor's center. On May 15, 2009, Phyllis Bovin and Josh Heise came to UCEPC to help staff members harvest approximately 700 linear feet (0.0317 acre) of blue grama plants. To harvest the blue grama a UCEPC plant lifter was used to extract the sod clumps. To uproot the plants the plant lifter has a rigid blade that was lowered into the soil approximately eight inches. The blade was then pulled through the soil undercutting the blue grama roots. After the roots were cut the vibrating motion of the lifter helped loosen any soil around the root balls of the extracted plants. GSD and UCEPC employees helped remove any additional soil from the root balls so they could easily be loaded onto the pick-up and trailer brought by GSD staff. The plants were watered and covered with large burlap bags to prevent them from drying out on the trip back to the park.

On August 13, 2009, Josh Heise delivered 19 collections of Indian ricegrass to UCEPC, collected during the summer of 2009 by GSD employees. The seed was cleaned by UCEPC staff resulting in 6.2 lb of clean seed.

Growing Season 2009- The one-acre field of blue grama was tilled up after sod was harvested by UCEPC and GSD staff. Indian ricegrass and ring muhly were maintained as in previous years. Ring muhly and Indian ricegrass fields were harvested; seed was cleaned, and stored at UCEPC.

SEED PRODUCTION Growing Season 2009 - Seed production for the ring muhly and Indian ricegrass for the 2009 growing season is presented in the following table. Seed lab test results are available upon request from UCEPC.

Table 1. Seed Production for Great Sand Dunes National Park and Preserve for 2009

Species	Scientific Name	Production Acres	Harvest Date	Clean Seed Weight	PLS
Blue grama	*Bouteloua gracilis*	1.0	5/15/2009	700 linear feet of plants	NA
Indian ricegrass	*Achnatherum hymenoides*	0.5	7/8/2009	32 lbs	20.93%
Ring muhly	*Muhlenbergia torreyi*	0.2	9/30/2009	3.4 lbs	31.35%

CONCLUSIONS - According GSD personnel, the harvested blue grama plants were transplanted successfully to the GSD's visitor center. Next year GSD staff will have to evaluate if the plants survived the winter.

When comparing seed lab results from the last five years for the Indian ricegrass field, it's been observed that PLS, after the first three years of production, has decreased. The first three years consistently had above 40 percent PLS. However, the last two years of production PLS has been below 20 percent, 12 percent being the lowest in 2008. The Indian ricegrass field has not had high PLS results and has shown to be a mediocre live seed producer.

The ring muhly field has been in production for three years. Its seed quantities and PLS results have fluctuated drastically over that period of time. Since the ring muhly has only been in production for a short period of time any conclusions for the fluctuating results is indeterminable at this time.

Project COPMC-S-0703-CR
Annual Report – December 2009
By: Terri Blanke

MESA VERDE NATIONAL PARK
COOPERATIVE AGREEMENT

Project COPMC-S-0703-CR
Annual Report – December 2009

INTRODUCTION - Upper Colorado Environmental Plant Center (UCEPC) and Mesa Verde National Park (MVNP) signed Interagency Agreement 1211-07-006 in August of 2007. The new agreement was for the propagation of approximately 415 PLS lb of a native erosion seed mix from the following species; muttongrass *Poa fendleriana*, slender wheatgrass *Elymus trachycaulus*, western wheatgrass *Pascopyrum smithii*, salina wildrye *Leymus salinus*, Indian ricegrass *Achnatherum hymenoides*, needle and thread *Hesperostipa comata*, yarrow *Achillea millefolium*, and Louisiana sage *Artemisia ludoviciana.* Seed for the project would utilize previously produced seed at UCEPC or was to be collected by MVNP staff as it became available in the fall of 2007-2008. This contract was for production through September of 2009.

Agreement 1211-07-006 was amended in June of 2009. Due to small amounts of seed collected and poor germination results for the Indian ricegrass *Achnatherum hymenoides* and needle and thread *Hesperostipa comata*, the half-acre field of Salina wildrye *Leymus salinus*, UCEPC accession # 43501, would be increased to one acre.

OBJECTIVE - The objective of this agreement is for UCEPC to produce a native seed mixture for revegetation of the areas disturbed by road construction. The seed mixture will consist of species indigenous to the main entrance road, Hwy 160, to MVNP, will have the best chance at survival and will be helpful in improving the drainage and erosion problems along the road.

ACTIVITIES - Germination tests were conducted in the UCEPC greenhouse on the small amounts of seed collected for Indian ricegrass (185 cleaned grams) and needle and thread (63 cleaned grams). The Indian ricegrass had zero germination. The needle and thread had only 36%. From those results the decision to increase production of Salina wildrye was agreed upon by both UCEPC and MVNP.

Achillea millefolium - Mesa Verde's 0.02-acre field of yarrow was inner-seeded by hand in April 2009 to bring the field to 100% establishment. The yarrow was weeded and irrigated as needed until it was harvested by hand on September 1, 2009. The planting produced 0.84 lb of bulk material. PLS is not known at this time. On October 20, 2009, the yarrow plot was treated with the granular pre-emergent herbicide, Pendulum, at the rate of 25 lb to ¼ acre. The herbicide was applied by hand with a Scott's fertilizer spreader.

Artemisia ludoviciana - The 0.02-acre field of Louisiana sage was inner-seeded by hand on April 30, 2009, for 100% establishment. The sage was weeded by hand and watered as necessary until it was hand harvested on September 23, 2009. A total of 5 lb of bulk material (2.71 PLS) was produced by the sage plot. On October 20, 2009, the sage plot was treated with the granular pre-emergent herbicide, Pendulum, at a rate of 25 lb to the ¼ acre.

Elymus trachycaulus **-** The 0.5-acre field of slender wheatgrass was harvested on July 13, 2009, and produced 118 lb of bulk material. PLS is not known at this date. The slender field was hand weeded and irrigated as needed

***Leymus salinus* -** On August 11, 2009, the one-acre field of Salina wildrye was planted by hand with a Planet Jr. at a seeding rate of 40 seeds per linear foot. A three pound blend of UCEPC's accession # 43501, Salina wildrye seed, was used for the planting. One pound of 2003 produced, breeders seed, one pound of 2005 produced, breeders seed and one pound of 2008 produced, foundation seed. The new field had emergence by fall. The northern eight rows were treated with the herbicide, 2, 4- Dichlorophenoxyacetic acid, (2-4-D) for winter annual invasives. The application rate equates to 1.5 pints per acre or 24 ounces of 2-4-D mixed with 35 gallons of water.

***Pascopyrum smithii* -** On August 7, 2009, the one-acre field of Western wheatgrass was harvested and produced 274 lb of bulk seed. PLS is not known at this date. The field was hand weeded and irrigated as needed.

***Poa fendleriana* -** The 0.5-acre of muttongrass was harvested with the Kincaid harvester on June 9, 2009. Total muttongrass seed harvested was 1.71 lb bulk material. PLS is not known at this time. The field was hand weeded and irrigated as needed.

RESULTS - The table below shows targeted species, contracted quantities, acreage planted and PLS production.

