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NEW PLANT RELEASES

Plants for Solving Resource Problems

'VAVILOV II' SIBERIAN WHEATGRASS

Species: ***Agropyron fragile***

Common Name: **Siberian Wheatgrass**
Plant Symbol: AGFR
Accession Number: 9076515

Source: 'Vavilov II' is a broad based 50 clone synthetic developed from clones of Siberian wheatgrass from Kazakhstan and genotypes from the original 'Vavilov' release. It was developed by the Agricultural Research Service (ARS), Forage and Range Laboratory in cooperation with the United States Army, Utah State University and NRCS Plant Materials Center, Aberdeen, ID.

Native Site Information: Siberian wheatgrass was introduced from Asia and is naturalized from the Pacific coast to New York and is widely used in dryland pasture and rangeland seedings throughout the western United States.

Method of Selection: The parent material for Vavilov II was selected from evaluation trials at Yakima, WA, Lakeside, UT and Curlew Valley, ID and genotypes from Vavilov and from collections from Kazakhstan to form a synthetic which can withstand heavy traffic from livestock and vehicular traffic such as found on military training sites. Vavilov II was released by the ARS, United States Army, Utah State University and NRCS Aberdeen PMC in 2008.

Description: Siberian wheatgrass is a long-lived, cool season, drought tolerant, introduced, winter hardy bunch grass with an extensive root system. Siberian wheatgrass is very similar to fairway and standard crested wheatgrass, but has finer leaves and stems, narrower and awnless glumes and lemmas, and the spikelets are more ascending, which gives the spike a narrow, oblong, sub-cylindrical shape.

'Vavilov II'
Siberian Wheatgrass

Siberian wheatgrass is more drought tolerant and retains its greenness and palatability later into the summer than either standard or fairway crested wheatgrass.

Use: Siberian wheatgrass is commonly seeded in the arid regions of the western United States. Siberian wheatgrass is usually recommended for livestock forage production. It is palatable to all classes of livestock and wildlife. It is a preferred feed for cattle, sheep, horses, and elk in spring, early summer and also in the fall, if additional growth occurs from late growing season rainfall. Siberian wheatgrass is well adapted for stabilization of disturbed soils. It competes well with aggressive introduced plants such as cheatgrass during the establishment period. Its drought tolerance,

fibrous root system, and excellent seedling vigor make Vavilov II ideal for reclamation in areas receiving 8 inches or more annual precipitation. This grass can be used in urban areas where irrigation water is limited to provide ground cover, weed control and to stabilize ditch banks, dikes, pipelines, power lines, and roadsides.

Insect and Disease Problems: When in pure stands, Vavilov II is susceptible to the black grass bug, *Labops hesperius*.

Environmental Considerations: Since Vavilov II is an introduced plant from Asia, it is not an appropriate component in native plant community restoration. This release is from a species that was introduced to the United States in the early 1900's. Vavilov II represents an incremental improvement in performance within a well documented species. Vavilov II spreads very little via natural seed distribution. It is not considered a weedy or invasive species but can spread into adjoining vegetative communities under ideal environmental conditions. There are no known negative impacts on wild or domestic animals.

Area of Adaptation: Vavilov II Siberian wheatgrass is adapted for non-irrigated seedings where annual precipitation averages 8-14 inches and where the frost-free period is generally less than 160 days. It is known to surpass fairway and standard crested wheatgrass in rate of establishment, stand persistence, and total forage yield on more arid sites (8 to 10 inches annual precipitation). It is very tolerant of fire.

Soil Adaptation: Vavilov II is well adapted to sandy to fine sandy loam to silt loam, droughty soils. It has been seeded in areas with as little as 5 inches of annual precipitation with some success. Siberian wheatgrass is cold tolerant and can withstand moderate periodic flooding, not exceeding 7-10 days in the spring. It will not tolerate long periods of inundation-standing water, poorly drained soils, or excessive irrigation.

Planting and Harvesting: Vavilov II should be seeded with a drill to a depth of ¼ to ½ inch into a firm, weed-free seedbed. The full seeding rate is 6 pounds Pure Live Seed (PLS) per acre. When used as a component of a seed mixture, adjust to the percent of mix desired.

For seed production Vavilov II should be seeded in 36 inch rows at a rate of 2.7 pounds PLS per acre to allow mechanical weed control and to maintain rows. Harvesting seed is best accomplished by swathing, followed by combining of the windrows. Direct combining is also acceptable. Seed is generally harvested in late July. Seed yields range from 150 pounds per acre (dryland) to 500 pounds per acre (irrigated).

Seed Maintenance: Breeder seed is maintained by ARS and Foundation seed is maintained at:

USDA-NRCS, Aberdeen PMC
P.O. Box 296
1691A S. 2700 W.
Aberdeen, ID 83210
Phone: (208) 397-4133

Foundation seed is available through the University of Idaho Foundation Seed Program and Utah Crop Improvement Association and Soil Conservation Districts in Idaho, Utah and Nevada. Certified seed shall be limited to not more than one generation from Foundation seed (Certified). Variety Protection has been applied for under the Plant Variety Protection Act of 1970. Conditions of this license specify that Vavilov II can be marketed only as a class of certified seed.

January 2008

Improved establishment characteristics of 'Vavilov II' Siberian Wheatgrass

K.B. Jensen*, A.J. Palazzo, B.L. Waldron, J.G. Robins,
B.S. Bushman, D.A. Johnson, and D.G. Ogle.

K.B. Jensen, B.L. Waldron, J.G. Robins, B.S. Bushman, D.A. Johnson, USDA-ARS, Forage and Range Research Laboratory, 695 North 1100 East., Logan, UT 84322-6300; A.J. Palazzo, US Army Corps of Engineers, Engineering Research and Development Center, Hanover, NH; D.G. Ogle, Natural Resources Conservation Service, 9173 W. Barnes Dr., Suite C, Boise, ID 83709.
Utah Agric. Exp. Stn. Journal Paper No. ____. Mention of a trademark, proprietary product, or vendor does not constitute a guarantee or warranty of the product by the USDA or Utah State University. Received ____. *Corresponding author (kevin@cc.usu.edu).

ABSTRACT

'Vavilov II' Siberian wheatgrass (*Agropyron fragile* (Roth) Candargy) (Reg. No. CV-__, PI_____) was developed by The United States Department of Agriculture - Agricultural Research Service, the United States Army - Engineer Research and Development Center, Utah State Agricultural Experiment Station, and the United States Department of Agriculture - Natural Resources Conservation Service. Vavilov II was evaluated in field trials as Vavilov-Select, SERDP Siberian wheatgrass, and 9076515 (NRCS). Vavilov II was developed for reseeding disturbed rangelands dominated by annual weeds as a result of severe disturbance, frequent fires, and soil erosion. Selection emphasis in Vavilov II was on seedling establishment and plant persistence. During the establishment year, Vavilov II had significantly ($P<0.05$) higher numbers of seedlings per unit area (m^2) using a frequency grid when planted at a rate of one pure live seed (PLS) per cm than Vavilov at Yakima, WA (est. fall 2002; 52 vs 23%), Fillmore, UT (est. fall 2004; 79 vs 54%), Dugway, UT (est. fall 2005; 79 vs 52%), and Curlew Valley, ID (est. fall 2002; 70 vs 40%). In persistence after establishment, Vavilov II was significantly more persistent than Vavilov at Yakima, WA (68 vs 44%); Fillmore, UT (84 vs 62%); Curlew Valley, ID (69 vs 55%), and Malta, ID (97 vs 91%). Seed of Vavilov II is available through the Utah Crop Improvement Association and the University of Idaho Foundation Seed Program.

Vast areas of semiarid rangeland in the western U.S. are severely disturbed, frequently burned, increasingly eroded, and subsequently infested with troublesome weeds such as cheatgrass (*Bromus tectorum* L.), medusahead (*Taeniatherum caput-medusae* (L.) Nevski) and others. Reseeding disturbed rangelands with plant materials that are competitive enough (seedling establishment and persistence) to replace existing undesirable vegetation is often the most plausible and economically feasible way to reclaim such sites (Asay et al., 2003). A failure to develop improved plant materials that can restore these degraded rangelands from predominantly annual to perennial vegetation will result in increased fire frequency, loss of soil structure (Norton et al., 2004), increased soil erosion, and economically unproductive rangelands. One species frequently used in rangeland revegetation is Siberian wheatgrass (*Agropyron fragile* (Roth) Candargy).

In its native habitat, Siberian wheatgrass is more drought-resistant and better adapted to medium to coarse textured soils than either Standard (*A. desertorum* (Fisch. ex Link) Schultes) or Fairway (*A. cristatum* L.) type crested wheatgrass. Siberian wheatgrass is commonly recommended for semiarid ecological sites receiving between 150 to 300 mm (6- 12 in) of mean annual precipitation annually at elevations up to 2154 m (7070 ft). When drilled under dryland range conditions, a seeding rate of 8 kg h^{-1} (6 lbs/ac) is recommended (Jensen et al., 2001). In recent studies on six ecological sites, Siberian wheatgrass was one of the easiest species to establish, more productive, more persistent, and more defoliation-tolerant under severe water stress than other rangeland revegetation grasses (Asay et al., 2001).

The first released Siberian wheatgrass cultivar 'P-27' was released in 1953 by the Natural Resources Conservation Service and was selected from a large evaluation nursery for persistence (Alderson and Sharp, 1994). At present, the most widely used Siberian wheatgrass cultivar is

Vavilov, which was released in 1994 exhibiting increased retention of plant color, vegetative vigor under extreme drought, seedling establishment, and seed yield over the cultivar P-27 (Asay et al., 1995). To combat the increasing spread of invasive annual weeds on western rangelands it is critical to develop improved plant materials with increased seedling establishment and persistence (Asay et al., 2003). The principle objectives of this research were to develop a Siberian wheatgrass cultivar with increased establishment characteristics and persistence under harsh dry environments of the western United States.

MATERIALS AND METHODS

Breeding History

The parent material for 'Vavilov II' Siberian wheatgrass was selected from evaluation trials at three locations (1) Yakima, WA, (2) Curlew Valley, ID, and (3) Lakeside, UT. (1) At Yakima, WA, an 832 plant nursery of the cultivar Vavilov was established in 1998. Based on visual plant vigor, total seed yield, and seedling establishment (ability to emerge from a 7.6 cm planting depth in the greenhouse) in 1999, 15 genotypes were selected. (2) At Curlew Valley, ID (USDA-FS-Curlew National Grasslands), an evaluation nursery was established in 1998 that included Vavilov and collections made from the Steppes of Kazakhstan in 1988 by Drs. Kay Asay and Douglas Johnson. Based on visual plant vigor, five genotypes of Vavilov and one from the Steppes of Kazakhstan (collection JA-45) (Jensen et al., 2008) were selected. (3) At Lakeside, UT, the cultivar Vavilov and two bulk populations (low and medium annual precipitation) from the 1988 collection trip by Drs. Asay and Johnson were evaluated. The low annual precipitation population originated by evenly bulking by weight original seed from collections JA- 62, 63, 64, 65, 66, 67, 68, 69 that originated from sites that receive annual precipitation ranging between 100 to 130 mm (4- 5 in) (Jensen et al., 2008). The medium annual precipitation population originated by evenly bulking by weight original seed from collections JA-41, 42, 43, 44, 71, 72, 73, 74, 75, 76, 77, 79, 80, 88, 98, 99 that originated from sites that receive annual precipitation of 150 mm (6 in) (Jensen et al., 2008). Twenty-one genotypes of Vavilov and eight genotypes, four each from the different annual precipitation populations, were selected from the Lakeside site.

Clones (20 replications) from the 50 selected genotypes from Yakima, WA; Curlew Valley, ID; and Lakeside, UT were established in 2000 at the Bluecreek, UT research station and designated as the Vavilov II Breeder seed.

Morphological Characterization

Twelve morphological characters were evaluated (Table 1) from at least 40 different plants each of Vavilov II, Vavilov, and P-27 at Nephi (39°38′43″ N 111°52′11″ W; elevation 1600 m) and Blue Creek (41°56′02″ N 112°26′20″ W; elevation 1563 m), UT. All data were subjected to analysis of variance using GLM procedures as a fixed model. Mean separations were made on the basis of least significant differences (LSD) at the 0.05 probability level (SAS Institute Inc., 1999).

Molecular Characterization

Twelve plants from each of four Siberian wheatgrass cultivars/breeding populations, Vavilov II, Vavilov, P-27, and a population originating from the JA collections called Kazak, were screened for DNA polymorphisms with six AFLP primer pairs: E.AGC_M.CAG, E.AGC_M.CAT, E.AGC_M.CTG, E.AGG_M.CAA, E.AGG_M.CAC, and E.AGG_M.CAG. AFLP reactions were conducted according to Vos et al. (1995), except that fluorescently labeled primers were used and detected on an ABI3730 (Applied Biosystems, Foster City, CA). Size standards were spiked into each reaction to assure band-length validity. Estimates of similarity were obtained using the method described by Leonard et al. (1999), and analysis of molecular variance and diversity were estimated as *per* Excoffier et al. (1992). Phylogenetic trees were constructed using UPGMA cluster methods in PAUP (Swofford, 2001).

Seeded Trials

Between 2002 and 2005, fall seeded evaluation trials were established to compare seedling establishment, persistence, and forage yield of Vavilov II and Vavilov at Yakima WA (46°50′47″ N 120°22′18″ W; elevation 704 m); Guernsey WY (42°15′46″ N 104°48′01″ W; elevation 1429 m); Fillmore UT (39°10′50″ N 112°14′27″ W; elevation 1769 m); Snowville ID (42°01′15″ N 112°39′09″ W; elevation 1432 m); and Malta ID (42°14′21″ N 113°08′09″ W; elevation 1650 m). Plots were arranged in a randomized complete block with four replications. Entries were seeded at a rate of one pure live seed cm^{-1} in five rows. Plot size was 1.5 meters wide by 8 meters long.

Seedling Establishment

Selection for improved seedling establishment followed the methods reviewed by Johnson and Asay (1993)**,** where they showed a strong correlation to a plants ability to emerge from a deep planting depth in the greenhouse and ability to germinate and establish rapidly when planted ¼ inch deep under dryland conditions. One hundred seeds (PLS) of each entry were placed at the bottom of 7.6-cm (3.0 in) trenches and then covered with soil. Benches were watered daily, and rate of emergence determined according to Maguire (1962).

Seedling establishment and persistence were measured as a plant density frequency using the grid system described by Vogel and Masters (2001). Frequency was determined by laying a grid of 2 x 2-inch quadrats over the drilled rows and determining the percentage of quadrats containing at least one seedling (100% stand if a seedling/plant occurs in every quadrant [48]). This was repeated three times along the 8 meter row for a total of 144 quadrats.

Forage Yield

Estimates of forage dry matter yield (DMY) were estimated by sub sampling three 1 meter squares within each plot. Samples were oven dried to a constant weight and weighed.

RESULTS and DISCUSSION

'Vavilov II' Siberian wheatgrass (*Agropyron fragile* (Roth) Candargy) Reg. No. CV-__, PI_____) was developed by The United States Department of Agriculture - Agricultural Research Service, the United States Army - Engineer Research and Development Center, Utah State Agricultural Experiment Station, and the United States Department of Agriculture - Natural Resources Conservation Service for use on arid and semiarid rangelands as a rapid establishing revegetation grass in the Intermountain West, Great Basin, and Northern Great Plains Regions of western U.S.A. Vavilov II is a broad-based 50 clone synthetic that was developed and tested as part of the Strategic Environmental Research and Development Program (SERDP) project CS-1103 to identify resilient plant characteristics and develop wear resistant plant cultivar(s) for use on military training lands. Vavilov II was evaluated in field trials as Vavilov-Select, SERDP Siberian wheatgrass, and 9076515 (NRCS). Vavilov II was selected for persistence and overall plant and seedling establishment in response to drought. Vavilov II expands the genetic base of the cultivar Vavilov and has been evaluated extensively on rangeland ecological sites in the western United States with seedling establishment and forage yield superior to the commercially available cultivar Vavilov.