	Planting			**Contract Qty**	**Production**	
Scientific Name	**2007**	**2008**	**2009**	**PLS lb**	**2008**	**2009**
Achillea millefolium	*0.02*	Replant	Re-seed	5	-	0.84 bulk lb
Artemisia ludoviciana	*0.02*	Replant	Re-seed	5	-	2.71 PLS lb
Elymus trachycaulus	*0.5*	Est.	Produced	100	618 bulk g	118 bulk lb
Leymus salinus	*1.0*	NA	Est.	100	-	NA
Pascopyrum smithii	*1.0*	Est.	Produced	200	343 bulk g	274 bulk lb
Poa fendleriana	*0.5*	Est.	Produced	5	-	1.71 bulk lb
Total	**3.04 acres**			**415**		

SUMMARY - Interagency Agreement 1211-07-006 was complete in September of 2009. Since salina wildrye was planted in 2009, it is assumed that at least part of this agreement will be extended. Production of containerized materials will continue in 2010 to meet a shortfall from a previous agreement. Needle and thread, pinyon pine and woods' rose, currently planted in the UCEPC compound yard, are available for delivery to MVNP at their request. This will complete all components of the previous agreement 1211-00-003. Mesa Verde live seed, plant inventory and Colorado Seed Laboratory results are available upon request.

Project COPMC-S-0308-CR
Annual Report - December 2009
By: Steve Parr

ROCKY MOUNTAIN NATIONAL PARK
COOPERATIVE AGREEMENT

INTRODUCTION - Upper Colorado Environmental Plant Center (UCEPC), Rocky Mountain National Park (ROMO), and the USDA Natural Resources Conservation Service (NRCS), signed a cooperative plant materials agreement (IA Project No. 1211-08-001) in May 2008. This agreement adds two species for seed increase activities to previously produced materials from an earlier agreement between these same entities. This agreement involves seed production of five forbs and five grass species for revegetation of the Bear Lake Road Project. The Bear Lake Road Project involves widening Bear Lake Road by two feet for ten miles, adding pullouts and retaining walls, widening switchbacks, and expanding some of the parking lots. This will amount to 20 acres of disturbance with an elevation change of 1500 feet. The first of two phases was completed in December 2005. Seed production of the same species has been identified for use in the second phase along with the addition of two new species in 2008.

Bear Lake Road Project

Common Name	Scientific Name	Symbol	Accession
Grasses			
Blue grama	*Bouteloua gracilis*	BOGR	9070991
Bottlebrush squirreltail	*Elymus elymoides*	ELEL	
Junegrass	*Koeleria macrantha*	KOCR	9070962
Mountain muhly	*Muhlenbergia montana*	MOMU	9070957
Needle and thread	*Stipa comata*	STCO	9070977
Forbs/Legumes			
Fringed sage	*Artemisia frigida*	ARFR	9070993
Hairy goldenaster	*Heterotheca villosa*	HEVI	9070992
Purple locoweed	*Oxytropis lambertii*	OXLA	9070989
Pussytoes	*Antennaria sp*	ANSP	
Spreading goldenbanner	*Thermopsis divaricarpa*	THDI	9070990

ACTIVITIES - This year, eight of the eight established materials were harvested for use in the revegetation of the Bear Lake Road Project. Three forbs, hairy goldenaster, purple locoweed, and fringed sage all produced good quantities of seed and accounted for 47.9 pounds of clean seed. A fourth forb, goldenbanner, produced just 1.7 pounds of seed. The four grasses produced 43.4 clean pounds of seed, with limited production of prairie Junegrass. Fourteen pounds of seed were harvested from needle-and-thread, 3.0 pounds of prairie Junegrass and 17 pounds of mountain muhly. Blue grama, which has been an inconsistent product at UCEPC, produced 9.4 pounds of clean seed. Fringed sage continues to be a good producing species. This year, UCEPC harvested 10.4 clean pounds of seed from a plot. Also productive in volume in 2009, was hairy goldenaster with 22 clean pounds of seed and the purple locoweed with 15.5 pounds.

On August 22, 2008, a 0.017-acre plot of pussytoes was planted in field 20. There were only 23 grams collected, but our seed germination trial in the greenhouse resulted in an 86 percent germination. As a result, we decided to direct seed the project. Very minor establishment was noted in the fall of 2008. Because of the poor field establishment, the remaining seed was used to produce plugs in the spring of 2009. On the 18th of May, 550 plugs of pussytoes were planted by hand.

A new bottlebrush field was established from seed collected for the general eastside project. Because there was not enough collected seed to plant 2.5 acres of bottlebrush for both; the Bear Lake project and the general eastside project, the Bear Lake project field was established from greenhouse produced stock. On the 23rd and 24th of June, 7500 plugs of eastside source bottlebrush squirreltail were planted for use on the Bear Lake Road revegetation project.

Additional plug production and inner-seeding continued in 2009 as a supplemental activity to fill in blank spots in fields of two forbs. On the 28th of May, 180 hills and 50 transplants of fringed sage were planted in blank or weak appearing plants for future production. After harvest, on July 28, seedling sprigs of purple locoweed that were growing outside cultivated rows were hand dug and transplanted into blank spots.

On August 4, Steve Parr and Pat Davey provided a Seed Collection Training Workshop for 20 park employees at ROMO. The following week, Lindsay Springer, Scott Esser, and Bryce Lloyd from ROMO traveled to UCEPC in Meeker to review the production fields for the Colorado River Power Line Revegetation Project and the Bear Lake Road Project. After a field session, a review of species being produced and those having promise for seed increase for additional projects, and estimates of seed collection efforts and size of production fields were discussed.

Production Fields and Goaled Production Quantities
The following table includes actual seeded (s) or transplanted (t) plot size at UCEPC with germplasm received from ROMO.

Common Name	Scientific Name	Goaled PLS Amt	Proposed Acres	Planted Acres
Grasses				
Blue grama	*Bouteloua gracilis*	40	1.1	1.2 (t)
Bottlebrush squirreltail	*Elymus elymoides*	20	0.5	0.5 (t)
Junegrass	*Koeleria macrantha*	10	0.25	0.25 (t)
Mountain muhly	*Muhlenbergia montana*	20	0.5	0.5 (s) (t)
Needle and thread	*Hesperostipa comata*	20	0.5	0.5 (t)
Forbs/Legumes				
Fringed sage	*Artemisia frigida*	8	0.02	0.02(t)
Hairy goldenaster	*Heterotheca villosa*	20	0.8	0.8 (s) (t)
Purple locoweed	*Oxytropis lambertii*	20	0.5	0.5 (s) (t)
Pussytoes	*Antennaria sp*	2	0.02	0.02 (t)
Spreading goldenbanner	*Thermopsis divaricarpa*	20	2.0	2.0 (s)
	Total:	**180 lb**	**6.19**	**6.29**

No seed was shipped to ROMO this year.

RESULTS – Seed harvest was conducted for eight ROMO materials in 2009. Seed production was better than expected for needle-and-thread and mountain muhly, but less than expected for prairie Junegrass. Except for the goldenbanner harvest, forb production was quite good.