Morphological Characterization

When combined over locations (Nephi and Blue Creek, UT) (Table 1), 'Vavilov II' is significantly ($P<0.05$) taller (64.2 cm) than 'P-27' (58.2 cm), but similar in plant height to

'Vavilov' (63.4 cm). Flag leaves in Vavilov II were oriented significantly ($P<0.05$) higher on the culm (40.3 cm) and wider (3.1 mm) than P-27. Spikes of Vavilov II were significantly ($P<0.05$) shorter (8.2 cm) than Vavilov (9.1 cm), but similar to P-27 (7.8). Vavilov II had significantly ($P<0.05$) longer lemmas (7.4 mm) than P-27 (6.4 mm), but similar to Vavilov (7.2 mm). Lemma and glume awn lengths in Vavilov II are significantly ($P<0.05$) longer than P-27. The ratio of spike length/width proved highly diagnostic when separating Vavilov II from Vavilov and P-27 (Table 1). The ratio of spike length/spike width is significantly ($P<0.05$) lower than Vavilov and P-27 (Table 1). Non diagnostic morphological traits included flag leaf length, spike width, lemma width, glume length and width. Heading and flowering dates at Blue Creek and Nephi, UT were the third week in May and first week in June, respectively. Vavilov II Siberian wheatgrass is an autotetraploid ($2n=4x=28$; PPPP) and has the same ploidy level and genomic composition as the commercially available cultivars P27 and Vavilov.

Molecular Characterization

Amplified fragment length polymorphisms (AFLP) were used to compare Vavilov II to other released cultivars of Siberian wheatgrass. The six AFLP primer pairs amplified 728 bands that were present in more than 5% and less than 95% of the individuals. The average number of AFLP bands ranged from 239 for P27 to 255 for Kazak Siberian wheatgrass and Vavilov II. The average number of pairwise differences within cultivars ranged from 203 to 218 bands, while the average number of pairwise differences between varieties was 226 to 247 bands. Across all four varieties, 88% of variation is within, while 12% is between. The most similar cultivars were Vavilov and Vavilov II. The results are consistent with the pedigree of the four varieties. A phylogenetic tree was generated using cluster analysis (UPGMA) based on the average pairwise

differences between varieties (Figure 1). The significant variation between varieties allows for molecular markers that distinguish the varieties (Table 2).

Seedling Establishment

Rapid seedling establishment is one of the primary keys to a successful revegatation planting in the western United States. Selection emphasis in Vavilov II Siberian wheatgrass was on seedling establishment and plant persistence. During the establishment year, Vavilov II had significantly ($P<0.05$) higher numbers of seedlings per unit area (m^2) using a frequency grid when planted at a rate of one pure live seed (PLS) per cm at Yakima, WA (est. fall 2002; 52 vs 23%), Fillmore, UT (est. fall 2004; 79 vs 54%), Dugway, UT (est. fall 2005; 79 vs 52%), and Curlew Valley, ID (est. fall 2002; 70 vs 40%) (Figure 2). In persistence after establishment, as measured by percent stand, Vavilov II was significantly more persistent than Vavilov at Yakima, WA (68 vs 44%); Fillmore, UT (84 vs 62%); Curlew Valley, ID (69 vs 55%), and Malta, ID (97 vs 91%) (Figure 3). Dry matter yields (64 cm x 38cm plot) combined across Yakima, WA and Guernsey, WY, were significantly ($P<0.05$) greater in Vavilov II (53 g $plot^{-1}$) than Vavilov (39 g $plot^{-1}$). Vavilov II germinated in seven days compared to 10 days for Vavilov on three different soil types (sandy loam, loam, and sand).

NRCS planted Vavilov II along with 58 other accessions of grasses, forbs, and shrubs at the Coffee Point test site about 25 miles northwest of Aberdeen, ID (200-300 mm (8- 12 in) mean annual precipitation) in November 2006. Plant density data was collected using a frequency grid on May 1, 2007. Vavilov II had the highest plant density of all accessions evaluated at 15.9 plants per m^2 compared to 8.0 plants per m^2 for Vavilov. On September 7, 2007 the second evaluation was completed and Vavilov II had 15.7 plants per m^2 and Vavilov had 7.4

plants per m^2. During the establishment year, the site received about 127 mm (5 in) of annual precipitation.

Seed Availability

A Foundation Seed production field was established at the USDA – NRCS, Aberdeen Plant Materials Center in August 2005. In 2006, seed was harvested from the field and the total yield for the first production year was 1649 pounds (660 pounds per acre).

Breeder, Foundation, Registered, and Certified seed classes will be recognized. Breeder and Foundation seed will be maintained by the USDA-ARS Forage and Range Research Laboratory at Logan, UT and the USDA-NRCS Plant Materials Center at Aberdeen, ID. Protection under the U.S. Plant Variety Protection Act of 1994 will be applied for, with the requirement that seed of Vavilov II can be marketed only as a class of certified seed. No seed will be distributed without written permission for 20 years from the date of release 12 March 2008 by the USDA-Agricultural Research Service, at which time seed will also be available from the National Plant Germplasm (NPGS). Foundation seed is available through the following contacts: 1) Utah Crop Improvement Association (435) 797-2082; sayoung@mendel.usu.edu) and 2) University of Idaho Foundation Seed Program (208) 423-6655; Williams@kimberly.uidaho.edu).

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Figure Headings

Figure 1. A phonetic tree based on UPGMA cluster analysis of the average pairwise differences among cultivars. Twelve plants per cultivar we used in the analysis.

Figure 2. Seedling establishment (% stand) measured during establishment year at five western range sites comparing Vavilov II with Vavilov.

Figure 3. Persistence (% stand) measured after the establishment year at five western range sites comparing Vavilov II with Vavilov.

Table 1. **Morpholgical Summary - Nephi and Blue Creek, UT. Planted April 2004**

**** Analysis included 10 reproductive culms (different plants) per replication (4-replications)**

Morphological Traits:		Vavilov II	Vavilov	P-27	LSD (P<0.05)
Plant Height (cm)	Mean	64.2	63.4	58.2	4.9
	Range	38.5-130.2	26.0-100.2	35.0-87.3	
Flag leaf height (cm)	Mean	40.3	39.3	34.0	4.2
	Range	15.1-68.2	7.0-63.5	11.4-55.8	
Flag leaf length (cm)	Mean	10.2	11.7	8.5	4
	Range	3.2-21.0	4.0-24.7	2.5-22.0	
Flag leaf width (mm)	Mean	3.1	2.8	2.6	0.4
	Range	1.5-6.0	2.0-5.0	1.0-6.0	
Spike length (cm)	Mean	8.2	9.1	7.8	0.7
	Range	5.0-12.5	4.8-22.4	4.0-18.1	
Spike width (mm)	Mean	1.1	1.0	0.9	0.2
	Range	0.5-2.2	0.6-1.6	0.5-2.7	
First lemma length (mm)	Mean	7.4	7.2	6.4	0.5
	Range	5.0-12.0	4.5-10.5	5.0-12.0	
First lemma width (mm)	Mean	1.1	1.2	1.1	0.1
	Range	1.0-2.0	0.9-2.5	0.9-2.0	
First lemma awn length (mm)	Mean	0.9	0.8	0.4	0.4
	Range	0.0-4.0	0.0-3.5	0.0-4.5	
First glume length (mm)	Mean	6.1	5.6	5.4	0.6
	Range	3.0-10.0	3.5-9.0	2.2-9.5	
First glume width (mm)	Mean	1.0	1.1	1.1	0.1
	Range	0.6-2.0	0.5-2.0	0.6-2.0	
First glume awn length (mm)	Mean	1.9	1.7	1.2	0.4
	Range	0.0-6.0	0.0-4.5	0.0-4.5	
Spike length/width	Mean	8.2	9.5	9.5	0.9
	Range	3.7-15.8	4.3-22.4	2.4-30.2	

Table 2. Gene frequencies of four AFLP markers and four Siberian wheatgrass cultivars.

	Kazak freq	P27 freq	Vavilov freq	Vavilov II freq
E.AGC_M.CAT_171.4	0.08	0.58	0.67	1.00
E.AGC_M.CAT_111.1	0.17	0.08	0.33	0.83
E.AGG_M.CAG_364.7	0.25	0.00	0.00	0.58
E.AGG_M.CAG_190.3	0.00	0.50	0.50	0.83

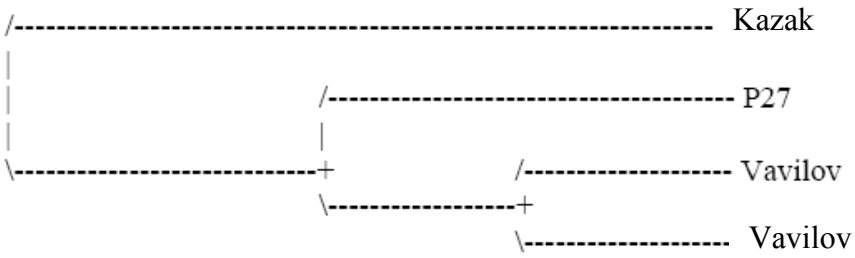


Figure 1. A phonetic tree based on UPGMA cluster analysis of the average pairwise differences among cultivars. Twelve plants per cultivar were used in the analysis.

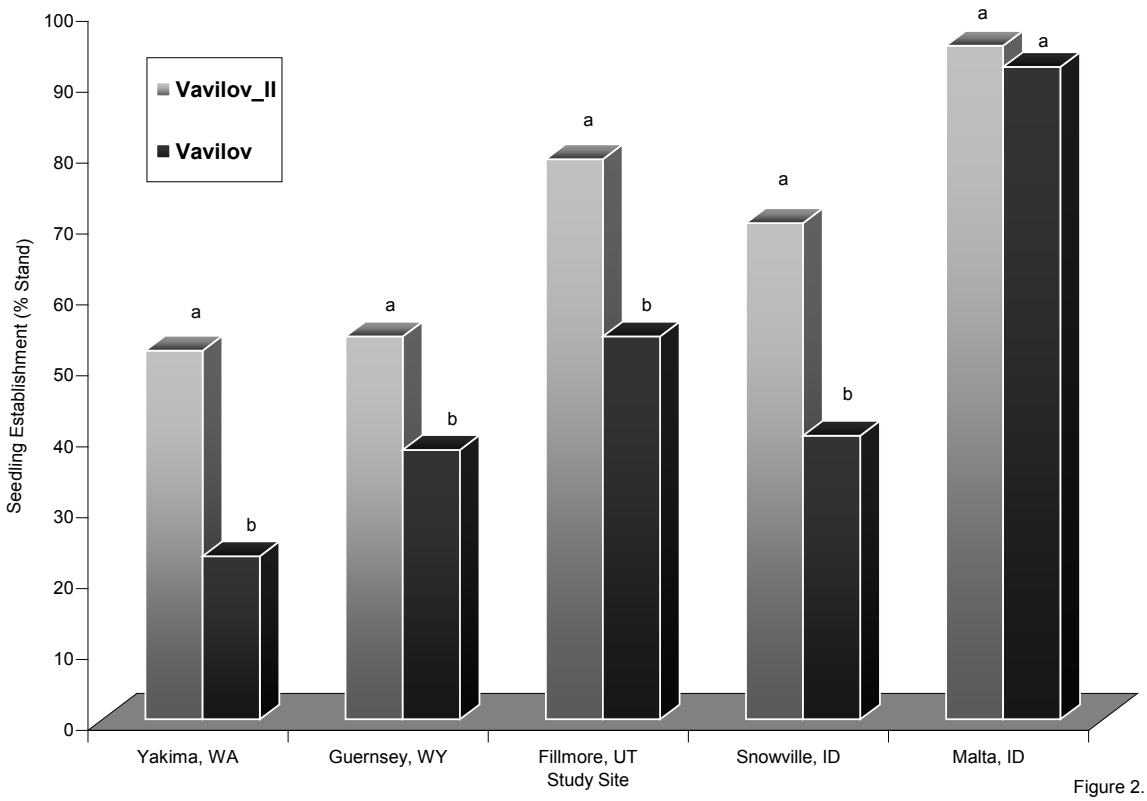

Vavilov_II
Vavilov
Seedling Establishment (% Stand)
100
90
80
70
60
50
40
30
20
10
0
a
b
a
b
a
b
a
b
a
a
Yakima, WA
Guernsey, WY
Fillmore, UT
Snowville, ID
Malta, ID
Study Site

Figure 2.

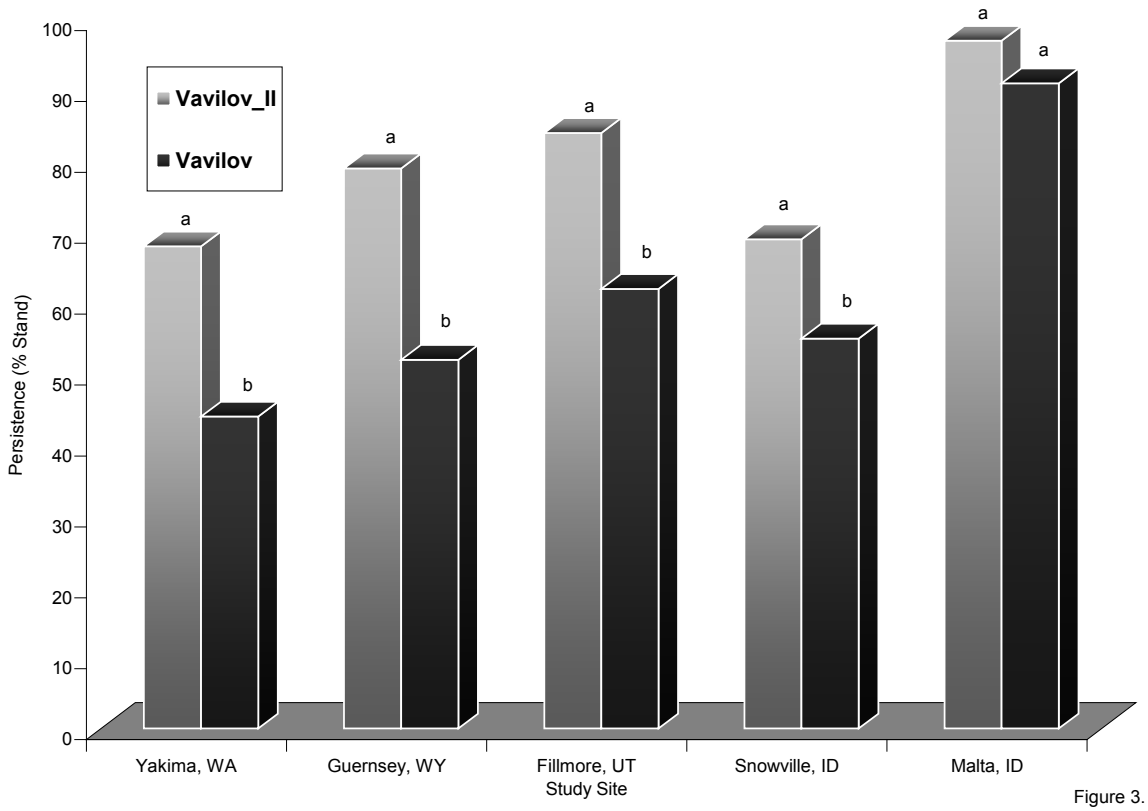

Persistence (% Stand)
100
90
80
70
60
50
40
30
20
10
0
Vavilov_II
Vavilov
a
b
a
b
a
b
a
b
a
a
Yakima, WA
Guernsey, WY
Fillmore, UT
Snowville, ID
Malta, ID
Study Site

Figure 3.

ON-CENTER ACTIVITIES

FOUNDATION SEED PRODUCTION AT ABERDEEN PLANT MATERIALS CENTER (PMC)

A major responsibility of the Aberdeen PMC is the production of Foundation quality seed of the plant releases by the PMC. Foundation seed is made available to the University of Idaho Agricultural Experiment Station, Idaho Crop Improvement Association, Utah Crop Improvement Association, other plant materials centers and cooperating agencies. Seed is distributed as provided for by allocation and exchange or other written agreements. Foundation seed of recent releases may also be provided to soil conservation districts for registered or certified seed production under the District Seed Increase (DSI) program.