SPECIES	DATE	QTY	PROCESS	
Blue grama				
Field Establishment:	August 27, 2003	Approx. 15,000 transplants	Transplanter	1.2 acres
	June 9, 2004	Approx. 4000 transplants	Hand transplant	Interplanted
	August 1, 2005	5500	Hand transplant	Interplanted
	July 2, 2008	600 transplants	Hand transplant	Interplanted
Harvest:	October 7, 2004	7 lb bulk	Hand harvest	
	September 2, 2005	10.4 lb bulk	Large combine	
	Aug. 8 & 17, 2006	28.5 lb bulk	Hege and by hand	
	August 29, 2007	13 lb	Flail-Vac	
	No Harvest for 2008	NA		
	September 14, 2009	9.4 lb clean	Flail-Vac	
Shipments:	October 5, 2005	2549 g and 10.4 lb		
	September 15, 2006	28.5 lb		
Fringed sage				
Field Establishment:	September 4, 2003	600 transplants	Transplanter	0.02 acres
	May 28, 2009	230 transplants/seed hills	Hand	Interplanted
Harvest:	September 10, 2004	3.5 lb bulk	Hand harvest	
	October 18, 2005	1.8 lb bulk	Hege combine	
	September 18, 2006	7.6 lb	Hege combine	
	September 12, 2007	2.4 lb	Hand harvest	
	September 15, 2008	7.8 lb	Hand harvest	
	September 2, 2009	10.4 lb	Hand harvest	
Shipment:	October 5, 2005	3.5 lb bulk		
Goldenaster				
Field Establishment:	May 29, 2003	203 PLS g	Planet Junior	0.8 acres
	August 5, 2005	2000 transplants	Hand transplant	Interplanted
Harvest:	September 1, 2005	20.5 lb bulk	Hege combine	
	August 7, 2006	60.6 lb	Hege combine	
	August 8, 2007	11 lb	Flail Vac	
	August 21, 2008	27.5 lb	Flail Vac and hand	
	August 26, 2009	22 lb	Flail Vac	
Shipments:	October 5, 2005	20.5 lb bulk		
	September 15, 2006	60.6 lb bulk		
Goldenbanner				
Field Establishment:	May 28, 2003	11.7 lb planted	Planet Junior	2.0 acres
Harvest:	July 7, 2004	2.5 lb bulk	Hand harvest	
	July 18-19, 2005	21 lb bulk	Hege and hand	
	July 13, 2006	142 g bulk	Hand	

SPECIES	DATE	QTY	PROCESS	
	July 12, 2007	7 lb	Combine	
	July 12, 2008	1.2 lb	Hand	
	July 10, 2009	1.8 lb	Hand	
Shipments:	October 5, 2005	23.4 lb bulk		
	September 15, 2006	142 g		
Mountain muhly				
Field Establishment:	May 28, 2003	59 PLS g	Planet Junior	0.5 acres
	August 3, 2005	2500 transplants	Hand transplant	Interplanted
	July 2, 2008	150 transplants	Hand transplant	Interplanted
Harvest:	October 21, 2004	29 g	Hand harvest	
	October 17, 2005	443 g	Hand harvest	
	September 19, 2006	20.5 lb	Hege combine	
	September 13, 2007	13 lb	Swather	
	September 23, 2008	14 lb	Swather	
	September 10, 2009	17 lb	Swather	
Shipment:	October 5, 2005	70 g		
Needle and thread				
Field Establishment:	September 4, 2003	600 transplants	Transplanter	0.07 acres
	September 14, 2004	4000 transplants	Transplanter	0.20 acres
	June 30, 2005	5500 transplants	Transplanter	0.30 acres
	June 11, 2008	116 transplants	Hand transplant	Interplanted
Harvest:	June 30, 2005	14 g	Hand harvest	
	June 22, 2006	2.1 lb		
	June 27, 2007	10 lb	Flail Vac	
	July 8, 2008	10.2 lb	Flail Vac	
	July 9 & 17, 2009	14 lb	Flail Vac	
Shipments:	October 5, 2005	1080 g		
	September 15, 2006	2.1 lb		
Prairie Junegrass				
Field Establishment:	May 29, 2003	28 g	Planet Junior	0.2 acres
	September 15, 2004	4000 transplants	Transplanter	0.2 acres
	June 25, 2008	256 transplants	Hand transplant	Interplanted
Harvest:	July 12, 2006	3.5 lb	Hege combine	
	July 12, 2007	5 lb	Swather	
	July 23, 2008	4.3 lb	Swather	
	July 22, 2009	3 lb	Kincaid Combine	
Shipment:	September 15, 2006	3.5 lb		
Purple locoweed				

SPECIES	DATE	QTY	PROCESS	
Field Establishment:	May 28, 2003	203 g	Planet Junior	0.5 acres
	May 2004	100 g	Hoe	Interplanted
	September 15, 2005	45 transplants	Hand transplant	Interplanted
	July 28, 2009	230 field sprouted transplants	Hand	Interplanted
Harvest:	July 14, 2005	5.8 lb bulk	Hege combine	
	July 6, 2006	15 lb bulk	Hege combine	
	July 18, 2007	10 lb	Hand clipped	
	July 15, 2008	3 lb	Hand clipped	
	July 20, 2009	15.5 lb	Hand clipped	
Shipments	October 5, 2005	290 g and 5.8 lb		
	September 15, 2006	15 lb		

The table above provides a complete recap of the activities conducted by UCEPC as outlined in the cooperative agreement. Six of the eight contract materials took two or more years to establish. Supplemental planting continues in order to establish fully productive fields.

CONCLUSION – This year signifies the second year of the two-year agreement. Discussions to extend the production of the established materials have occurred. No formal agreement extension or amendment has been drafted at this time. Two materials have been identified to remove from production and two additions will be planted for the next portion of the Bear Lake Road project. Goldenbanner was identified as the most important product for Bear Lake Road revegetation. However, hard freezes in late May through mid June at the peak of flowering have occurred the last three years. Goldenbanner has produced much less than expected. The plants in the field look fine with reasonable vigor, height, and color that indicates something else is a major factor limiting seed production. Blue grama has also produced very limited seed since its establishment efforts in 2003. This source, along with another source of blue grama, have not done well at UCEPC. Interestingly, a released source, Bad River blue grama, has done very well with seed production in a demonstration planting.

Bee boards that have been placed near the goldenbanner field are being used, and the goldenbanner is hopefully benefitting from the effort if there are blooms remaining on the plants after the middle of June. This was done as an attempt to promote pollination activity. Freezing during bloom has been our most likely reason for limited production of goldenbanner seed over the past five years. We will discontinue with the effort in 2010 as part of the agreement, but we may continue to experiment with production.

A new agreement will extend production of six established fields and add two new fields, rose pussytoes, and bottlebrush squirreltail, which were planted this year.

Project COPMC-S-0805-CR
Annual Report - December 2009
By: Steve Parr

ROCKY MOUNTAIN NATIONAL PARK
COOPERATIVE AGREEMENT

INTRODUCTION - Upper Colorado Environmental Plant Center (UCEPC), Rocky Mountain National Park (ROMO), and the USDA Natural Resources Conservation Service (NRCS), signed a cooperative plant materials agreement (IA Project No. 1211-07-009) in August 2008. The agreement calls for the production of native plant materials indigenous to the west side of Rocky Mountain National Park for a restoration project. The project will remove an overhead power line and install the power transmission lines underground. The project is estimated to disturb between 10 and 15 acres, with power pole removal slated for this winter. The estimated disturbance will require a production target of 210 pounds of seed. However, the species and production acreage changed since the agreement was written, and an amendment was signed in April 2009 that identified species, acreage, and targeted seed production quantities.