The following table illustrates seed shipments from the Aberdeen Plant Materials Center for Fiscal year 2000 through 2008:

Cultivar	2000	2001	2002	2003	2004	2005	2006	2007	2008	TOTAL POUNDS
					POUNDS PLS					
Anatone bluebunch wheatgrass	-	-	-	-	20	250	350	400	775	1795
Appar blue flax	320	300	470	65	0	848	955	150	150	3258
Bannock thickspike wheatgrass	275	250	550	25	0	1110	900	240	150	3500
Delar small burnet	451	150	75	0	1250	945	490	100	1225	4686
Ephraim crested wheatgrass	260	455	696	0	200	0	1300	300	500	3711
Goldar bluebunch wheatgrass	175	100	375	250	200	200	170	250	450	2170
Magnar basin wildrye	517	1035	490	150	245	0	0	490	50	2977
Maple Grove Lewis flax	-	-	-	-	240	280	70	0	0	590
Nezpar Indian ricegrass	900	150	75	340	0	300	500	700	150	3115
P-27 Siberian wheatgrass	150	200	500	0	0	0	0	200	200	1250
Penstemon, Venus "Clearwater Selection"	1	10	1	10	4	8	0	0	0	34
Penstemon, firecracker "Richfield Selection"	5	1	7	6	3	11	25	6	4	68
Paiute orchardgrass	101	450	200	0	0	0	75	200	50	1076
Regar meadow brome	670	1061	207	50	50	0	650	50	400	3138
Rush intermediate wheatgrass	215	525	0	0	0	800	300	500	0	2340
S.R.P. fourwing saltbush	-	-	25	5	2	16	0	0	0	48
Sodar streambank wheatgrass	860	500	500	200	0	625	775	250	400	4110
Tegmar dwarf intermediate wheatgrass	100	0	0	0	200	0	0	0	0	300
Northern Cold Desert winterfat	-	-	8	3	8	20	5	4	0	48
Vavilov II Siberian wheatgrass	-	-	-	-	-	-	-	-	600	600
TOTAL POUNDS	5,000	5,187	4,179	1,104	2,422	5,413	6,565	3,840	5,104	38,814

March 19, 2008

Aberdeen Plant Materials Center

2008 FIELD ANNUAL PLAN OF OPERATION
HOME FARM

Field	Acres	Crop	Operation
1	1.7	Display Nursery (2007)	Manage for display.
2E	1.3	Anatone (2007)	Manage for Certified seed production.
2W	1.0	Mountain Brome (Grand Teton NP - 2006)	Manage for seed production.
3	1.8	Anatone Bluebunch (2005)	Manage for Certified seed production.
4	1.4	Constructed Wetland Ponds	Establish and evaluate test plots according to study plan.
5	2.4	Rush (2008)	Establish and manage for Foundation seed production.
6	2.4	Anatone Bluebunch (2004)	Manage for Certified seed production.
7	3.2	Delar (2006)	Manage for cover and plow down.
8	3.2	Sodar (2008)	Establish and manage for Foundation seed production.
9	3.2	Green Manure	Establish annual legume for plow down.
10N	1.7	Green Manure	Establish annual legume for plow down.
10S	1.5	Potatoes	U of I will plant potatoes.
11N	1.1	Maple Grove (2008)	Establish and manage for Certified seed production.
11S	0.2	9076402 Mutton grass (2002)	Harvest seed and remove.
12	1.4	Buckwheat IEP (2007)	Evaluate and manage according to study plan.
		USFS Forbs (2004)	Evaluate for potential release.
		Great Basin Forbs (2005)	Evaluate for potential release.
13N	0.1	Penstemon (2003)	Manage for Certified seed production.
13S	0.25	Sandberg Bluegrass (Grand Teton NP - 2006)	Manage for seed production.
14	1.2	Woody Display Nursery (1995)	Maintain display of woody conservation plants. Manage Durar/Covar cover crop.
14S		Biofuel Study (2008)	Establish and evaluate according to study plan.

Aberdeen Plant Materials Center

2008 FIELD ANNUAL PLAN OF OPERATION

HOME FARM (Continued)

15	1.4	Field windbreak (2000)	Maintain Simon poplar field windbreak.
16	1.0	Fallow	Fallow as needed for weed control.
17	0.5	Hybrid Poplars (1998)	Manage and evaluate according to study plan.
18-19	0.9	Fourwing and winterfat (1999)	Manage for Certified seed production.
20	1.5	Grass Display Nursery (2002)	Manage for display. Remove late summer.

Aberdeen Plant Materials Center

2008 FIELD ANNUAL PLAN OF OPERATION

FISH AND GAME FARM

Field	Acres	Crop	Operation
21W	1.0	Bluebunch Wheatgrass (Grand Teton NP – 2008)	Establish and manage for seed production.
21M	1.3	Wildlife Food Plot	Establish and Maintain corn for wildlife use.
21E	1.4	Pipe yard (2004)	Maintain permanent yard for pipe storage.
21N	1.3	Bozoisky Cover crop (1985)	Maintain as needed for permanent cover.
22W	4.1	Alfalfa (2008)	Establish and manage for hay production and wildlife benefits.
22E	1.3	Willow IEP (1984)	Maintain as needed.
23W	2.4	Bozoisky Cover crop (2007)	Maintain as needed for permanent cover.
23M	--	Windbreak	Maintain and irrigate as needed.
23E	2.2	Wildlife Food Plot	Establish and Maintain corn for wildlife use.
24W	1.1	Windbreaks	Maintain and irrigate as needed.
24 M	2.2	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
24E	1.5	Durar Cover Crop	Maintain as needed for permanent cover.
25	5.1	Alfalfa (2003)	Manage for hay production and wildlife benefits.
26W	1.0	Bozoisky Cover crop (2005)	Maintain as needed for permanent cover.
26E	2.7	Willow Cutting Nursery (1994)	Maintain as needed.
27W	2.2	Bozoisky Cover crop (2005)	Maintain as needed for permanent cover.
27M	1.2	Bozoisky Cover crop (2007)	Maintain as needed for permanent cover.
27E	1.0	Slender Wheatgrass (Grand Teton NP - 2006)	Manage for seed production.
28	5.3	Alfalfa (2004)	Manage for hay production and wildlife benefits.
29W	1.3	Willows (1994)	Manage for cuttings.
29E	3.7	Alfalfa (2008)	Establish and manage for hay production and wildlife benefits.

Aberdeen Plant Materials Center

2008 FIELD ANNUAL PLAN OF OPERATION (continued)

FISH AND GAME FARM (continued)

Field	Acres	Crop	Operation
30W	0.7	Windbreak/Guard Row	Maintain and irrigate as needed.
30M	2.5	Wildlife Food Plot USFS Grasses (2005)	Establish and maintain wheat for wildlife use. Evaluate for potential release.
30E	2.3	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
31W	1.5	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
31E	3.75	DOD Western w.g. (2005)	Maintain for seed increase.
32	6.2	Windbreak IEP (1982)	Maintain as needed.

Any hay grown will not be cut prior to June 15 and not after September 1. Hay will be irrigated after last cut to first fall frost to achieve regrowth prior to winter dormancy.

Irrigated, permanent grass cover seedings will not be mowed prior to July 1 and not after August 1 and will be irrigated a minimum of 3 times. Non-irrigated grass cover seedings will not be mowed. Early mowing or mowing of non-irrigated grass cover requires notification to and inspection by Fish and Game.

BREWINGTON FARM (U of I)

Field	Acres	Crop	Operation
410W	2.0	DOD Siberian w.g. (2005)	Manage for Foundation seed production
411	4.5	Nezpar (2007)	Manage for Foundation seed production.

PEARL FARM

Field	Acres	Crop	Operation
S1	5.0	Alfalfa (2006)	Maintain for hay production and to improve soil quality.
S2	5.0	Alfalfa (2006)	Maintain for hay production and to improve soil quality.
S3	5.0	Alfalfa (2006)	Maintain for hay production and to improve soil quality.
S4W	1.0	Idaho Fescue (Grand Teton NP - 2008)	Establish and manage for seed production.

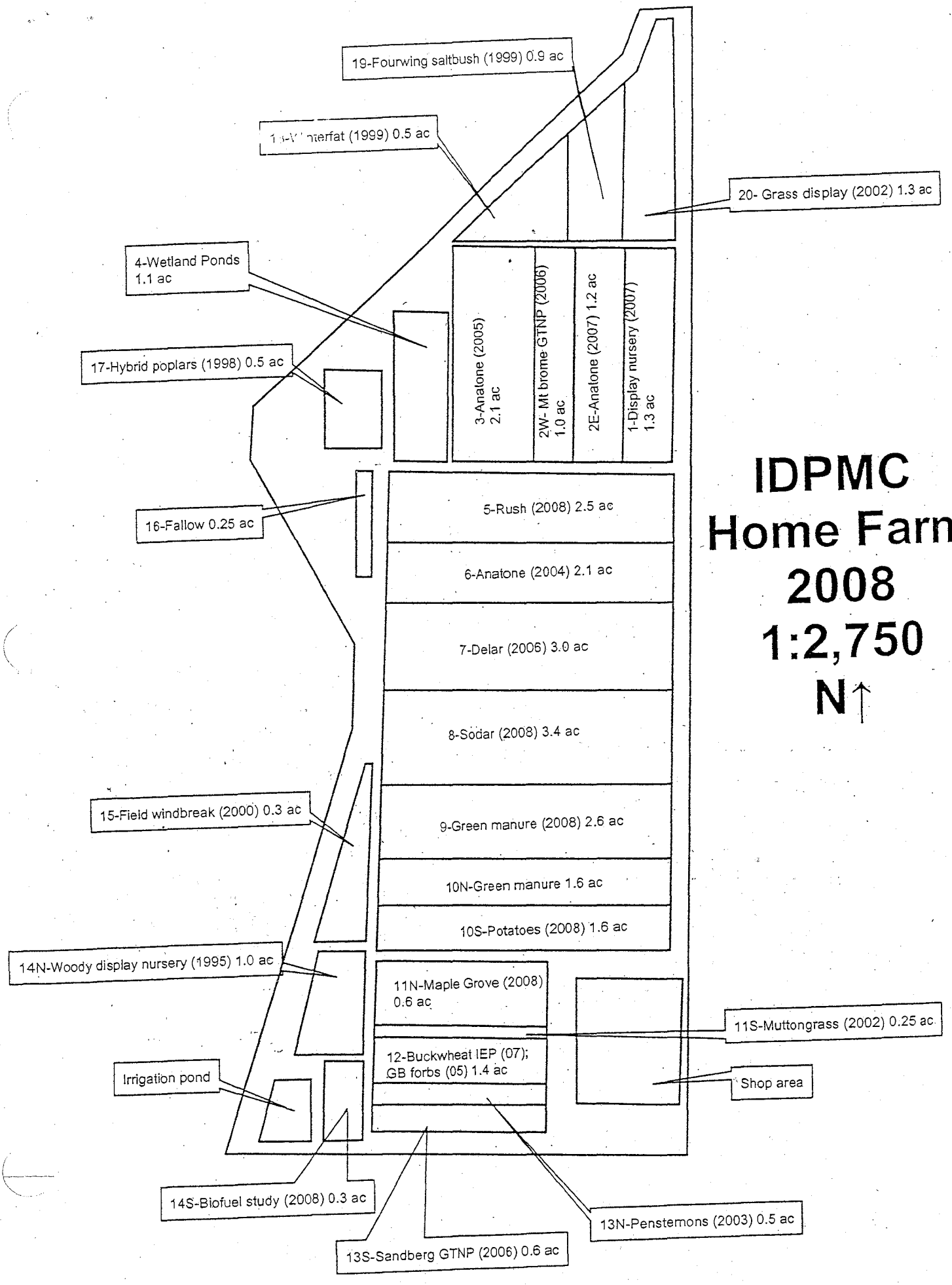
Aberdeen Plant Materials Center

2007 FIELD ANNUAL PLAN OF OPERATION (continued)

PEARL FARM (continued)

Field	Acres	Crop	Operation
S4E	1.0	Fallow	Fallow as needed for weed control.
S5W	2.5	Alfalfa (2007)	Maintain for hay production and to improve soil quality.
S5E	2.5	Western Wheatgrass (DOD – 2008)	Establish and manage for Foundation seed.
S6W	2.5	Magnar (2006)	Manage for Foundation seed production.
S6E	2.5	Goldar (2006)	Manage for Foundation seed production.
S7W	2.5	Blue Wildrye (Grand Teton NP - 2006)	Manage for seed production.
S7E	2.5	Bannock (2006)	Manage for Foundation seed production.
S8	2.2	Appar	Manage for Foundation seed production.

Maintain two-row windbreak (Rocky Mountain Juniper and Simon Poplar established on south and west farm borders.


19-Fourwing saltbush (1999) 0.9 ac
20- Grass display (2002) 1.3 ac
4-Wetland Ponds 1.1 ac
17-Hybrid poplars (1998) 0.5 ac
3-Anatone (2005) 2.1 ac
2W- Mt brome GTNP (2006) 1.0 ac
2E-Anatone (2007) 1.2 ac
1-Display nursery (2007) 1.3 ac
16-Fallow 0.25 ac
5-Rush (2008) 2.5 ac
6-Anatone (2004) 2.1 ac
7-Delar (2006) 3.0 ac
8-Sodar (2008) 3.4 ac
15-Field windbreak (2000) 0.3 ac
9-Green manure (2008) 2.6 ac
10N-Green manure 1.6 ac
10S-Potatoes (2008) 1.6 ac
14N-Woody display nursery (1995) 1.0 ac
11N-Maple Grove (2008) 0.6 ac
11S-Muttongrass (2002) 0.25 ac
12-Buckwheat IEP (07); GB forbs (05) 1.4 ac
Irrigation pond
Shop area
14S-Biofuel study (2008) 0.3 ac
13N-Penstemons (2003) 0.5 ac
13S-Sandberg GTNP (2006) 0.6 ac
IDPMC
Home Farm
2008
1:2,750
N