Colorado River District Powerline Project

Common Name	Scientific Name	Symbol
Grasses		
Blue wildrye	*Elymus glaucus*	ELGL
Nodding brome	*Bromus anomalus*	BRAN
Forbs/Legumes		
Beauty cinquefoil	*Potentilla pulcherrima*	POPU

On June 21, 2007, UCEPC received an e-mail explaining the funding for this project was a line item that would secure the use of year-end funds for 2007, but that no funds had been secured for 2008 and 2009. For that reason, a quick scoping trip by Russ Haas, Pat Davey, Lonnie Pilkington, and Jim Cheatham was conducted on June 26 along the area of projected disturbance to identify species for increase. As the year progressed, a number of species were collected by Lonnie Pilkington and his crews from ROMO, and a decision on what materials to plant for the project were finalized July 27, 2008.

ACTIVITIES - After receiving the collected seed the fall of 2007, the materials were cleaned and some of the larger collections were sent to Colorado State University Seed Laboratory for analysis, while other materials were germinated at UCEPC to determine viability. Below is the list of collected materials from the west side of ROMO and the clean seed quantities:

CRD Power Line Seed Collection Totals as of 9/27/07

Primary Species	Pounds Collected	Clean Seed
Bromus anomalus	19.05	11.4 lb
Elymus glaucus	1.66	227 g
Secondary Species		
Achnatherum lettermannii	1.39	345 g
Eriogonum subalpinum or jamesii	4.57	317 g
Potentilla pulcherrima	21.73	637 g
Solidago sp.	0.06	< 1 g

Production Fields and Goaled Production Quantities
The following table includes actual seeded (s) or transplanted (t) plot size at UCEPC with germplasm received from ROMO along with 2009 production.

Common Name	Scientific Name	Goaled PLS Amt	Proposed Acres	Planted Acres	Produced Seed
Blue wildrye	*Elymus glaucus* (s)	50	0.25	0.26	1.6 lb
Nodding brome	*Bromus anomalus* (s)	150	1.2	1.2	106 lb
Beauty cinquefoil	*Potentilla pulcherrima* (t)	10	0.1	0.17	1.7 lb
	Totals:	**210**	**1.55**	**1.63**	**109.3**

UCEPC staff produced plugs of the beauty cinquefoil for field establishment after determining that germination could be challenging in a direct seeding in the field, and we had limited seed to work with. But after several attempts, germination efforts were successful and a 0.17-acre field was established utilizing 1600 greenhouse produced plugs on June 26, 2008. On August 5, 2008, a 0.26 acre field of blue wildrye was planted and the following day, August 6, a 1.2-acre field of nodding brome was planted. The brome seed was treated with a fungicide, Dividend, as a water bath solution to reduce or prevent the transmission of head smut to the produced seed.

Because the agreement was signed in 2007, and year-end funds were used to pay UCEPC in 2007, production will be conducted through 2010, and 2009 will represent the first year of production and only the second year of the project. On August 26, Lonnie Pilkington and Jim Cheatham visited the UCEPC for a tour of general operations and to see the seed production fields for ROMO. Discussions were conducted on the future needs of this and other projects in the park.

RESULTS - All fields established in 2008, however there was considerable slender wheatgrass contamination in the blue wildrye field. This field was hand clipped, and produced a small quantity of seed that will be used to supplement the field production effort. Because of the poor field production of blue wildrye in 2009, UCEPC made a request to increase the field of nodding brome to 1.5 acres. This situation was acknowledged and an additional 0.33 acre was added on August 24, 2009. The nodding brome, or wooly brome, produced well in its first year, and should produce well again in 2010. The beauty cinquefoil did not produce much seed in its first full year. We are hopeful that we will harvest much more seed in 2010.

CONCLUSION - The first production year was very successful and should be near the half way point for targeted quantities. While each collection of a given species is in itself unique relative to production, the generalized view is that the products being produced for the agreement are suited to providing good seed quantities at a reasonable price for immediate restoration uses.

Project COPMC-S-0901-CR
Annual Report – December 2009
By: Steve Parr

ROCKY MOUNTAIN NATIONAL PARK

COOPERATIVE AGREEMENT

GENERAL EASTSIDE SEED INCREASE

Project COPMC-S-0901-CR
Annual Report – December 2009

INTRODUCTION - Upper Colorado Environmental Plant Center (UCEPC), Rocky Mountain National Park (ROMO), and the USDA Natural Resources Conservation Service (NRCS), signed a cooperative plant materials agreement (IA Project No. 1211-09-003) in July 2009. This agreement extends through 2013. The agreement calls for the production of three native plant materials indigenous to the eastside of ROMO for general restoration projects. The primary focus of plant material selection for this agreement is based on those species that naturally occur on the eastside of ROMO that have attributes that will enable successful competition with cheatgrass.

ACTIVITIES - Each planting was established from seed collected from park personnel in 2008. All fields were directly seeded, and emergence and establishment was noted for each. Below, the species and acreage planted are listed.

Common Name	Scientific Name	Goaled PLS Amt	Proposed Acres	Planted Acres
Grasses				
Bottlebrush squirreltail	Elymus elymoides	350 lb	2.0	2.0
Canada wildrye	Elymus canadensis	550 lb	1.5	1.5
Scratch grass	Agrostis scabra	50 lb	0.5	0.5

Steve Parr and Pat Davey also conducted a Seed Collection Training for 20 employees of ROMO on August 4, 2009. Some of the seed collected from the training as well as subsequent collections will be utilized for new projects and to supplement agreements that are currently in place.

RESULTS – All activities that relate to field production will be presented in the table below.

SPECIES	DATE	QTY	PROCESS
Bottlebrush			
Field Establishment	8/6/2009	2.0 acres	Planet Jr.
Canada wildrye			
Field Establishment	8/5/2009	1.5 acres	Planet Jr.
Scratch grass			
Field Establishment	8/12/09	0.5 acre	Planet Jr.

The table above provides a recap of the activities conducted by UCEPC as outlined in the cooperative agreement. Each of the three contract materials were planted in 2009 and seed production should begin in 2010.

CONCLUSION – This year signifies the first year of a five-year agreement. Seeding and resulting establishment on the selected species should yield seed for multiple applications on the eastside of ROMO.

Seed Production - 2009
Upper Colorado Envronmental Plant Center
by Dr. Gary L. Noller

INTRODUCTION

The following plant materials had seed harvested in 2009. This report does not include seed produced for special contracts. Species and planting information can be requested from the UCEPC.

Common Name/ Variety	Scientific Name	Project No.	Accession No.	Year	Acres	Harvest Date	Field No.	Cleaned Weight
GRASSES								
Smooth Brome	*Bromus inermis*	08S229	9030693	1996	0.01	7/22	25	2.19 lb
'Liso'				1997	0.01	7/26	25	1.10 lb
				1998	0.01	8/12	25	1.25 lb Heavy shatter
				1999	0.01	No harvest	25	--
				2000	0.01	No harvest	25	--
				2001	0.01	No harvest	25	--
				2002	0.01	No harvest	25	--
				2003	0.01	7/16	25	256.00 g
				2004	0.01	No harvest	25	--
				2005	0.01	No harvest	25	--
				2006	0.01	No harvest	25	--
				2007	0.01	No harvest	25	--
				2008	0.01	No harvest	25	--
				2009	0.01	8/26	25	142.00 g
Mountain Brome	*Bromus marginatus*	08S217	9005308	1989	0.20	--	17	--
Garnet - tested class				1990	0.20	--	17	75.00 lb
				1991	0.20	--	17	92.00 lb
				1992	0.20	--	17	104.00 lb
				1993	0.20	--	17	6.20 lb
				1994	1.00	--	6	1235.00 lb
				1995	1.00	--	6	1266.00 lb
				1996	1.00	7/8	6	610.00 lb
				1997	1.00	7/8	6	473.00 lb
				1998	1.00	7/12	6	479.00 lb
				1999	1.00	7/8 - 7/9	6	607.00 lb
				2000	1.00	6/28	6	6.60 lb

Common Name/ Variety	Scientific Name	Project No.	Accession No.	Year	Acres	Harvest Date	Field No.	Cleaned Weight
				2000	--	Plowed 26 rows	6	
				2000	0.18	6 rows not plowed	6	
				2001	0.18	6/27	6	43.00 lb
				2002	0.18	6/5	6	10.00 lb
				2003	0.18	7/1	6	41.00 lb
				2004	0.18	7/1	6	95.00 lb
				2004	1.10	New planting	6	
				2005	0.18	7/8	6	33.00 lb
				2005	1.10	7/8	6	37.00 lb
				2006	0.18	6/26	6	16.50 lb
				2006	1.10	6/26	6	112.00 lb
				2007	0.18	6/29	6	95.00 lb
				2007	1.10	6/30	6	287.00 lb
				2008	0.18	7/9	6	85.00 lb
				2008	1.10	7/9	6	222.50 lb
				2009	0.18	7/9	6	48.00 lb 14.7 PLS
				2009	1.10	7/9	6	487.00 lb 231.5 PLS
Purple reedgrass	*Calamagrostis purpurascens*		9070968	2005	plot	Planted	20	
				2006	plot	7/26	20	1.00 g
				2007	plot	7/31	20	5.00 g
				2008	plot	8/12	20	471.00 g
				2009	plot	7/31	20	43.00 g
Bottlebrush Squirreltail	*Elymus elymoides*		9040189	2005	1.00	New planting	18	
Wapiti - selected class			Poor stand	2006	1.00	No harvest	18	--
				2007	1.00	7/20 - 8/8	18	24.00 lb
				2008	1.00	7/27	18	29.50 lb
				2009	1.00	8/1	18	24.00 lb 20.7 PLS
Bottlebrush Squirreltail	*Elymus elymoides*		9040187	2006	0.50	New planting	18	
Pueblo - selected class		harvest from	demo plot	2007		8/10	20	422.00 g
				2008	0.50	7/31	18	1.25 lb
				2009	0.50	8/10	18	39.00 lb 31.7 PLS
'Peru creek'	*Deschampsia caespitosa*		9024403	2006	plot	7/26	20	13.00 g
Foundation				2007	plot	7/30	20	57.00 g
				2008	plot	7/29	20	153.00 g

Common Name/ Variety	Scientific Name	Project No.	Accession No.	Year	Acres	Harvest Date	Field No.	Cleaned Weight	
				2009	plot	7/30	20	0.58 lb	
Pubescent wheatgrass	*Elytrigia intermedia*	08S216	106831	1993	1.00	--	11		
'Luna'				1994	1.00	--	11	379.00 lb	
Foundation				1995	1.00	9/30	11	335.00 lb	
				1996	1.00	8/15	11	150.00 lb	
				1997	1.00	8/20	11	161.00 lb	
				1997	0.66	Planted 6/6	11		
				1998	1.66	8/26	11	353.00 lb	
				1999	0.66	Removed 1993 planting	11	121.50 lb	
				2000	0.66	No harvest	11	--	
				2001	0.66	8/16	11	24.50 lb	
				2002	0.66	Field plowed	11		
				2002	0.70	Planted 7/18	11		
				2003	0.70	9/8	11	43.00 lb	
				2004	0.70	8/24	11	213.00 lb	
				2005	0.70	8/15	11	138.00 lb	
				2006	0.70	9/27	11	10.00 lb	
				2006	1.30	July (New planting)	11		
				2007	1.30	8/7	11	637.00 lb	
				2008	1.30	8/12	11	314.50 lb	
				2009	1.30	8/11	11	228.00 lb	132.0 PLS
Arizona fescue	*Festuca arizonica*	08S214	469218	1994	1.00	--	6		
'Redondo'				1995	1.00	8/7	6	191.50 lb	
Foundation				1996	1.00	8/1	6	97.00 lb	
				1997	1.00	8/11	6	111.00 lb	
				1998	1.00	8/8	6	89.00 lb	
				1999	1.00	8/3	6	33.50 lb	
				2000	1.00	7/21	6	57.00 lb	
				2001	1.00	8/1	6	45.00 lb	
				2002	1.00	7/30	6	54.00 lb	
				2003	1.00	No harvest	6	--	Reduced to .18 ac
				2004	1.00	New planting	18		
				2005	0.18	7/28	6	9.00 lb	
				2005	1.00	No harvest	18	--	Replant
				2006	0.18	No harvest	6	--	
				2006	1.00	No harvest	18	--	
				2007	0.18	7/27	6	1.00 lb	

Common Name/ Variety	Scientific Name	Project No.	Accession No.	Year	Acres	Harvest Date	Field No.	Cleaned Weight	
				2008	0.18	7/30	18	18.50 lb	
				2009	0.18	7/28	18	44.00 lb	17.8 PLS
Thurber fescue	*Festuca thurberi*		9024002	2007	plot	7/11	20	190.00 g	
				2008	plot	7/11	20	1.95 lb	
				2009	plot	7/8	20	0.86 lb	
Big bluegrass	*Poa secunda*	08S244	9092261	2002	1.00	Planted 7/16/02	11A		
Name changed	Not released			2003	1.00	7/17	11A	47.00 lb	
				2004	1.00	7/7	11A	221.00 lb	
				2005	1.00	7/13	11A	100.00 lb	
originally called				2006	1.00	7/1	11A	120.00 lb	
Prairie junegrass	*Koeleria cristata*			2007	1.00	7/2	11A	134.00 lb	
				2008	1.00	No harvest	11A	--	
				2009	1.00	Field plowed 4/24	11A		
Salina wildrye	*Leymus salinus*	08S213	9043501	1996	0.02	7/22	Hqts.	154.00 g	
				1996	0.10	7/22	4	631.00 g	
				1996	0.20	Planted	4	No harvest	Breeders
				1997	0.02	Field plowed	Hqts.	No harvest	Foundation
				1997	0.10	7/21	4	2.96 lb	Breeders
				1997	0.20	7/21	4	5.32 lb	Foundation
				1998	0.10	8/4	4	4.00 lb	Breeders
				1998	0.20	8/4	4	9.00 lb	Foundation
				1999	0.10	7/15	4	22.00 g	Breeders
				1999	0.20	7/15	4	32.00 g	Foundation
				2000	0.10	No harvest	4	--	Foundation
				2000	0.20	7/7	4	6.00 g	Breeders
				2001	0.20	7/9	4	174.00 g	Breeders
				2001	0.10	7/9	4	227.00 g	Foundation
				2002	0.10	7/11	4	7.00 g	Breeders
				2002	0.20	7/11	4	23.00 g	Foundation
				2003	0.10	7/9	4	1.69 lb	Breeders
				2003	0.20	7/9	4	0.60 lb	Foundation
				2004	0.10	7/9	4	19.00 g	Foundation
				2004	0.20	7/9	4	146.00 g	Breeders
				2004	0.10	New planting	4		Foundation
				2005	0.10	7/13	4	1.40 lb	Foundation
				2005	0.30	7/13	4	302.00 g	Breeders