IDPMC
Fish and Game Farm
2008
1:2,750

N →

27W-Bozoisky cover (2005) 27M (2007) 3.2 ac

27E-Slender WG, GTNP (2006) 1.0 ac

28-Alfalfa (2004) 5.5 ac

29W-Willows (1994) 1.7 ac

29E-Alfalfa (2008) 3.7 ac

30W-Windbreak 0.7 ac

30M-Wheat (2008) 3.3 ac

30E-USFS R4 grass IEP 1.4 ac

31W-Wheat (2008) 1.5 ac

31E-DOD Western (2005) 3.6 ac

32-Windbreak IEP (1982) 6.0 ac

21W-PSSPS, GTNP (2008) 0.6 ac

21M-Corn (2008) 1.3 ac

21M-FEID,GTNP (2008) 0.6 ac

21E-Pipeyard 1.3 ac

21N-Bozoisky cover 1.3 ac

22W-Alfalfa (2008) 4.0 ac

22E-Willow IEP (1984) 0.9 ac

23W-Boz. cover (2007) 2.5 ac

23M-windbreak 0.3 ac

23E-corn (2008) 2.2 ac

24W-windbreak 0.5 ac

24M-wheat (2008) 2.2 ac

24W-windbreak 0.5 ac

24E-Durar cover 2.0 ac

25-Afalfa (2003) 5.0 ac

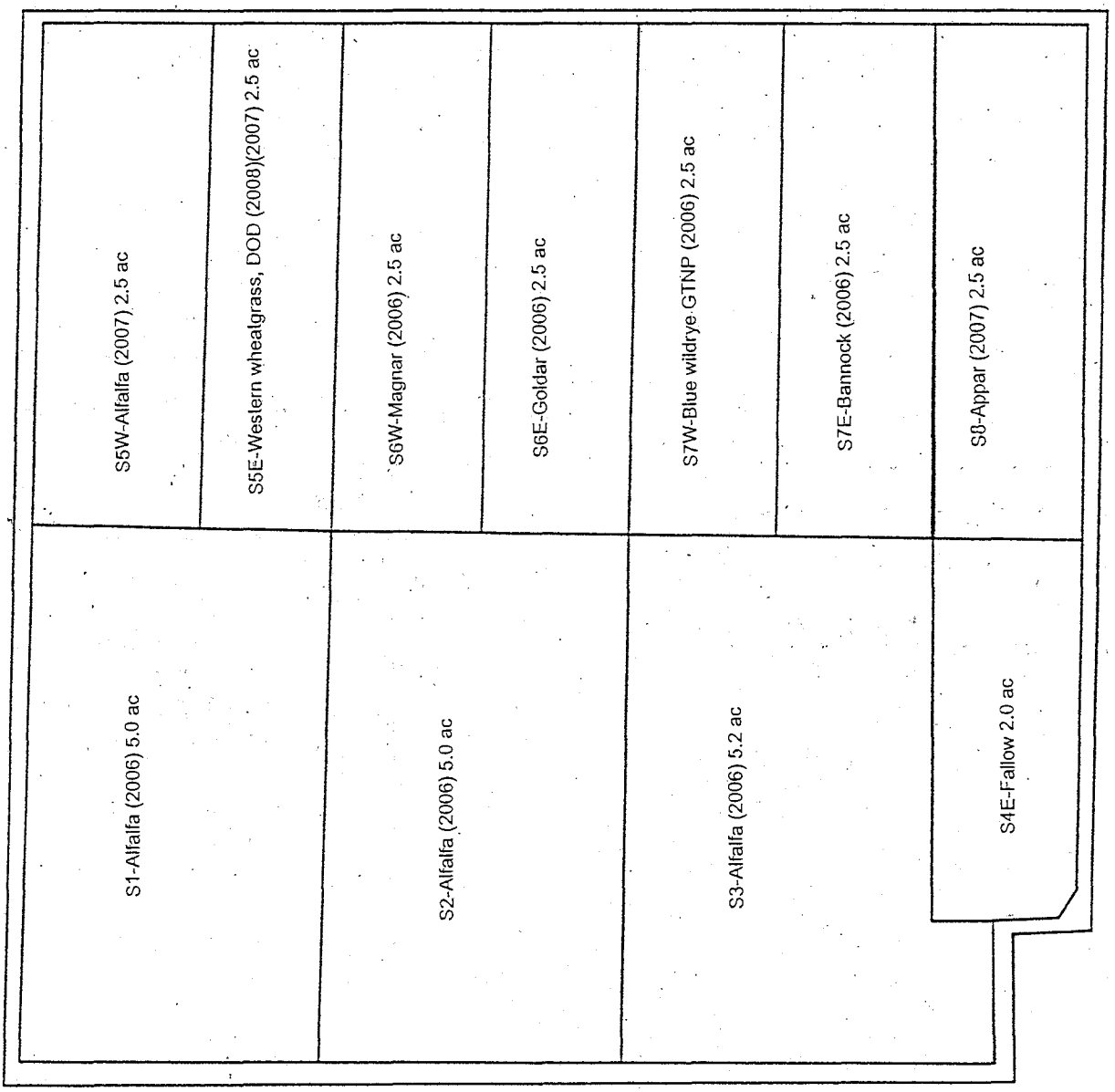
24W-windbreak 0.4 ac

26W-Boz. cover 0.5 ac

26E-Willow cutting nursery (1994) 2.7 ac

IDPMC
Pearl Farm
2008
1:2,000

N ↑



2008 Progress Report
Hybrid Poplar Initial Evaluation Planting
Field 17, Aberdeen PMC
Loren St. John, Team Leader

The purpose of the Hybrid Poplar Initial Evaluation Planting is to evaluate accessions of hybrid poplar currently being grown in Oregon and Washington for adaptability to northern Utah and the Upper Snake River Plain of southeast Idaho. Hybrid poplar used for fiber, fuel and other lumber products is becoming a large agroforestry business in Oregon, Washington, and western Idaho. Presently there is no commercial production of hybrid poplar in southeast Idaho or northern Utah.

Five accessions of hybrid poplar considered to be very productive and the most cold tolerant were obtained from Mount Jefferson Farms, Salem, Oregon. These accessions were planted in a complete randomized block design with 'Imperial', 'Siouxland', 'Robust', and 'Canam' poplar as standards of comparison. The cuttings planted were dormant, 9 inches long and approximately 3/4 inch in diameter. The standards of comparison were collected at the PMC after spring growth had initiated.

Weed barrier material was installed in the clean-tilled field prior to planting. The cuttings were then hand planted through the weed barrier on May 28, 1998 so that only one bud was above the soil surface. Planting a cutting with only one bud above the soil surface increases the chance that the cutting will develop a single trunk which is desirable for wood production. Weed control needs were minimal because of the installation of weed barrier material. On June 1, 1999 forty-three plots were re-planted that failed to establish the first growing season. The evaluation planting is irrigated with a solid-set handline sprinkler system.

Between-row weed control was accomplished with mechanical cultivation between 1998 and 2000. The between-row area was seeded to a mixture of 'Durar' hard fescue and 'Bighorn' sheep fescue (3.5 pounds PLS per acre of each species) in June, 2001. The grass seeding is well established and controlling weeds.

In March, 2008 before buds began to break dormancy, the trees were pruned to remove all side branches up to a height of 20 – 25 feet on the trees that were well established to encourage a single dominant trunk that is preferred for saw logs. No more than 50 percent of the branches on a single tree were removed. During the growing season sprouts and side branches below the prune line were removed periodically.

The plots were evaluated on September 17, 2008 and the data is summarized in Table 1. An Abney Level was used to measure plant height. Accession no. 9076418 (OP-367) continued to have the best survival. 9076418 (OP-367) was the tallest (mean plant height 18.7 m – 60.0 feet) and also had the largest D.B.H. (mean 36.9 cm – 14.5 inches). This accession continues to appear to be the best adapted to the soil and climate in the Snake River Plains of southeastern Idaho. Accession no. 9076418 (OP-367) also had the best vigor rating from the original planting in 1998. No destructive pests were observed on the plants this year.

Of the plots re-planted in 1999, Robust poplar continued to have the best survival and the tallest average height. Siouxland had the largest mean D.B.H. (21.9 cm – 8.6 inches) of the plots that were re-planted in 1999.

The planting will again be pruned during dormancy in late winter 2009 to reduce side branching and will be evaluated next fall. A summary of the annual evaluations from 1998 to 2009 will be prepared and the plots will be maintained indefinitely to evaluate longevity of the accessions.

Table 1.
2008 Evaluation Data
1998 Hybrid Poplar Initial Evaluation Planting

Accession Number	Number Survived	Percent Survival	Plant Height (m) Minimum	Mean	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	8	88.9	17.3	18.7	20.1	36.9	1.3
9076419 (184-411)	1	11.1	--	--	12.8	15.2	4.0
9076420 (50-197)	0	0.0	--	--	--	--	9.0
9076421 (52-225)	4	44.4	15.5	17.6	19.8	14.7	6.0
9076422 (15-29)	2	22.2	7.6	17.4	17.3	11.7	7.4
Canam	2	22.2	6.4	10.2	14.0	14.1	5.5
Robust	3	33.3	16.1	16.8	17.3	25.2	3.0
Siouxland	5	55.5	14.0	16.3	17.3	25.2	3.4
Imperial	5	55.5	12.8	14.1	15.5	27.3	3.6

Re-planted Hybrid Poplar 1999

Accession Number	Number Re-planted	Percent Survival	Plant Height (m) Minimum	Avg.	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	1	0	--	--	--	--	9.0
9076419 (184-411)	8	12	--	--	13.4	16.3	5.0
9076420 (50-197)	8	0	--	--	--	--	9.0
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	0	--	--	--	--	9.0
Canam	7	42	11.2	12.3	14.0	16.7	7.3
Robust	6	83	12.8	15.3	17.0	21.0	5.0
Siouxland	4	50	14.0	14.6	15.2	21.9	6.0
Imperial	4	0	--	--	--	--	9.0

[1/] D.B.H. is diameter at breast height (1.4 m from ground surface)
[2/] Rated 1 – 9, with 1 best, 9 worst

Project Title:

- Establishment and Maintenance of Certified Generation 1 (G1) Seed
- Propagation of Native Forbs
- Plant Display Nursery Evaluation
- Develop Technology to Improve the Diversity of Introduced Grass Stands

Location: NRCS Aberdeen, ID Plant Materials Center

Principal Investigators and Contact Information:

Loren St. John, Center Manager
Aberdeen Plant Materials Center,
P.O. Box 296, Aberdeen, ID 83210
(208)397-4133, fax (208)397-3104
Loren.Stjohn@id.usda.gov

Dan Ogle, Plant Materials Specialist, Boise, ID
USDA-NRCS, 9173 West Barnes Drive, Suite C, Boise, ID 83709.
(208) 685-6987, fax (208)378-5735
Dan.Ogle@id.usda.gov

Project Description: Production of Certified Generation 1 (G1) seed of Anatone Germplasm bluebunch wheatgrass, Maple Grove Germplasm Lewis flax, Snake River Plains Germplasm fourwing saltbush and Northern Cold Desert Germplasm winterfat to facilitate commercial seed production. Propagation of native forbs for evaluation and seed increase. Evaluation of display nursery near Boise, ID. Assist in development of technology to improve the diversity of introduced grass stands by evaluating methods to introduce native species into established plant communities. Equipment and Strategies to enhance the post-wildfire establishment and persistence of Great Basin native plants.

Seed Production

Anatone Germplasm bluebunch wheatgrass – Currently 5.2 acres are in production. Estimated seed yield from 2007 seed crop is 1,384 pounds. Shipped 400 pounds of Certified seed to commercial growers in 2007.

Maple Grove Germplasm Lewis Flax – Seed fields established in 2005 (3.2 acres) and 2006 (3.2 acres) were contaminated with 'Appar' blue flax so harvested seed could not be certified. Attempts to rouge out Appar were unsuccessful. The field established in 2006 was used to conduct a herbicide tolerance trial in cooperation with the University of Idaho. No seed was shipped to commercial growers in 2006. The PMC will establish a new field in 2008 with stock seed to be provided by the FS Rocky Mountain Research Station.

Snake River Plains Germplasm fourwing saltbush – Estimated seed yield from 2007 crop is 24 pounds. No seed was requested by commercial growers in 2007.

Northern Cold Desert Germplasm winterfat – Estimated seed yield from 2007 crop is 8 pounds. Shipped 4 pounds of Certified seed to commercial growers in 2007.

Propagation of Native Forbs

The original project plan in 2005 was to propagate 8,000 plants total of *Lomatium dissectum* (LODI) fernleaf biscuitroot, *Lomatium grayii* (LOGR) Grays biscuitroot, *Lomatium triternatum* (LOTR) nineleaf biscuitroot, *Eriogonum umbellatum* (ERUM) sulphurflower buckwheat, *Penstemon deustus* (PEDE) hotrock penstemon, *Penstemon acuminatus* (PEAC) sharpleaf penstemon, and *Penstemon speciousus* (PESP) sagebrush penstemon in the greenhouse. Approximately 1000 plants each of ERUM and LOTR were to be transplanted at the PMC and remaining plants were to be made available to cooperators for transplanting at field sites. Due to no plant establishment of *Lomatium* species and minimal success with greenhouse propagation of *Penstemon* species, no plants were made available to cooperators. All plants that were successfully propagated in the PMC greenhouse were transplanted at the PMC during the 2005 growing season and direct dormant seeding of *Eriogonum*, *Lomatium* and *Penstemon* accessions were completed at the PMC in November 2005. Weed barrier fabric was installed to control weeds.

On May 8, 2007 the biscuitroot and sulphurflower buckwheat plots were treated with a wick application of 100 percent Roundup to control weeds and on June 18 they were also hand weeded. On June 20, 2007 survival counts were made and seed was harvested at seed ripeness and the results are shown in the following table:

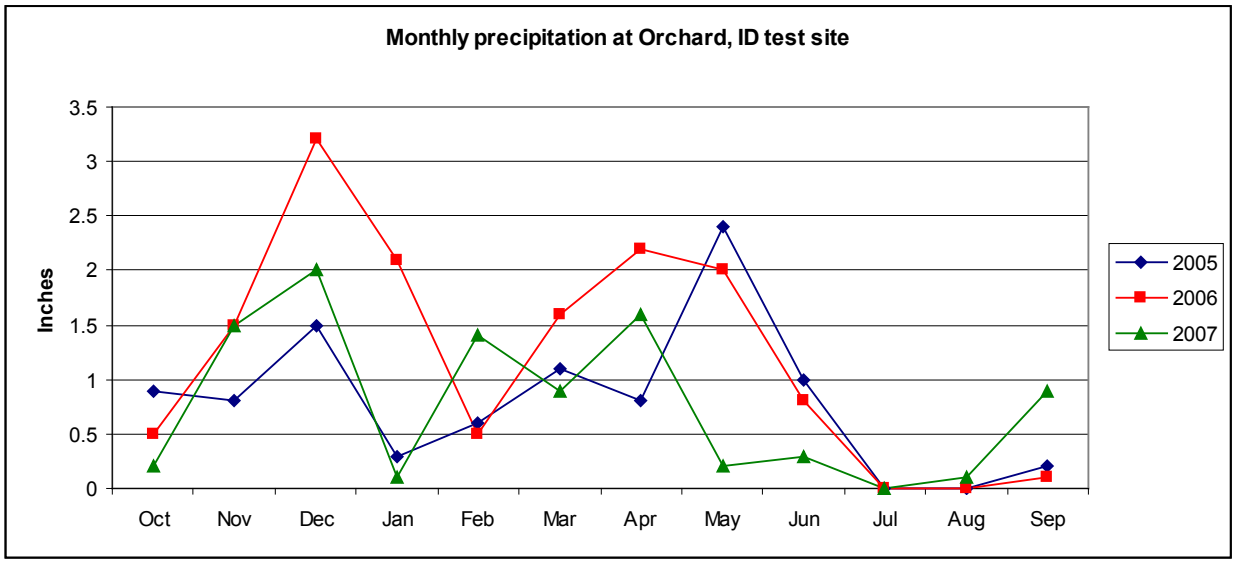
Species	Survival (percent)	Clean seed (pounds)
ERUM	40	4.0
LODI	25	NA
LOGR	70	NA
LOTR	71	NA
PEAC	68	8.0 (estimated)
PEDE	58	19.0 (estimated)
PESP	60	0.7

By early July, the *Lomatium* species had gone completely dormant. None of the *Lomatium* plants have yet to develop flowers. It is thought that most of their energy is still going to development of the tap root. In early November 2007 the dormant *Lomatium* plots were treated with a spray application of Roundup to control weeds that were still green. PEAC (a short-lived species) is beginning to die out.

Orchard Display Nursery
Evaluation Summary

Introduction

The Orchard Display Nursery was planted on November 16, 2004 in cooperation with the Great Basin Native Plant Selection and Increase Project. The nursery includes 82 accessions of 27 native and introduced grass, forb and shrub species. Each accession was planted in 7 X 60 foot plots. See Tilley et al (2005) for descriptions of the species and accessions planted. The remaining area was planted to a cover crop mix of 50% Anatone bluebunch wheatgrass, 20% Bannock thickspike wheatgrass, 20% Magnar basin wildrye and 10% Snake River Plains fourwing saltbush. The test site is located on a loamy 10-12 inch precipitation ecological site that historically supported a Wyoming big sagebrush - bluebunch wheatgrass – Thurber's needlegrass plant community. Total precipitation at the Orchard Test Site for water year 2005 was 9.6 inches, 2006 was 14.4 inches and total accumulated precipitation for 2007 was 8.5 inches (USDA 2007).