Common Name/ Variety	Scientific Name	Project No.	Accession No.	Year	Acres	Harvest Date	Field No.	Cleaned Weight
				2006	0.30	7/13	4	83.00 g Foundation
				2006	0.10	7/13	4	2.00 g Breeders
				2007	0.30	7/11	4	5.50 lb Foundation
				2007	0.10	7/13	4	296.00 g Breeders
				2008	0.10	7/28	4	1.17 lb Breeders
				2008	0.30	7/28	4	1.27 lb Foundation
				2009	0.30	7/20	4	1.00 lb Foundation
Western wheatgrass	*Pascopyron smithii*	08S226	432402	1996	1.00	Planted	4	
'Arriba'				1997	1.00	8/14	4	640.00 lb
Foundation				1998	1.00	8/22	4	238.00 lb
				1999	1.00	8/26	4	87.00 lb
				1999	0.80	New planting 10/6	6A	
				2000	0.80	No harvest	6A	--
				2000	1.00	Field plowed	4	
				2001	0.80	8/3	6A	173.00 lb
				2002	0.80	8/14	6A	100.00 lb
				2003	0.80	8/22	6A	126.00 lb
				2004	0.80	No harvest-plowed	6A	
				2004	1.30	New planting	4	
				2005	1.30	8/27	4	35.00 lb
				2006	1.30	7/28	4	273.00 lb
				2007	1.30	8/5	4	108.00 lb
				2007	1.30	Fall plowed	4	
				2007	1.13	New planting - 8/9	1A	34 rows
				2008	1.13	8/11	1A	41.00 lb
				2009	1.13	8/6	1A	263.00 lb 162.5 PLS
Crested wheatgrass	*Agropyron cristatum X*		9028605	2007	0.30	planted 8/10	17	17 rows
'Hycrest'	desertorum			2008	0.30	8/19	17	59.00 lb
Foundation				2009	0.30	8/17	17	83.00 lb 62.8 PLS
Mammoth wildrye	Leymus racemosus		108491	2007	0.13	planted 8/18	2	
Volga'				2008		No harvest		
Foundation				2009	0.13	8/5	2	79.00 lb 57.1 PLS

FORBS

Common Name/ Variety	Scientific Name	Project No.	Accession No.	Year	Acres	Harvest Date	Field No.	Cleaned Weight
Fringed sage	*Artemisia frigida*		9021471	2006	plot	9/26	20	2.45 lb
				2007	plot	9/27	20	539.00 g
				2008	plot	9/16	20	277.00 g
				2009	plot	9/22	20	1.80 lb
Louisiana sage	*Artemisia ludoviciana*	08S109	9021474	1984	0.25	--	2	
'Summit'				1985	0.25	No harvest	2	--
Foundation				1986	0.25	10/6	2	2.44 g
				1987	0.25	9/14	2	0.96 g
				1988	0.25	10/5	2	0.10 g
				1989	0.25	10/11	2	4.00 g
				1990	0.25	No harvest	2	--
				1991	0.25	9/10	2	3.43 lb
				1992	0.25	9/2	2	57.00 g
				1993	0.25	9/15	2	4.39 lb
				1994	0.35	9/8	2	4.38 lb
				1995	0.35	9/11	2	28.00 lb
				1996	0.35	9/10	2	0.78 lb
				1997	0.35	9/8	2	0.90 lb
				1998	0.35	Stand dead-field plowed	2	
				1998	0.06	New planting	2	No harvest
				1999	0.06	Field plowed	--	
				1999	0.10	New planting	25	
				2000	0.10	No harvest	25	--
				2001	0.10	No harvest	25	--
				2002	0.10	No harvest	25	--
				2003	0.10	No harvest	25	--
				2004	0.10	No harvest	25	--
				2005	0.10	No harvest	25	--
				2006	0.10	No harvest	25	--
				2007	0.10	No harvest	25	--
				2007	plot	New planting	Hdqtrs	
				2008	plot	No harvest	Hdqtrs	--
	New planting			2009	plot	November	3	
Utah sweetvetch	*Hedysarum boreale*		9024375	2005	1.00	New planting	1	
'Timp'				2006	1.00	Poor stand	1	No harvest
Foundation				2007	1.00	Late July	1	45.00 g
				2008	1.00	7/17	1	1.80 lb

Common Name/ Variety	Scientific Name	Project No.	Accession No.	Year	Acres	Harvest Date	Field No.	Cleaned Weight
				2009	1.00	7/22	1	23.00 lb 11.3 PLS
Rocky Mtn penstemon	*Penstemon strictus*		9004712	2004	0.10	New planting	8A	
'Bandera'				2005	0.10	No harvest	8A	--
Foundation				2006	0.10	deer used heavily	8A	No harvest
				2007	0.10	8/24	8A	5.00 lb
				2008	0.10	9/24	8A	14.50 lb
				2009	0.10	8/26	8A	65.00 lb 21.4 PLS
Kura clover	Trifolium ambiguum		ARS-2678	2009		7/27	17	3.50 lb
SHRUBS								
Serviceberry	*Amelanchier utahensis*	08S078Z	9021438	1984	0.25	--	3	
Long ridge				1993	0.25	--	3	2.88 lb
selected class				1994	0.25	--	3	0.88 lb
				1995	0.25	--	3	1.77 lb
				1996	0.25	No harvest	3	--
				1997	0.25	--	3	131.00 g
				1998	0.25	7/30	3	0.18 lb
				1999	0.25	No harvest	3	--
				2000	0.25	7/20 - 8/9	3	283.00 g
				2001	0.25	No harvest	3	--
				2002	0.25	No harvest	3	--
				2003	0.25	7/10 - 8/13	3	2.64 lb
				2004	0.25	No harvest	3	--
				2005	0.25	No harvest	3	--
				2006	0.25	1/6	3	0.80 lb
				2007	0.25	8/2	3	449.00 g
	not sure of harvest			2008	0.25		3	
				2009	0.25	No harvest		
Serviceberry	*Amelanchier alnifolia*	08S235	9021442	2009	0.01	8/26	18	4.00 g
Clarks								
Mountain mahogany	*Cercocarpus montanus*	08S035Z	477976	1979	0.02	--	17	
'Montane'				1984	0.02	9/24	17	43.00 g
Foundation				1985	0.02	9/11	17	286.00 g