Materials and Methods

The Bureau of Land Management (BLM) burned the site in the fall of 2002. The site was later sprayed by PMC staff in May 2003 and May 2004 with a Roundup/2, 4-D herbicide mix to create a weed free seedbed. Due to limited breakdown of dead grass clumps that would inhibit proper seed placement with a drill and to ensure a clean seedbed, the decision was made to cultivate the site with a culti-packer just prior to seeding. During the first evaluation most plots contained high numbers of Russian thistle (*Salsola* sp.) and moderate amounts of bur buttercup (*Ranunculus testiculatus* Crantz) plants. Russian thistle plants were approximately two to three inches tall and the buttercup plants had already flowered. At the time of the second evaluation, there was a heavy infestation of tumble mustard (*Sisymbrium altissimum* L.). Plots were consequently sprayed again on June 9, 2005 with 16 oz. 2, 4-D and 8 oz. Clarity per acre to control the mustard.

The first evaluation of the plots for initial establishment was conducted on April 27, 2005 using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40 x 41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The first grid was laid on the rows approximately two grid lengths (80 inches) into the plot. Counts were made of the cells that contained at least one plant. Grids were subsequently flipped and evaluated three more times giving a total of 80 evaluated cells. Total area for one grid is approximately 1m². Total area evaluated is therefore approximately 4m². A conservative estimate of plant density (plants/m²) is the total number of cells containing at least one plant divided by four. The second evaluation occurred on May 25, 2005. The 2006 evaluation was conducted on May 31, and the 2007 evaluation took place on May 16. The methods followed in 2006 and 2007 were the same as described above; however, the frame was evaluated five times for a total of 100 cells or $5m^2$. Total counts were then divided by five for approximate plants/m^2. Numbers for approximate plants/m^2 were then divided by 10.8 to calculate approximate plants/ft^2. It is important to note that because cells with plants were counted and not number of plants per cell, the best possible score is 100 hits per five frames which converts to 20 plants/m^2 or 1.85 plants/ft^2. Actual plant density may be higher than the numbers indicated below. All tables have been arranged with accessions ranked from highest plant density to the lowest at the time of the second evaluation in 2005. Data were not analyzed for significance.

Native Grasses

There were forty-seven accessions of native grasses planted. Overall the native grasses established well considering the limited amount of precipitation received over the winter and early spring of 2005. Especially good stands were seen in the bluebunch wheatgrass and Snake River wheatgrass plots during 2005. There was a marked decrease in plant density between the first and second evaluations with some notable exceptions. Seven of nine bluebunch wheatgrass accessions and three of four Snake River wheatgrass accessions increased in density from the first evaluation to the second. This is possibly due to receiving 2.5 inches of precipitation during that period and/or from a lack of pressure by black grass bugs (*Labops* sp.). Most of the native grasses decreased steadily in density from 2005 to 2007.

In 2005 the best performing Indian ricegrass accession was White River, having a plant density of 0.56 plants/ft^2 during the first evaluation and 0.17 plants/ft^2 during the second evaluation. In 2006 and continuing to 2007 there were no plants of any Indian ricegrass accessions observed in the evaluation grids and very few seen within their respective plots.

In 2005 the squirreltail plots had as high as 0.54 plants/ft^2 with Fish Creek. In 2006 all squirreltail accessions had decreased. Fish Creek maintained the best plant density with 0.26 plants/ft^2. Densities remained essentially the same in 2007.

Bannock thickspike wheatgrass had a density of 1.04 plants/ft^2 and stayed essentially the same at the second evaluation of 2005. In 2006 Bannock had dropped to nearly half of

the original density to 0.58 plants/ft^2. The 2007 evaluations showed small declines from established plots.

Revenue and San Luis slender wheatgrass both showed zero plants/ft^2 in 2006. Pryor slender wheatgrass similarly dropped in density but had 0.02 plants/ft^2. In 2007 no slender wheatgrass plants could be found in any of the evaluated grids.

The western wheatgrass accessions had less dramatic declines in density from 2005 to 2006, but still showed poor stands with Rodan having the highest density of 0.13 plants/ft^2. In 2007 all accessions had zero plants surviving.

The bluebunch wheatgrass accessions had the highest average densities of all the native grasses. All decreased slightly in density from 2005 to 2006, but still maintained good stands. P-12, Wahluke and Jim Creek all had densities over 1.00 plants/ft^2. Columbia, Anatone, P-7 and P-15 had densities between 0.50 and 1.00 plants/ft^2 while P-5 and Goldar both shared low densities. In 2007 densities were generally slightly lower, but still higher than all other species as a whole. The highest density recorded in 2007 was Jim Creek at 1.07 plants/ft^2.

Snake River wheatgrass accessions had good densities the establishment year with three accessions having densities greater than 1.00 plants/ft^2. Numbers declined slightly yet steadily over the next two years. In 2007 the best density was from SERDP with 0.70 plants/ft^2.

The plant densities of the basin wildrye accessions also decreased from 2005 to 2006; U108-02 and Trailhead retained the highest densities at 0.24 and 0.26 plants/ft^2 respectively. By 2007 the best density was achieved by Trailhead with 0.17 plants/ft^2. U108-02 and U100-01 had similar densities with 0.11 and 0.13 plants/ft^2 respectively.

Sheep fescue stands remained poor from 2005 to 2006 with Covar slightly increasing from 0.00 to 0.07 plants/ft^2. In 2007 Covar still had 0.07 plants/ft^2, and Initial Point sheep fescue had decreased to 0.00 plants/ft^2.

Thurber's needlegrass had no plants in the evaluated grids for any year.

All five of the Sandberg bluegrass accessions increased in density from 2005 to 2006. The best stands were observed in the High Plains and Mountain Home plots with respective stands of 0.54 and 0.35 plants/ft^2. In 2007 all stands had been reduced to 0.0 plants/ft^2.

Species	Name or accession	4/27/05	5/25/05	5/30/06	5/16/07
		----------Plants/ft²----------			
Indian ricegrass	Rimrock	0.37	0.20	0.00	0.00
	White River	0.56	0.17	0.00	0.00
	Nezpar	0.42	0.17	0.00	0.00
	Ribstone	0.14	0.09	0.00	0.00
	Paloma	0.05	0.00	0.00	0.00

Squirreltail	Fish Creek	0.97	0.54	0.26	0.22
	Sand Hollow	0.37	0.20	0.19	0.20
	Shaniko Plateau	0.81	0.52	0.06	0.09
	Toe Jam Creek	0.58	0.17	0.00	0.00
	9019219	0.02	0.02	0.00	0.00
Thickspike wheatgrass	Bannock	1.04	1.07	0.58	0.43
	Schwendimar	0.69	0.52	0.39	0.24
	Critana	0.90	0.56	0.24	0.17
	Sodar	0.37	0.30	0.15	0.07
Slender wheatgrass	Revenue	1.00	0.93	0.00	0.00
	San Luis	0.60	0.69	0.00	0.00
	Pryor	0.30	0.30	0.02	0.00
Western wheatgrass	Rodan	0.28	0.35	0.13	0.00
	Rosana	0.05	0.20	0.04	0.00
	Arriba	0.16	0.15	0.06	0.00
Bluebunch wheatgrass	Jim Creek	0.83	1.02	1.02	1.07
	Wahluke	0.97	1.26	1.02	0.98
	P-12	1.34	1.59	1.04	0.89
	Columbia	1.30	1.23	0.84	0.83
	Anatone	0.81	1.15	0.80	0.69
	P-7	0.93	1.15	0.67	0.57
	P-15	0.60	0.93	0.54	0.50
	Goldar	0.51	0.37	0.33	0.19
	P-5	0.42	0.61	0.22	0.13
Snake River wheatgrass	SERDP	1.02	0.94	0.67	0.70
	Secar	1.00	1.11	0.76	0.56
	Expedition	1.27	1.44	0.54	0.41
	E-26	0.21	0.23	0.22	0.13
Basin wildrye	Trailhead	0.60	0.52	0.26	0.17
	U100-01	0.53	0.41	0.11	0.13
	U108-02	0.56	0.57	0.24	0.11
	Washoe	0.21	0.09	0.09	0.06
	Magnar	0.28	0.22	0.04	0.04
	U70-01	0.30	0.22	0.02	0.02
Sheep fescue	Covar	0.16	0.00	0.07	0.07
	Initial Point	0.21	0.04	0.02	0.00
Thurber's needlegrass	Thurber's	0.00	0.00	0.00	0.00
Sandberg bluegrass	High Plains	0.25	0.00	0.54	0.00
	Sherman	0.00	0.00	0.02	0.00
	Mountain Home	0.00	0.00	0.35	0.00
	Toole County, MT	0.00	0.00	0.04	0.00
	Hanford Source	0.00	0.00	0.19	0.00

Introduced Grasses

Although many of the introduced grass accessions had fair emergence, an outbreak of black grass bugs at the time of the first evaluation in 2005 was noted. The infestation appeared limited to the introduced grass section of the nursery. Plants were covered with yellow spots making the plants appear yellow-green overall. Although most of the stands of the introduced grasses decreased from the first to the second evaluation, many stands had recovered and increased by 2006 indicating that many plants thought to be dead during the second evaluation in 2005 were still alive. However, the plants of crested wheatgrass were very small when compared to the other wheatgrass accessions in the nursery and still appear to be recovering from black grass bug pressure. The 2007

evaluation showed all established plots with reduced densities, many accessions dropping out completely.

In 2006 all of the crested wheatgrass accessions increased in density or remained approximately where they were in 2005. Ephraim rose from 0.28 to 1.23 plants/ft^2; however, many of the plants were small in size due to the black grass bug infestation during the spring of 2005. In 2007 the best density was obtained from Nordan with 0.67 plants/ft^2. Ephraim had dropped from 1.23 to 0.02 plants/ft^2.

Both Siberian wheatgrass accessions similarly increased from 2005 to 2006, but decreased in 2007. In 2007 Vavilov was down to 0.26 plants/ft^2 and P-27 had 0.00 plants/ft^2.

The three pubescent wheatgrass accessions decreased from 2005 to 2006 with the highest density in 2006 coming from Manska at 0.28 plants/ft^2. Manska continued to have the best density in 2007 with 0.13 plants/ft^2.

Rush intermediate wheatgrass, had 0.00 plants/ft^2 in 2006 and 2007.

Prairieland and Eejay Altai wildrye had zero plants in 2006. Pearl Altai wildrye had 0.02 plants/ft^2. In 2007 Prairieland and Eejay again had 0.00 plants/ft^2 and Pearl increased slightly to 0.04 plants/ft^2.

The Russian wildrye accessions all increased in density with the exception of Tetracan which decreased slightly. The best stand was recorded in the Bozoisky Select plot with 0.58 plants/ft^2. Bozoisky select had the best stand in 2007 with 0.35 plants/ft^2. Bozoisky II had the next best rating with 0.26 plants/ft^2.

Species	Name or accession	4/27/05	5/25/05	5/30/06	5/16/07
		----------Plants/ft²----------			
Crested wheatgrass	Nordan	1.30	1.19	1.10	0.67
	Roadcrest	1.30	0.07	0.52	0.19
	Hycrest	0.39	0.24	0.15	0.07
	Ephraim	0.65	0.28	1.23	0.02
	CD-II	0.56	0.24	0.20	0.00
	Douglas	0.28	0.04	0.09	0.00
Siberian wheatgrass	Vavilov	0.65	0.20	0.61	0.26
	P-27	0.09	0.02	0.33	0.00
Pubescent wheatgrass	Manska	0.69	0.65	0.28	0.13
	Greenleaf	0.60	0.59	0.15	0.09
	Luna	0.79	0.54	0.13	0.00
Intermediate wheatgrass	Rush	0.60	0.56	0.00	0.00
	Pearl	0.35	0.15	0.02	0.04
Altai wildrye	Prairieland	0.56	0.39	0.00	0.00
	Eejay	0.16	0.28	0.00	0.00
Russian wildrye	Bozoisky Select	0.72	0.54	0.58	0.35
	Syn-A (Bozoisky II)	0.21	0.13	0.24	0.26
	Mankota	0.46	0.28	0.32	0.19
	Tetracan	0.42	0.20	0.17	0.07

Forbs and Shrubs

Despite some good stands in 2005, all of the forb and shrub accessions except for Eagle yarrow had zero plants during the 2006 evaluation. Eagle had 0.07 plants/ft^2 in the frequency grids along with a small stand of plants at one end of the seeded plot. In 2007 more plants of Eagle had either germinated from the original seeding, or seed had spread from established plants. Plant density for Eagle in 2007 equaled 0.24 plants/ft^2. Snake River Plains fourwing saltbush also had a single plant found in the plots, increasing its density from 0.00 to 0.02 plants/ft^2.

Species	Name or accession	4/27/05	5/25/05	5/30/06	5/16/07
		----------Plants/ft²----------			
Western yarrow	Eagle	0.51	0.50	0.07	0.24
	Great Northern	0.19	0.09	0.00	0.00
Utah sweetvetch	Timp	0.14	0.02	0.00	0.00
Firecracker penstemon	Richfield Selection	0.02	0.02	0.00	0.00
Scarlet globemallow		0.00	0.00	0.00	0.00
Lewis flax	Maple Grove	0.42	0.15	0.00	0.00
Blue flax	Appar	0.90	0.26	0.00	0.00
Wyoming big sagebrush		0.02	0.02	0.00	0.00
Fourwing saltbush	Snake River Plains	0.00	0.00	0.00	0.02
	Wytana	0.00	0.00	0.00	0.00
	Rincon	0.00	0.00	0.00	0.00
Gardner's saltbush	9016134	0.00	0.00	0.00	0.00
Winterfat	Hatch	0.28	0.17	0.00	0.00
	Northern Cold Desert	0.00	0.00	0.00	0.00
	Open Range	0.00	0.00	0.00	0.00
Forage kochia	Immigrant	0.00	0.00	0.00	0.00

Cover Crop

The cover crop consisted of a four species mix which contained: 50% Anatone bluebunch wheatgrass, 20% Bannock thickspike wheatgrass, 20% Magnar basin wildrye and 10% Snake River Plains fourwing saltbush. Four grids were examined during the first evaluation in 2005, one on each side of the nursery, and five grids were evaluated at the time of the second evaluation in 2005 and the 2006 evaluation. Total plant density was estimated at 0.37 plants/ft^2 at the first evaluation and 0.57plants/ft^2 at the second evaluation. In 2006 the cover crop density was 0.13 plants/ft^2. Cover crop densities increased in 2007 up to 0.20 plants/ft^2.

Discussion

Despite large amounts of Russian thistle, native and introduced grasses had fair to good emergence and plant density during the establishment year. Germination and emergence might have increased with more precipitation during March and April, 2005 but emergence was good with the rain that was received. The majority of the plots showed decreased stands from 2005 to 2006 and again into 2007. The low precipitation at the site, especially the lack of moisture in July and August every year seems to have eliminated many of the less drought tolerant accessions. One concern is the effect of black grass bugs on the introduced grasses. Plants subjected to black grass bug are normally affected by decreased seed yield and a reduction in palatability. Infestations rarely result in the death of established plants, but in low water years establishing plants

may be under enough stress to kill the establishing seedlings (Hammon and Peairs 2001). The second evaluation in 2005 indicated a loss in plant densities; however it appears that many of the plants survived, although stunted, through 2006. In 2007 many more plants had died out leaving poor or no stands in many plots. Snake River and blue bunch wheatgrass had consistently good stands from essentially all accessions. Introduced species like crested wheatgrass and Russian wildrye also had good performers such as Nordan and Bozoisky select.

Future evaluations will provide more information on plant establishment, persistence and longevity. The PMC staff will continue to evaluate plant performance at the site.

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Develop Technology to Improve the Diversity of Introduced Grass Stands

The PMC assisted Brigham Young University (BYU) Provo, UT and the Agricultural Research Service (ARS) Burns, OR in developing technology to improve the diversity of introduced grass stands by evaluating methods to introduce native species into established introduced plant communities. In 2005, the PMC modified a Truax Rough Rider range drill, mixed the seed and rice hull mixtures and completed the first year of seedings at sites in Utah and Oregon. In 2006, modified seed drop boots by the manufacturer were installed on the Truax drill and the second year of seeding was completed. In addition to these seedings, the PMC also seeded drill comparison trials near Elko, NV on recently burned rangeland to compare the Truax drill to the Kemmerer drill, a standard range drill used by BLM. The Truax drill is designed to both broadcast and drill seed in the same pass so species that require broadcasting or very shallow planting depth were broadcast and the deeper seeded species were drill seeded in alternating rows.

In 2007, seeding trials were scheduled to be planted near Elko, NV. However, seedbed preparation was unable to be completed. Trials have been rescheduled to the fall of 2008.

Equipment and Strategies to Enhance the Post-wildfire Establishment and Persistence of Great Basin Native Plants

The objectives of this project are to: examine seeding techniques for Wyoming big sagebrush; test seeding technology for native species, particularly native forbs; compare the ability of a modified rangeland drill and an experimental minimum-till drill to plant native seeds of diverse size and to reduce surface disturbance; apply and examine the use of USGS proposed monitoring protocols for gauging seeding success for both the short and long term; and provide plantings for long-term examination of livestock on diversity in native seedings.

The minimum-till drill (Truax Rough Rider range drill) which has been modified by PMC personnel was provided by the FS Rocky Mountain Research Station. The PMC provided a trailer and tractor and the Utah Division of Wildlife provided an additional tractor. The modified rangeland drill (Kemmerer range drill) was provided by the BLM.

The PMC mixed the seed and rice hull mixtures and calibrated the drills prior to seeding. The PMC also made a modification to the Kemmerer drill by replacing the existing drop tubes with used aluminum 3 inch diameter irrigation pipe to facilitate seed flow to the drill openers. The aluminum pipe provided a more slippery surface for the seed to flow. The drills were set up to both broadcast and drill seed in the same pass so species that require broadcasting or very shallow planting were broadcast and the deeper seeded species were drill seeded in alternating rows.

Wildfire sites near Mountain Home, ID and Burns, OR were seeded during the week of October 28, 2007. A total of approximately 184.3 acres were seeded in plots to the following mixes:

Cover Crop Mix
24.3 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Rimrock Indian ricegrass	4.5	5.25
Anatone bluebunch wheatgrass	4.0	4.64
Rice Hulls		6.16

Drill Mix
80.0 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Rimrock Indian ricegrass	1.0	1.17
Munro globemallow	0.50	0.94
Anatone bluebunch wheatgrass	2.0	2.32
Toe Jam Cr. b. squirreltail	1.0	1.09
Sulphurflower buckwheat	0.24	0.39
Rice Hulls		1.79

Mountain Home 10X Broadcast Mix

5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	1.30	6.22
Rubber rabbitbrush	0.50	1.85
Hotrock penstemon	0.09	0.16
Mtn. Home Sandberg bluegrass	0.40	0.48
Rice Hulls		5.05

Mountain Home 5X Broadcast Mix

30 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.65	3.11
Rubber rabbitbrush	0.50	1.85
Hotrock penstemon	0.09	0.16
Mtn. Home Sandberg bluegrass	0.40	0.48
Rice Hulls		5.05

Mountain Home Standard Broadcast Mix

5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.13	0.62
Rubber rabbitbrush	0.50	1.85
Hotrock penstemon	0.09	0.16
Mtn. Home Sandberg bluegrass	0.40	0.48
Rice Hulls		3.54

Burns 10X Broadcast Mix

5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.95	3.25
Rubber rabbitbrush	0.50	1.85
Hotrock penstemon	0.09	0.16
Mtn. Home Sandberg bluegrass	0.40	0.48
Rice Hulls		8.03

Burns 5X Broadcast Mix

30 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.45	1.54

Rubber rabbitbrush	0.50	1.85
Hotrock penstemon	0.09	0.16
Mtn. Home Sandberg bluegrass	0.40	0.48
Rice Hulls		6.62

Burns Standard Broadcast Mix

5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.10	0.34
Rubber rabbitbrush	0.50	1.85
Hotrock penstemon	0.09	0.16
Mtn. Home Sandberg bluegrass	0.40	0.48
Rice Hulls		3.81

It is planned to be repeat these trials in the fall of 2008. Location of the trials to be determined based on areas that burn during the 2008 fire season.

Publications

(Available online at http://plant-materials.nrcs.usda.gov/idpmc/publications.html)

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St. John, L., Tilley, D.J. and D.G. Ogle. 2006. Plants for Solving Resource Problems - Northern Cold Desert Winterfat. Aberdeen Plant Materials Center, Aberdeen, Idaho. November 15, 2006. 2p. Release Brochure.

St. John, L., Tilley, D.J., and D.G. Ogle. 2006. Plants for Solving Resource Problems - Snake River Plains Germplasm Fourwing Saltbush. Aberdeen Plant Materials Center, Aberdeen, ID. November 7, 2006. 2p. Release Brochure.

St. John, L. 2006. Great Basin Native Plant Selection and Increase Project - 2006 Annual Report. Aberdeen Plant Materials Center, Aberdeen, Idaho. December 19, 2006. 11p.

Presentations

Date: 2/15/2007

Title: Aberdeen PMC report of Activities 2006: Great Basin native plant selection and increase project

Presenter: Derek Tilley

Location: Society for Range Management annual meeting, Reno, NV

Management Applications

1. Certified seed stock of Anatone bluebunch wheatgrass, Snake River Plains fourwing saltbush, and Northern Cold Desert winterfat produced by the PMC is available though the University of Idaho Foundation Seed Program and Utah Crop Improvement Association.

2. Based on propagation studies at the PMC, sulphurflower buckwheat, hotrock, sagebrush and sharpleaf penstemon appear to be able to be commercially grown, at least with the use of weed barrier fabric. Lomatium species are taking a long time to mature to reproductive stage and may not be conducive to commercial production because of the long period to reach reproductive capability.

3. The Orchard Display Nursery has been established for 3 years. The best performing native accessions identified in 2007 are: Fish Creek germplasm bottlebrush squirreltail, 'Bannock' thickspike wheatgrass, Jim Creek germplasm bluebunch wheatgrass, SERDP Snake River wheatgrass, 'Trailhead basin wildrye, Eagle germplasm western yarrow and Snake River Plains germplasm fourwing saltbush.

Products

1. Certified seed stock of Anatone bluebunch wheatgrass, Snake River Plains fourwing saltbush, and Northern Cold Desert winterfat produced by the PMC is available though the University of Idaho Foundation Seed Program and Utah Crop Improvement Association

2. Seed of sulphurflower buckwheat and hotrock penstemon that were produced from the propagation studies were planted in the seed mixtures for the post-wildfire establishment study.

3. Technical Note 20: Calibrating the Truax Rough Rider Drill for Restoration Plantings was developed and should be a useful guide to calibrating the drill.

GRAND TETON NATIONAL PARK

FY2007 Annual Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION

The Aberdeen Plant Materials Center (PMC) entered into an interagency agreement with Grand Teton National Park (GTNP) in 2006 to produce seed of four native grasses for use in revegetation of disturbed areas following road construction. Seed fields were planted in 2006 and seed was harvested in 2007. The fields will be harvested again in 2008.

ACCOMPLISHMENTS

Seed fields were planted the last week of May 2006. Slender wheatgrass was planted in Field 27E at the PMC Fish and Game Farm. Mountain brome and Sandberg bluegrass were planted in Fields 2W and 13N respectively at the PMC Home Farm. Blue wildrye was planted in Field 6E at the PMC Pearl Farm.

Soil at the Home Farm and Fish and Game Farm is Declo silt loam with pH of 7.4 to 8.4. Soil at the Pearl Farm is Kimama silt loam with pH of 7.4 to 9.0. Average annual precipitation is 9.39 inches and seed fields are sprinkler irrigated to supplement natural precipitation to approximate 16 to 24 inches total annual precipitation. Weeds were controlled as needed during the growing season. All species with the exception of Sandberg bluegrass established well. Sandberg bluegrass plants were established but overall field establishment is spotty.

The following table lists the species, field acreage and seed yields from 2007 harvest (at time of report, seed had not been tested):

Species	Scientific Name	Acres	Clean seed (lbs)
Slender wheatgrass	*Elymus trachycaulis*	1.0	1031
Blue wildrye	*Elymus glaucus*	2.7	1052
Mountain brome	*Bromus marginatus*	1.0	217
Sandberg bluegrass	*Poa secunda*	0.25	13

Seed samples from each lot will be submitted to the Idaho State Seed Laboratory for purity and viability testing.

Seed harvest will occur again from these fields in 2008.

Grand Teton National Park Seed Increase. Blue wildrye.
Aberdeen Plant Materials Center, July 9, 2007.

Grand Teton National Park Seed Increase. Mountain brome.
Aberdeen Plant Materials Center, June 1, 2007.

Grand Teton National Park Seed Increase. Slender wheatgrass.
Aberdeen Plant Materials Center, July 9, 2007

Grand Teton National Park Seed Increase. Sandberg bluegrass.
Aberdeen Plant Materials Center, September 6, 2006.

NATIONAL PARK SERVICE
WETLAND ESTABLISHMENT RESEARCH STUDY

FY2007 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION - In 2003 the Aberdeen Plant Materials Center entered into an agreement with the National Park Service to evaluate the efficacy of different methods of direct seeding wetland plant species. Currently, wetland restoration is best accomplished using greenhouse grown or wildland collected plugs. An effective means of direct seeding is highly desirable for ease in planting and potential cost savings.

ACCOMPLISHMENTS - This project was designed in incremental steps for ease of evaluation and development of seeding rates. The first experiment (trial 1) was conducted in the PMC greenhouse during the summer of 2006. Trial 1 compared seedling establishment from four hydroseed mulches and four dry, inert carriers. The second trial occurred in 2007 with the most promising treatments from trial 1 and compare each treatment with Submerseed™ pellets, a promising treatment from an earlier trial (Tilley and Hoag 2006), in a controlled outdoor seeding in 4' X 8' tanks. These studies are the precursors to field testing the best methods of direct seeding into the PMC wetland ponds. Due to volunteer wetland seed contamination, the ponds were chemically treated in 2006 and 2007 to ensure a clean, weed-free seed bed for use in seeding evaluations that will take place in 2008.

TECHNOLOGY DEVELOPMENT – Four treatments were planted in a replicated trial in five 4' X 8' wetland tanks placed outside at the PMC farm: Fertil Fibers, Broadcast with rice hulls, tackifier alone, and Submerseed pellets. Fertil Fibers had significantly better emergence than tackifier alone and Submerseed at the seeded rate ($p=0.001$). At the adjusted seeding rate of 100 PLS/ft, Fertil Fibers had significantly better establishment than the Submerseed treatment ($p=0.027$).

Table 3. Establishment in 2007 outdoor trial.

	Plants/ft² @ seeded rate	Plants/ft² adjusted for 100 PLS/ft²	2006 GH means adjusted for 100 PLS/ft²
Fertil Fibers	42 a	18 a	60
Broadcast (rice hulls)	25 ab	10 ab	14
Tackifier alone	21 bc	9 ab	41
Submerseed	6 c	6 b	66 (Tilley & Hoag 2006)
Critical value (0.05)	18	10	na

DIGITAL PHOTOS

Wetland tank divided into 2X4’ plots for treatments.

Establishment in 2007 outdoor trial.

YELLOWSTONE NATIONAL PARK CONTAINERIZED PLANT PRODUCTION

Aberdeen Plant Materials Center
Progress Report, July 31, 2008
Derek Tilley, Range Conservationist (plants)
Loren St. John, Team Leader

Introduction

In 2007 the Natural Resources Conservation Service (NRCS), Plant Materials Center (PMC), Aberdeen, Idaho entered into an interagency agreement with the National Park Service (NPS), Yellowstone National Park (YNP) to propagate and deliver approximately 35,000 plants in 10 cubic inch containers. Delivery is to take place over a three year period (approximately 12,000 plants per year) beginning in the fall of 2009. Species to be grown include *Carex aquatilis, C. microptera, C. rostrata, C. utriculata, Juncus ensifolius, and Deschampsia caespitosa*. A preliminary literature search indicated that *C. utriculata* and *C. rostrata* are currently considered synonymous by taxonomists and will hereafter be treated as *C. utriculata*.

Table 1. Species desired for propagation

Scientific name	Common name
Carex aquatilis	Water sedge
Carex microptera	Smallwing sedge
Carex rostrata	Beaked sedge
Carex utriculata=C. rostrata	Beaked sedge
Juncus ensifolius	Swordleaf rush
Deschampsia caespitosa	Tufted hairgrass

Due to limited availability of information regarding the propagation of the desired species, it was agreed that the PMC would conduct propagation research studies on available seed during 2008. Seed used for these studies came from YNP collections being stored at the Bridger, Montana, PMC. Table 2 lists accession numbers, species and other relevant information as received from Bridger PMC.

Seed received from Bridger PMC was in good condition, but some accessions required additional cleaning prior to planting. *Carex* species required the removal of perigynia before they could be planted. Two accessions, 9087451 and 9087464, appeared to be misidentified. 9087451 is clearly a *Juncus* sp. and 9087464 is a *Carex sp.*, most likely *C. utriculata*. Other species determinations may change as plants being tested begin to flower and are more readily identifiable. Of the accessions identified to species, there was a total of 430g *C. utriculata*, 9g C. aquatilis, and 7g of D. caespitosa. No accessions received were identified as *C. microptera* or *J. ensifolius*.

Table 2. Species received

Accession	Species	Age (yrs)	Bulk (g)
9081715	*Carex aquatilis*	1	6
9087692	*Carex aquatilis*	2	3
9087763	*Carex cusickii*	1	54
9087693	*Carex gynocrates*	2	74
9087450	*Carex* sp.	4	43
9087451	*Carex* sp.	4	56
9087452	*Carex* sp.	4	70
9087582	*Carex* sp.	3	73
9087691	*Carex* sp.	2	15
9087584	*Carex utriculata*	3	304
9087584	*Carex utriculata*	1	70
9087694	*Carex utriculata*	2	56
9087455	*Deschampsia caespitosa*	1	7
9087766	*Juncus mertensianus*	1	7
9087463	*Juncus* sp.	4	11
9087464	*Juncus* sp.	4	130

Materials and Methods

Propagation studies were conducted on seed from identified species. *Carex* seed was stratified by placing seed in bags made from coffee filters and submerging the seed bags in an 8 oz ointment jar with 8.0g green moss and filled with water. Stratification treatments lasted 30 days at 4º C.

Juncus species typically do not require special stratification treatment, so these were planted with no pre-treatment.

A literature review indicated that *Deschampsia* seed may or not require stratification depending on the population the seed was collected from. However, experience gained from previous work completed at the PMC indicated *Deschampsia* germinates readily with no pre-treatment, and it was decided that stratification of the seed in the initial testing was not necessary.

Two irrigation regimes were tested. The first technique was overhead irrigation with sprinklers programmed to water 2 minutes per hour from 8:00am to 3:00pm, plus a 60 minute weekly deep soak to flush accumulated salts. The second technique was subsurface irrigation by placing the containers in 4x8x1' tanks filled with 4 to 8 inches of water.

Seed from unidentified species was planted into 12x18" greenhouse flats to allow plants to grow to a point where they can be properly identified. If these are determined to be of the desired species the seed can be used for future propagation.

Juncus species were planted on April 25, 2008. *Deschampsia* was seeded on April 30. *Carex* seed was stratified from May 5 to June 9. *Deschampsia* and *Carex* were seeded with 5 to 20 seeds per cone. Seed of all species was sprinkled on the soil surface and

pressed by hand. *Deschampsia* seed was additionally covered with a thin later of soil. Soil used was a 1:1:1 mixture of peat, sand and perlite with the addition of 18g 11-15-11 fertilizer and 16ml Redimil fungicide per cubic foot.

Germination counts of cones with established plants were taken on July 28, 2008.

Results

Identification of unknown collections

Poor to excellent germination was achieved in the unknown species plots (figure 1). All seed identified as *Juncus* (including accession 9087766 previously identified as J. *mertensianus*) appears to be *J. ensifolius* with small amounts of *J. acuminatus*. As of July 31, none of the *Carex* plants have flowered so positive identification is not possible, but educated guesses can be made in some instances by comparing vegetative characters to those of identified accessions. Table 3 lists accessions of unknown species, probable determination (if possible) and comments on general establishment.