Common Name/ Variety	Scientific Name	Project No.	Accession No.	Year	Acres	Harvest Date	Field No.	Cleaned Weight	
				1986	0.02	10/7	17	37.00 g	
				1987	0.02	8/31 - 9/15	17	2.47 lb	
				1988	0.02	9/1 - 9/13	17	2.05 lb	
				1989	0.02	9/15	17	0.20 lb	
				1990	0.02	No harvest	17	--	
				1991	0.02	10/17	17	285.00 g	
				1992	0.02	9/21	17	0.83 lb	
				1993	0.02	9/15	17	2.44 lb	
				1994	0.02	8/12	17	2.30 lb	Not all harvested
				1995	0.02	No harvest	17	--	
				1996	0.02	--	17	0.82 lb	Not all harvested
				1997	0.02	No harvest	17	--	
				1998	0.02	11/2	17	0.86 lb	
				1999	0.02	No harvest	17	--	
				2000	0.02	No harvest	17	--	
				2001	0.02	No harvest	17	--	
				2002	0.02	No harvest	17	--	
				2003	0.02	No harvest	17	--	
				2004	0.02	No harvest	17	--	
				2005	0.02	No harvest	17	--	
				2006	0.02	No harvest	17	--	
				2007	0.02	No harvest	17	--	
				2008	0.02	No harvest	17	--	
				2009	0.02	8/27	17	112.00 g	
Bitterbrush	*Purshia tridentata*	08A073J	9038521	1995	0.01	7/29	21	239.00 g	
Fire tolerant				1996	0.01	8/15	21	66.00 g	
				1997	0.01	No harvest	21	--	
				1998	0.01	No harvest	21	--	
				1999	0.01	8/6	21	27.00 g	
				2000	0.01	7/18	21	153.00 g	
				2001	0.01	7/19	21	159.00 g	
				2002	0.01	No harvest	21	--	
				2003	0.01	No harvest	21	--	
				2004	0.01	No harvest	21	--	
				2005	0.01	No harvest	21		
				2006	0.01	No harvest	21	--	
				2007	0.01	No harvest	21	--	

Common Name/ Variety	Scientific Name	Project No.	Accession No.	Year	Acres	Harvest Date	Field No.	Cleaned Weight
				2008	0.01	7/29	21	367.00 g
				2009	0.01	No harvest	21	
Chokecherry	*Prunus virginiana*	08S235	9024060	1997	0.01	8/15	18	11.90 lb
			EPC229	1998	0.01	8/25-8/27	18	115.00 lb
				1999	0.01	8/20	18	9.00 lb
				2000	0.01	7/28	18	30.50 lb
				2001	0.01	--	18	21.92 lb
				2002	0.01	July - Aug.	18	Few grams
				2003	0.01	8/4	18	4.80 lb
				2004	0.01	No harvest	18	--
				2005	0.01	No harvest	18	--
				2006	0.01	No harvest	18	--
				2007	0.01	8/10	18	47.00 g
				2008	0.01	8/18	18	36.50 lb
	(hot dried)			2009	0.01	8/19	18	74.50 lb
	(cool dried)			2009	0.01	8/26	18	16.00 lb
Silver buffaloberry	*Shepherdia argentea*	08S235	9008027	1998	0.01	9/1	18	13.00 g
			EPC476	1999	0.01	No harvest	18	--
				2000	0.01	No harvest	18	--
				2001	0.01	No harvest	18	--
				2002	0.01	No harvest	18	--
				2003	0.01	8/10	18	238.00 g
				2004	0.01	No harvest	18	--
				2005	0.01	No harvest	18	--
				2006	0.01	No harvest	18	--
				2007	0.01	Mid August	18	751.00 g
				2008	0.01	8/19	18	2.60 lb
	(cool dried)			2009	0.01	8/1 to 12	18	96.00 g
	(hot dried)			2009	0.01	8/1 to 12	18	21.00 g
Thinleaf alder	*Alnus tenuifolia*		9070975	2000	0.25	10/4	3	558.00 g
				2001	0.25	10/2-10/3	3	2.13 lb
				2002	0.25	No harvest	3	--
				2003	0.25	No harvest	3	--
				2004	0.25	No harvest	3	--
				2005	0.25	No harvest	3	--
				2006	0.25	No harvest	3	--

Common Name/ Variety	Scientific Name	Project No.	Accession No.	Year	Acres	Harvest Date	Field No.	Cleaned Weight
				2007	0.25	No harvest	3	--
				2008	0.25	No harvest	3	--
				2009	0.25	11/25	3	82.00 g
Bitterbrush	*Purshia tridentata*		9024373	2008		from Maybell site 7/30	N/A	5.40 lb
Maybell select class				2009		from Maybell site 7/24	N/A	440.00 g
Cliff fendlerbush	*Fendlera rupicola*	orchard	9024143	2009		11/4	15	42.00 g
Littleleaf mock orange	*Philadelphus microphyllus*	orchard	9024096	2009		11/5	15	50.00 g

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
WEATHER SUMMARY FOR 2009

Prepared by Dr. Gary L. Noller

PRECIPITATION

A total of 16.3 inches of precipitation was measured at the plant center in 2009 (Table 1). That is 0.7 percent above the long time average of 16.19 inches. Precipitation was recorded on 98 recording dates during the year (Table 2). Two months in 2009 were considered wet (May – 2.13 and June – 3.64 inches), both were substantially above the long time averages for those months. The two month total of 5.77 inches of precipitation represents 35.4 percent of the total for year. In addition, four months (February – 0.30, July - 0.46, August – 0.36, and November – 0.88) were dry. In this four month period, only 12.3 percent (2.00 inches) of the precipitation for the year was received. In addition, August 2009 was the driest August since the plant center was started in 1976. August 2009 followed a very dry July and August is normally the wettest month during the calendar year.

SNOW

Snowfall in 2009 measured 89.0 inches (Table 2). Snow in 2009 produced 5.37 inches of moisture or 32.9 percent of the total precipitation for the year, when considering the times, only snow was recorded and not when snow and rain occurred together in the same event.

GROWING SEASON

The frost-free growing season in 2009 measured 129 days. This represents the period from May 14 to September 22. This exceeded the average growing season which generally measures about 90 days. Precipitation during this important period measured 7.14 inches and represents 43.8 percent of the total for the year.

TEMPERATURES

Temperatures in 2009 seemed relatively moderate, except for a low of 3 below zero recorded on April 6. This seemed to be late in the spring for such a cold low temperature. Lows below 0°F were recorded on 22 recording dates and a high failed to reach 32°F or above on 19 recording dates (Table 2). A maximum temperature of 85°F or above was recorded on 37 recording dates. The highest average monthly maximum temperature (86.4°F) was recorded in July and the lowest average monthly minimum (0.2°F) was recorded in December.