Figure 1. Unidentified species grown out in 12x18" flats.

Table 3. Identification of unknown species.

Accession	Species	Comments
9087450	*Carex aquatilis*	Excellent germination
9087451	*Juncus ensifolius*	Excellent germination
9087452	*Carex* sp.	Small statured sedge; good germ
9087582	*Carex cusickii?*	Poor stand
9087691	*Carex sp.*	Excellent germination
9087463	*J. ensifolius*	Good germ; some J. acuminatus
9087464	*Carex sp.*	Probably same as 9087691; poor germination
9087766	*J. ensifolius*	Excellent germ; some J. acuminatus

Germination of known species

Germination results from the initial establishment trial were encouraging (table 4). All accessions produced seedlings with some having 100% of seeded cones filled. This study was not replicated so no statistical analysis was conducted.

Carex aquatilis appears to be easily propagated with 100% germination coming from all accessions under both irrigation regimes.

Carex cusickii, though not on the list of species to be propagated, was tested with the thought that YNP may want some plants propagated if seed for other species is limited. *C. cusickii* had fair germination with 14 to 57 percent of cones being filled depending on accession and watering schedule. Because one accession had better germination with overhead water and one had better germination with subsurface water, there was no detectable preference in watering regime.

Two accessions of *Carex utriculata* were tested with one accession, 9087584, having collections from 2005 and 2007. *C. utriculata* had high germination rates in all accessions ranging from 71 to 100% of cones being filled. In two of three cases germination was slightly higher in the overhead irrigated cones.

Figure 2. Carex species grown in 10 cubic inch containers under overhead irrigation.

Table 4. Germination of known species with overhead or subsurface irrigation.

Accession	Species	Overhead irr. % cones with seedlings	Subsurface irr. % cones with seedlings
9087692	*C. aquatilis*	100	100
9087450	*C. aquatilis*	100	100
9081715	*C. aquatilis*	100	100
9087582	*C. cusickii*	14	57
9087763	*C. cusickii*	50	33
9087584 (05)	*C. utriculata*	97	100
9087584 (07)	*C. utriculata*	86	71
9087694	*C. utriculata*	93	76
9087455	*Deschampsia caespitosa*	100	100

State of seedlings

On July 25 plants from the overhead irrigation table were compared with those in the subsurface irrigation tanks. Plants grown with subsurface irrigation appear to be larger and have better root development (figure 3). The applied irrigation schedule of 2 minutes each hour did a good job germinating seed, but needs to be changed to longer, less frequent watering as the plants (seedlings) grow to promote root elongation. *Deschampsia* seedlings grown in the subsurface irrigation tanks had excellent root growth and were developed enough for transplanting after 90-100 days. This rate of root growth should also be achievable with overhead irrigation if an adjusted schedule is implemented.

Figure 3. *Deschampsia caespitosa* seedlings grown under subsurface irrigation (top) and overhead irrigation (bottom) after 90 days.

Discussion

Initial establishment tests show that the species desired to be propagated are germinable at satisfactory amounts using standard propagation protocols. *J. ensifolius* and *D. caespitosa* are easily propagated without stratification. *Carex* species require the removal of the perigynia to germinate and also require a 30 day stratification period. Although no *C. microptera* was tested, it is likely that this species will perform similarly to other *Carex* species examined.

In order to meet the 35,000 desired plants, Aberdeen PMC will require additional seed collections from YNP. Because seed will have to be processed, cleaned and stratified in the case of *Carex* species, the first installment of seed should be delivered to the PMC beginning early fall 2008. Seed can then be cleaned to be ready for planting in early spring. Under this schedule, the first year's seedlings should be ready for delivery in July 2009.

CARIBOU-TARGHEE AND BRIDGER-TETON NATIONAL FOREST
NATIVE GRASS INITIAL EVALUATION
2008 FINAL REPORT

DEREK J. TILLEY, RANGE CONSERVATIONIST (PLANTS)
LOREN ST. JOHN, TEAM LEADER
ABERDEEN PLANT MATERIALS CENTER

INTRODUCTION

The purpose of this study is to evaluate collections of two species of native short-lived perennial grasses for use in revegetation, stabilization and beautification projects in the USDA Forest Service, Caribou-Targhee and Bridger-Teton National Forests (CTNF and BTNF).

During the summer of 2004, CTNF and BTNF collected 11 accessions of slender wheatgrass (*Elymus trachycaulus* [Link] ssp. *trachycaulus*) and 10 accessions of mountain brome (*Bromus marginatus* Nees ex Steudel). The collections were cleaned by the USDA-NRCS Aberdeen Plant Materials Center (PMC) for evaluation. Appendix 1 lists the accessions collected, the size of each collection and collection location. This progress report summarizes evaluations that took place in 2005 (establishment year) through 2008, the final year of evaluation.

MATERIALS AND METHODS

Harvested seed collections were cleaned at the PMC seed cleaning facilities during the winter of 2004-2005. Appendix 2 provides detailed information on seed cleaning equipment and calibrations used. Estimated viability was obtained using the kerosene heater "popping" method outlined in Ogle and Cornforth (2000) and was used to approximate pure live seed (PLS).

The trial was conducted at the PMC, Fish and Game Farm located approximately 5 miles northeast of Aberdeen, Idaho. Experimental design was a randomized complete block with six replications of each accession. Each plot is 20 feet long and contains one row, and plots were planted on three foot centers. Experimental design also contains plots of known industry standards from each species for comparison. Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 8.75 inches. The field was plowed in the fall of 2004 and subsequently disked and roller packed in the spring of 2005 prior to planting.

Plots were seeded on May 19, 2005 using a hand-pushed belt seeder calibrated to drill 30 pure live seeds (PLS) per foot of row. Seeds were drilled to an approximate depth of one half inch. Border rows of 'Tegmar' intermediate wheatgrass (*Thinopyrum intermedium* [Host] Barkworth & D. Dewey) were planted on the outside of the blocks to eliminate edge effect. Plots were sprinkler irrigated and fertilized as needed during the growing season for maximum seed production. Natural precipitation was supplemented with irrigation to approximate 16 to 24 inches total annual precipitation. Weeds were controlled with herbicide treatments and between row mechanical cultivation.

The initial establishment evaluation was conducted on June 15, 2005 (27 days after planting) when most of the plants from both species had reached a one to two leaf stage. Plots were evaluated for percent stand, plant density and seedling vigor. Percent stand

was measured using a twenty foot rope marked with one foot increments stretched the length of the plot and anchored at either end. Plants intercepting the one foot increments were summed and recorded as a percentage. Plant density was measured by counting seedlings found in the middle two feet of row and converted to average plants per foot of row. Seedling vigor was measured on an ordinal scale of one to nine (one being most healthy and nine being dead). Entire plots as well as individual plants within plots were viewed and given a rating based on overall apparent vigor.

The second evaluation was conducted on September 16, 2005. Plots were evaluated for percent stand by the same procedure used in June. Plant width was also evaluated. It was originally planned to record plant height measurements at this time; however, due to weeds reaching seed maturity it was decided to mow the entire field to a height of about four inches on August 5. It is our assumption that plant width measurements should provide a minimal amount of information regarding plant biomass production as well as vigor for the establishment year.

In 2006 (first seed harvest year) plots were evaluated when the seed within a plot was judged to be ready for harvest, between July 20 and 28. All plots were evaluated for forage yield, average plant height and seed yield. Each plot was divided in half lengthwise, and the northern adjacent three feet were harvested for seed production, while the southern three feet were sampled for forage yield. Seed samples from each species were cleaned to a visually estimated 90% purity. Forage samples were collected in paper sacks and allowed to air dry for a minimum of two weeks prior to weighing.

The 2007 evaluations took place from July 9 through July 25. The evaluations were conducted in the same manner as 2006 and included forage yield, seed yield, height, and in the case of mountain brome, smut presence.

In 2008 the forage harvest was conducted using a Swift Machine Ltd. walk-behind harvester. Plots were divided in the same manner as previously described, but in 2008 five feet were harvested for forage and seed production. Forage harvest took place from July 24 through July 29. The average seed production from 2006 through 2008 was also compared. Each year was treated as one of three replications, and means were generated. Height measurements were not taken in 2008.

All data from the 2005 evaluations were subjected to an Analysis of Variance (ANOVA) and means were separated using Duncan's Multiple Range Test using the MSTAT-C Microcomputer Statistical Program (Freed et al, 1991). Sample means from 2006 through 2008 were separated with a Tukey's multiple comparison test using the Statistix 8 Analytical software.

EVALUATIONS AND DISCUSSION

Slender Wheatgrass

CTNF and BTNF accessions of slender wheatgrass were compared against five previously released cultivars; 'AEC Hillcrest', 'Pryor', 'Revenue', 'San Luis', and 'Adanac', and one non-released selection from the U.S. Army (D.O.D.). Of these, three (AEC Hillcrest, Revenue and Adanac) are from collections originally made in Canada. Pryor originates from a collection made in Montana and San Luis was originally collected in Colorado. See Tilley et al (2005b) for a detailed comparison of the characteristics for each released cultivar. The Army accession is a currently unreleased breeding population made of several collections from Colorado. AEC Hillcrest differs from the other accessions by being of the subspecies *subsecundus* and should not be considered directly comparable to the collections made by CTNF and BTNF.

At the first evaluation, percent stand ranged from 25.4 % (accession no. 9076496) to 85.1 (San Luis and Adanac). The high rating from San Luis and Adanac did not, however, differ significantly from several collections with percent stands of 70% or greater. The best plant density rating came from Adanac with 18.1 plants/foot. The poorest density was recorded from accession 9076496 with a density of 2.3 plants/foot. This accession similarly had the lowest seedling vigor rating of 6.7, while the best vigor was observed in Revenue (1.2). Of the CTNF and BTNF accessions 9076495, 9076498 and 9076499 performed the best in the three evaluated categories (Table 1).

At the time of the second evaluation in 2005, the best stand was recorded from Revenue (96.3 %). The other industry releases made up the rest of the top six in this category. Of the CTNF and BTNF collections, 9076495 had the best stand at 86.8 %, followed by 9076494, 9076499 and 9076498 with 86.0, 86.0 and 84.8 % stand respectively. The poorest percent stand rating was recorded from accession 9076496 with 56.3 % stand. With regard to plant width, the three Canadian releases, Adanac, Revenue and AEC Hillcrest were significantly larger than all other collections (4.8, 4.6 and 4.3 inches wide respectively). The largest plants of the CTNF and BTNF collections were recorded by accession 9076502 (3.7 in.) which did not differ significantly from Pryor, D.O.D., 9076495, 9076494, San Luis or 9076497. The smallest plant widths were recorded from accession 9076496 (2.8 in.).

Slender wheatgrass plots. Photo taken July 2006

In the 2006 evaluation, forage yields were lead by the industry standards Adanac, San Luis, Revenue, Pryor and the D.O.D. test material with mean yields ranging from 9400 to 7500 lb/ac. The best yields from the CTNF and BTNF accessions were from accessions 9076494 (5200 lb/ac) and 9076498 (5100 lb/ac). Seed yields were also dominated by released materials. San Luis had the greatest seed yield

with 1500 lb/ac. Other top performers were Adanac (1200 lb/ac) and Revenue (1000 lb/ac). Of the CTNF and BTNF accessions, 9076500 and 9076498 had the top seed yields with 700 and 550 lb/ac respectively. Similarly, the releases had the top scores in the height evaluation, with measurements from 47 to 50 inches, while the CTNF and BTNF accessions ranged from 35 to 44 inches in height.

During the 2006 growing season the Canadian release AEC Hillcrest, became visibly different from all other collections as the growing season progressed. Plants of AEC Hillcrest were smaller in stature, grew in a more decumbent form and had bluer leaves than the other accessions. In the evaluations, AEC Hillcrest scored lowest in forage and height, and third lowest in seed yield.

Forage yields were generally greater in 2007 than 2006. The Department of Defense accession had the highest yield with over 11,000 lb/ac, significantly better than all others with the exception of San Luis (8520 lb/ac). Forest Service (FS) collections had generally lower yields; the top performer being 9076503 with 6500 lb/ac. Seed yields were also impressively higher in 2007. D.O.D again had the top rating with nearly 1300 lb seed/ac followed by Pryor at 1060 lb/ac and 9076500 with just under 1000 lb/ac. Revenue had surprisingly low seed yield, only 39 lb/ac. This was most likely due to harvesting too early (at the same time as the other accessions) and the seed had not yet filled out. Plant heights ranged from around 35 inches to 45 inches tall. Taller plants with good seed yield were often lodging at the time of harvest.

Forage and seed yields decreased from 2007 to 2008. This was to be expected with the short-lived nature of the species. Forage yields ranged from 2700 lb/ac (9076495) to over 7100 lb/ac (Revenue). There was little in the way of significant difference detected in the forage yields with only the poorest four producers being significantly different from Revenue, the top yielding accession. With the exception of D.O.D., the industry releases had greater forage yields than all FS collections. Seed yields also showed drastic declines with most yields being reduced by greater than 50% compared to 2007. Five of the six industry released standards had the greatest seed yields for 2008. Adanac was the best seed producer of the year with 418 lb/ac. The largest seed yields of the FS accessions came from 9076500 with 291 lb/ac. Average seed yield over the three production years of the study ranged from 160 lb/ac (9076496) to 920 lb/ac (San Luis). With the exception of AEC hillcrest, the industry standards made up five of the top six average yields. The best three year average yield from a FS collection came from accession 9076500 with an average of 660 lb/ac.

Table 1. Slender wheatgrass.