Table 1. Monthly and Total Yearly Precipitation in Inches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Longtime Avg. Over 50 Yrs.	**1.15**	**1.00**	**1.50**	**1.56**	**1.45**	**1.06**	**1.51**	**1.82**	**1.43**	**1.49**	**1.10**	**1.12**	**16.19**
1976 *	0.47	0.74	1.37	1.25	1.44	1.43	2.03	1.18	1.14	0.37	0.11	0.17	**11.70**
1977 *	0.37	0.49	0.74	0.70	1.11	0.25	1.76	3.04	0.66	0.82	0.74	0.63	**11.31**
1978 +	1.58	0.82	1.69	1.77	1.32	0.30	0.44	0.72	1.25	0.14	1.31	1.47	**12.81**
1979 +	0.82	0.89	0.97	1.19	3.25	0.49	0.54	1.05	0.34	1.20	1.15	0.24	**12.13**
1980 +	1.63	1.75	1.74	0.67	2.36	0.01	2.22	1.53	0.38	1.58	0.63	0.13	**14.63**
1981 +	0.24	0.46	1.56	0.27	3.15	1.58	3.50	0.99	0.61	4.47	0.79	1.40	**19.02**
1982 +	0.78	0.32	0.56	0.59	1.79	0.04	1.64	2.81	2.91	1.81	0.97	0.62	**14.84**
1983 +	0.50	1.32	0.84	0.98	2.29	2.52	1.83	1.05	0.75	1.83	1.90	3.00	**18.81**
1984 +	0.70	0.24	1.62	2.00	0.93	4.22	2.20	3.24	1.65	2.78	0.34	0.71	**20.63**
1985 +	1.13	0.45	1.49	2.80	1.70	1.65	1.77	0.48	1.39	3.10	2.27	0.83	**19.06**
1986 +	0.65	1.76	1.48	1.44	0.73	1.16	3.45	1.99	2.36	1.70	1.65	0.57	**18.94**
1987 +	0.67	1.10	1.51	0.76	2.63	0.90	1.72	3.22	0.50	1.15	1.31	1.20	**16.67**
1988 +	1.31	0.82	1.26	1.23	1.45	0.50	0.79	3.39	2.52	0.17	1.69	0.99	**16.12**
1989 +	1.24	1.75	0.96	1.10	0.54	0.91	1.16	1.49	1.50	0.66	0.62	0.39	**12.32**
1990 +	0.28	1.27	0.46	1.28	1.29	0.93	1.29	0.41	2.18	2.12	0.82	0.55	**12.88**
1991 +	1.28	0.35	1.98	1.48	0.75	1.16	3.54	2.13	1.30	2.25	1.65	0.70	**18.57**
1992 +	0.52	1.09	1.45	1.37	3.03	1.10	3.28	1.21	1.20	0.57	2.85	0.73	**18.40**
1993 +	1.27	1.07	1.91	2.32	2.11	1.08	0.31	1.14	0.52	1.63	1.31	0.50	**15.17**
1994 +	0.32	0.62	0.66	1.50	0.82	0.89	0.41	1.08	1.64	1.65	1.55	0.75	**11.89**
1995 +	0.83	0.84	0.99	2.87	5.72	2.40	1.68	1.29	2.11	2.17	0.95	0.94	**22.79**
1996 +	1.98	2.01	0.57	1.36	1.46	1.12	0.86	0.86	2.13	2.21	2.34	1.38	**18.28**
1997 +	2.04	0.72	0.34	3.04	1.82	1.05	1.02	2.93	5.42	2.37	0.76	0.61	**22.12**
1998 +	0.79	1.20	1.87	1.65	0.45	3.58	1.79	0.64	0.87	1.63	1.03	0.92	**16.42**
1999 +	0.99	0.73	0.59	3.57	2.24	1.09	2.60	1.49	0.89	0.70	0.50	1.08	**16.47**

* From the National Oceanic and Atmospheric Administrations Climatic Summary of the United States.
\+ From the weather instruments located at the UCEPC.
Note: Some precipitation was not recorded in Oct. 2003.

Table 1. Monthly and Total Yearly Precipitation in Inches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Longtime Avg. Over 50 Yrs.	**1.15**	**1.00**	**1.50**	**1.56**	**1.45**	**1.06**	**1.51**	**1.82**	**1.43**	**1.49**	**1.10**	**1.12**	**16.19**
2000 +	0.84	0.99	1.98	0.69	1.32	0.78	0.54	2.98	2.38	0.90	1.30	0.74	**15.44**
2001 +	0.49	1.03	0.45	0.53	1.53	0.79	0.78	1.56	0.92	1.57	0.91	0.70	**11.26**
2002 +	0.92	0.18	0.96	0.41	0.09	0.81	1.31	1.19	1.93	1.77	0.81	0.63	**11.01**
2003 +	0.72	1.41	0.98	1.30	1.71	1.77	0.52	0.65	1.31	0.04	0.77	1.37	**12.55**
2004 +	0.21	0.50	0.53	2.23	0.97	1.05	1.29	1.17	1.99	1.09	1.58	0.62	**13.23**
2005 +	1.61	0.97	1.26	1.76	1.51	3.55	0.58	1.83	1.74	2.56	1.60	0.93	**19.90**
2006 +	0.87	1.05	1.70	0.76	0.49	0.03	1.63	3.00	2.86	3.49	0.79	0.69	**17.36**
2007	1.08	1.16	0.69	0.59	1.39	0.20	0.93	2.35	3.49	2.58	0.43	2.52	**17.41**
2008	1.90	1.18	0.99	1.29	2.18	1.31	0.16	1.61	2.34	0.57	0.90	1.56	**15.99**
2009	1.45	0.30	1.68	1.66	2.13	3.64	0.46	0.36	1.50	1.17	0.88	1.07	**16.30**

* From the National Oceanic and Atmospheric Administrations Climatic Summary of the United States.
\+ From the weather instruments located at the UCEPC.
Note: Some precipitation was not recorded in Oct. 2003.

Table 2. Weather Data

2009	Precip.	% of Total	Snow Inches	Recording Dates * With Precip.	Below 0ºF	High Less Than 32ºF	High 85ºF or Above	Avg. Min. Temp. Fah.	Avg. Max. Temp. Fah.
Jan	1.45	8.9	14.5	11	7	4	0	4.7	39.0
Feb	0.30	1.8	3.5	8	1	2	0	15.5	43.6
Mar	1.68	10.3	24.0	8	2	2	0	18.2	52.1
Apr	1.66	10.2	9.0	9	1	2	0	23.8	55.2
May	2.13	13.1	0.0	5	0	0	1	36.5	70.9
Jun	3.64	22.3	0.0	16	0	0	2	40.9	74.0
Jul	0.46	2.8	0.0	7	0	0	20	46.7	86.4
Aug	0.36	2.2	0.0	8	0	0	9	44.3	83.8
Sep	1.50	9.2	0.0	5	0	0	5	39.7	75.8
Oct	1.17	7.2	10.5	9	0	0	0	18.1	57.7
Nov	0.88	5.4	10.0	4	2	0	0	15.9	53.4
Dec	1.07	6.6	17.5	8	9	9	0	0.2	31.8
Total	16.30	-	89.0	98	22	19	37	-	-

* Weather instruments are not read on weekends.

Colorow Germplasm
Black chokecherry

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