Accession No.	% Est. viability	% PLS[3/]	% stand 6/15	Density[1/] 6/15	Vigor[2/] 6/15	% stand 9/16	Plant width (in.) 9/16
9076493	95	90.25	54.4 c[4/]	6.8 d-f	4.0 b-d	71.0 f	3.1 e-g
9076494	95	90.25	70.2 a-b	13.0 a-c	4.0 b-d	86.0 a-e	3.6 c-e
9076495	90	85.5	77.2 a-b	13.4 a-c	3.0 d-f	86.8 a-d	3.6 c-e
9076496	90	85.5	25.4 d	2.3 f	6.7 a	56.3 g	2.8 g
9076497	95	90.25	64.0 b-c	7.8 c-f	3.3 d-f	77.0 d-f	3.2 d-g
9076498	95	90.25	75.4 a-b	15.3 a-b	3.7 c-e	84.8a-e	3.1 e-g
9076499	85	80.75	71.1 a-b	14.5 a-b	3.0 d-f	86 a-e	3.1 e-g
9076500	95	90.25	51.8 c	4.8 e-f	4.8 b-c	72.8 f	2.9 f-g
9076501	95	90.25	73.7 a-b	10.8 b-e	2.8 d-f	79.8 b-f	3.0 f-g
9076502	90	85.5	51.8 c	8.2 c-f	3.7 c-e	78.8 c-f	3.7 c-d
9076503	85	80.75	52.7 c	8.0 c-f	5.0 b	74.5 e-f	2.8 f-g
AEC Hillcrest	95	91.2	71.9 a-b	13.3 a-c	2.7 e-f	91.0 a-c	4.3 b
Pryor	99.9	91.9	71.9 a-b	12.3 a-d	2.2 f-g	90.3 a-c	3.8 c
Revenue	*	80.1	79.8 a-b	17.9 a	1.2 g	96.3 a	4.6 a-b
San Luis	99	87.12	85.1 a	16.9 a-b	5.2 b	92.0 a-b	3.3 c-f
D.O.D.	98	90.2	79.8 a-b	16.6 a-b	1.3 g	90.2 a-c	3.8 c
Adanac	98	84.3	85.1 a	18.1 a	1.5 g	95.5 a	4.8 a
Critical value (0.05)			13.8	5.4	1.1	10.4	0.5

[1/] Plants per foot of row
[2/] Rated 1-9 with 1best, 9 worst
[3/] Percent PLS based on estimated 95% purity for CTMF collections
[4/] Means followed by the same letter are not significantly different
* Information not available from source

Table 1 (continued)

Accession No.	Forage (lb/ac) 2006	Seed (lb/ac) 2006	Height (in) 2006	Forage (lb/ac) 2007	Seed (lb/ac) 2007	Height (in) 2007	Forage (lb/ac) 2008	Seed (lb/ac) 2008	Seed (lb/ac) 3 yr avg
9076493	3326 d	308 e-f	40.3 d-f	4537 c-d	572 b-g	38 a-d	3252 a-b	143 c-d	341 a-b
9076494	5165 b-d	493 d-f	44.0 a-d	6050 b-d	681 b-f	44 a-b	3489 a-b	230 a-d	468 a-b
9076495	4093 d	401 e-f	43.8 a-d	5546 b-d	726 a-e	43 a-d	2710 b	208 a-d	445 a-b
9076496	2496 d	209 f	37.0 e-f	2874 d	163 e-g	36 de	3727 a-b	110 d	161 b
9076497	3939 d	435 e-f	39.7 d-f	4991 b-d	577 b-g	38 b-d	3151 b	195 a-d	402 a-b
9076498	5133 b-d	550 d-f	41.7 c-e	5495 b-d	967 a-c	42 a-d	4370 a-b	227 a-d	581 a-b
9076499	3786 d	376 e-f	35.5 e-f	5243 b-d	535 b-g	43 a-c	4201 a-b	203 a-d	371 a-b
9076500	4766 c-d	702 c-e	42.1 b-e	4890 b-d	997 a-c	43 a-c	3625 a-b	291 a-d	663 a-b
9076501	4092 d	340 e-f	39.0 d-f	5042 b-d	446 c-g	41 a-d	2982 b	135 c-d	307 a-b
9076502	2713 d	200 f	37.8 d-f	3933 c-d	284 d-g	37 b-d	2846 b	180 b-d	221 a-b
9076503	4092 d	349 e-f	39.0 d-f	6504 b-d	814 a-d	44 a-c	4303 a-b	259 a-d	474 a-b
AEC Hillcrest	1823 d	303 e-f	34.1 f	3126 d	141 f-g	29 e	3591 a-b	250 a-d	231 a-b
Pryor	8384 a-b	544 d-f	49.5 a	7512 b-c	1059 a-b	44 a-b	6268 a-b	405 a-b	669 a-b
Revenue	8997 a	1050 b-c	49.2 a-b	7563 b-c	39 g	37 c-d	7183 a	395 a-b	805 a-b
San Luis	9304 a	1501 a	50.5 a	8520 a-b	851 a-c	45 a	5116 a-b	409 a	920 a
D.O.D.	7464 a-c	846 b-d	47.8 a-c	11243 a	1282 a	42 a-d	3761 a-b	337 a-c	822 a-b
Adanac	9457 a	1226 a-b	47.3 a-c	5848 b-d	285 d-g	38 a-d	6471 a-b	418 a	643 a-b
Critical value (0.05)	varies*	varies	varies	3656	564	7	3959	226	724

*indicates missing data values in one or more plots.

Mountain Brome

The mountain brome trial included two industry releases, Garnet Germplasm from Montana and 'Bromar' from the Pacific Northwest. See Tilley et al (2005a) for detailed information on these mountain brome releases.

At the first evaluation (establishment year), the best percent stand and plant density were recorded from Garnet (81.6 % and 22.3 plants/foot). Second best in both categories was Bromar (78.1 % and 14.1 plants/foot) which also had the best possible rating for seedling vigor (1.0). In general, the CTNF and BTNF accessions showed little if any significant differences from one another (Table 2). At the time of the second evaluation there was no significant difference between accessions for percent stand. All plots showed nice, dense stands with vigorous plant growth. There was, however, significant difference detected with regard to plant width. Bromar was significantly larger than all other accessions tested with a width of 6.8 inches. The best performing CTNF and BTNF collection was 9076507 with a width of 5.4 inches.

In the 2006 evaluations, analysis showed no statistical significant differences between accessions for forage or seed yields. Mean forage yields were all high ranging from 6600 lb/ac (9076513) down to 4100 lb/ac (9076512). Seed yield means, however, had a wide range, 1700 lb/ac (9076506) to 500 lb/ac (9076512). The lack of statistical significance for seed yield is most likely due to the high variability of seed yields in plots, including a number of plots in which no seed was found in the harvested plot. Maximum plant height was achieved by Garnet and Bromar, both with means of 45.3 in. The top FS accessions were 9076506, 9076507, and 9076508, all with heights of 42.3 in.

Because mountain brome is known to be susceptible to head smut (*Ustilago bullata*) the PMC decided to rate the presence of head smut on the inflorescences at the time of seed harvest. This was done by inspecting the plots visually and assigning an overall rating of 1 to 9 with 1 being the best score (no smut present) and 9 being the worst (heavily infested with smut). The best score from the evaluation was obtained by Bromar (1.0) while accession 9076513 had the second best score of 1.8. Interestingly, Garnet, which was released as having superior smut resistance compared to Bromar, came in third with a score of 2.2.

Forage yields for mountain brome in 2007 ranged between 3000 and 6000 lb/ac. The best producer was Garnet (6260 lb/ac) followed by 9076506 and 9076504, both with over 5000 lb/ac. The top two seed yields came from FS accessions 9076505 and 9076506, both with approximately 1100 lb seed/ac. These were followed by Bromar and Garnet with 1000 and 900 lb/ac respectively. 9076505 also had a fair smut score with 2.6, slightly better than Garnet, but worse than Bromar which received a score of 1.2. Heights were not separable statistically. All were from 42 to 48 inches tall.

Forage and seed yields of mountain brome were much lower in 2008 than in 2007, due to the short lifespan of the species. Most accessions appeared to have reached their peak performance in 2007, and were on the decline during 2008. Forage yields of most accessions fell by about 2000 lb/ac. Accessions 9076507, 9076510 and 9076512 however had increases of 318, 339 and 585 lb/ac respectively. Three accessions had yields over 4000 lb/ac. The greatest forage yield was obtained by Bromar with 4734 lb/ac. Accession 9076512 had a similar yield of 4618 lb/ac, and Garnet had a yield of 4211 lb/ac. Seed yields also dropped sharply from 2007 to 2008. The highest seed yield in 2008 was 271

lb/ac (Bromar); a significant decline compared to the highest yielding accession of 2007, accession 9076505 which yielded 1121 lb/ac. In contrast accession 9076505 yielded only 50 lb/ac seed in 2008. Average seed yields over the three year study ranged from 320 lb/ac from accession 9076512 to 942 lb/ac from 9076506.

Mountain brome plots. Lodging evident in nearly all plots. Photo taken July 2006

Mountain brome infested with head smut. Photo taken July 2006

Table 2. Mountain brome.

Accession No.	% Est. viability	% PLS	% stand 6/15/05	Density 6/15/05	Vigor 6/15/05	% stand 9/16/05	Plant width (in.) 9/16/05
9076504	85[1/]	80.75[1/]	72.8 a-c	10.9 b	3.8 a	93.0[1/]	4.9 c-e
9076505	85	80.75	66.7 a-c	11.3 b	3.3 a-b	83.3	5.0 b-e
9076506	90	85.5	66.7 a-c	8.7 b	2.7 a-b	85.7	4.4 d-e
9076507	90	85.5	70.2 a-c	9.8 b	3.8 a	92.0	5.4 b-c
9076508	85	80.75	74.6 a-c	12.8 b	2.8 a-b	93.2	5.0 b-e
9076509	95	90.25	73.7 a-c	12.6 b	3.2 a-b	91.0	4.2 e
9076510	95	90.25	74.6 a-c	12.8 b	2.8 a-b	93.7	5.3 b-d
9076511	90	85.5	59.7 b-c	10.8 b	3.2 a-b	82.5	4.8 c-e
9076512	90	85.5	59.7 b-c	11.9 b	2.3 a-c	88.3	5.1 b-e
9076513	90	85.5	54.4 c	10.1 b	2.2 b-c	78.0	5.2 b-d
Garnet	55	53.35	81.6 a	22.3 a	2.0 b-c	96.7	5.9 b
Bromar	97	96.0	78.1 a-b	14.1 b	1.0 c	94.7	6.8 a
Critical value (0.05)	NA	NA	18.3	5.3	1.4	15.7	0.8

[1/] No significant difference detected between treatments.
[2/] Rated 1-9 with 1best, 9 worst

Table 2 (continued).

	Forage (lb/ac) 2006	Seed (lb/ac) 2006	Height (in) 2006	Smut 2006	Forage (lb/ac) 2007	Seed (lb/ac) 2007	Height (in) 2007	Smut 2007
Accession No.								
9076504	5300[1/]	1600[1/]	42.0 a-b	2.2 c-e [2/]	5042 a-b	411 d-e	46[1/]	3.5 a-b
9076505	4900	1300	39.2 b	5.3 a	4808 a-b	1121 a	46	2.6 a-b
9076506	5500	1700	42.3 a-b	3.5 a-d	5798 a-b	1069 a-b	46	3.7 a-b
9076507	5200	1500	42.3 a-b	2.7 b-e	3719 a-b	505 b-e	48	4.2 a-b
9076508	5600	1300	42.3 a-b	3.7 a-d	4185 a-b	470 c-e	44	4.3 a
9076509	5900	1000	36.7 b	5.7 a	4627 a-b	670 a-e	43	5.2 a
9076510	5200	800	40.5 a-b	4.3 a-c	3378 b	299 e	42	5.5 a
9076511	5300	1300	40.5 a-b	4.8 a-b	4185 a-b	500 c-e	43	4.0 a-b
9076512	4100	500	41.0 a-b	4.2 a-d	3961 a-b	360 d-e	45	4.6 a
9076513	6600	700	41.8 a-b	1.8 d-e	4033 a-b	773 a-e	45	2.5 a-b
Garnet	5600	1400	45.3 a	2.2 c-e	6260 a	896 a-d	48	3.0 a-b
Bromar	4700	700	45.3 a	1.0 e	4739 a-b	996 a-c	47	1.2 b
Critical value (0.05)	varies	varies	varies		varies	varies	NA	varies

[1/] No significant difference detected between treatments.
[2/] Rated 1-9 with 1best, 9 worst

Table 2 (continued).

	Forage (lb/ac) 2008	Seed (lb/ac) 2008	Smut 2008	Seed (lb/ac) 3 yr avg
Accession No.				
9076504	2730[1/]	46 b	4.5 a-b	686
9076505	3398	50 b	4.2 a-b	824
9076506	2294	57 b	4.8 a	942
9076507	4037	124 a-b	2.5 a-b	710
9076508	2672	85 a-b	4.5 a-b	618
9076509	3427	170 a-b	4.2 a-b	613
9076510	3717	102 a-b	5.3 a	400
9076511	3340	121 a-b	5.3 a	640
9076512	4618	100 a-b	2.8 a-b	320
9076513	3717	84 a-b	4.8 a	519
Garnet	4211	98 a-b	3.3 a-b	798
Bromar	4734	271 a	1.0 b	656
Critical value (0.05)	NA	187	3.4	NA

[1/] No significant difference detected between treatments.

SUMMARY

A small amount of the decrease in forage and seed yields from 2007 to 2008 may be attributable to using a mechanical walk-behind harvester instead of hand clipping. The walk-behind harvester left more standing stubble in the plots, and there may have been some seed loss due to maneuvering the harvester. However the 2008 forage yield numbers might be a more accurate representation of yields encountered on a farm scale operation using a combine or other mechanical harvester.

At the end of the study, no accession of slender wheatgrass or mountain brome stood out as being consistently superior to the industry standards in all aspects. Forage and seed yields were typically equal to or lower than those of the industry standards of both species, and the smut resistance of Bromar was clearly superior to the accessions collected by the FS. For these reasons the PMC sees limited potential for further development towards a commercial release among the collected accessions, especially when releases currently exist from the Rocky Mountain region.

However, the performance of a select few of the test accessions was generally acceptable for native-local site restoration and might be considered for use by the FS on a local basis. Slender wheatgrass accession 9076500, though not as productive as the industry standards, had robust seed and forage yields for all years. Its three year average seed yield ranked fifth overall with 663 lb/ac/year, which would make it a good choice for the FS as a locally collected seed source to be used in contract seed increase programs. Mountain brome accession 9076506 similarly had good seed production values. It ranked first overall in average seed production over the three years of the study with an average of 942 lb/ac/year. Accession 9076506 did rank notably poorer in smut resistance than Bromar, however, this should not be a problem for seed production if proper seed treatment protocols are followed. Interestingly, both accessions originated from the same collection site at McCoy Creek in the Palisades District of Caribou National Forest.

The PMC appreciates the support and cooperation of the Caribou-Targhee and Bridger-Teton National Forests to complete this study.

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Appendix 1. Seed collection and origin data

Accession No.	Species	Date collected	Cleaned wt. (lbs)	National Forest	District	Location	Elevation (ft)
9076493	ELTR7	8/31/04	1.00	Bridger-Teton	Jackson	Shadow Mt	7,872
9076494	ELTR7	8/10/04	0.85	Targhee	Island Park	Taylor Creek	6,619
9076495	ELTR7	8/31/04	1.06	Bridger-Teton	Jackson	Curtis Canyon	7,662
9076496	ELTR7	8/23/04	0.92	Caribou	Montpelier	Green Canyon	8,309
9076497	ELTR7	9/1/04	0.49	Targhee	Dubois	Bear Trap Creek	7,402
9076498	ELTR7	7/29/04	0.20	Caribou	Westside	Big Springs	6,290
9076499	ELTR7	8/19/04	1.54	Caribou	Soda Springs	Diamond Creek	6,784
9076500	ELTR7	8/3/04	0.70	Caribou	Palisades	McCoy Creek	5,766
9076501	ELTR7	8/11/04	0.57	Targhee	Teton Basin	Dry Creek	6,743
9076502	ELTR7	9/9/04	1.62	Bridger-Teton	Buffalo	Togwotee Pass	8,514
9076503	ELTR7	7/30/04	0.10	Caribou	Palisades	Little Elk Creek	5,990
9076504	BRMA4	8/24/04	0.84	Caribou	Montpelier	Egan Basin	8,135
9076505	BRMA4	8/4/04	1.46	Caribou	Palisades	Moody Meadow	6,307
9076506	BRMA4	8/3/04	0.76	Caribou	Palisades	McCoy Creek	5,766
9076507	BRMA4	7/30/04	0.24	Caribou	Palisades	Little Elk Creek	5,990
9076508	BRMA4	8/11/04	0.36	Targhee	Teton Basin	Dry Creek	6,743
9076509	BRMA4	8/31/04	2.04	Bridger-Teton	Jackson	Shadow Mt.	7,872
9076510	BRMA4	8/10/04	0.94	Targhee	Island Park	Taylor Creek	6,619
9076511	BRMA4	7/29/04	0.20	Caribou	Westside	Big Springs	6,290
9076512	BRMA4	9/9/04	3.60	Bridger-Teton	Buffalo	Togwotee Pass	8,514
9076513	BRMA4	8/19/04	2.25	Caribou	Soda Springs	Diamond Creek	6,784

Appendix 2. Seed cleaning calibrations

Mountain Brome

I. Air Screen Cleaner
- 1. Screens
  - a. top: 5.550
  - b. middle: 4.750
  - c. bottom: blank
- 2. Valves
  - a. 3.25
  - b. 3.5
  - c. 5.0
  - d. closed
- 3. Settings
  - a. sieve: 10.0
  - b. blower 5.0

II. Indent Cleaner (used to remove seeds infected w/ smut)
- 1. Drum: 7.25

Slender wheatgrass

I. Hammermill
- 1. Screen: 0.5 inch
- 2. Air: low

II. Air Screen Cleaner*
- 1. Screens
  - a. top: 3.550
  - b. bottom: 6x24
- 2. Valves
  - a. 3.45
  - b. 3.50
  - c. 4.75
  - d. closed
- 3. Settings
  - a. sieve: 2.0
  - b. blower: 2.0

*Ran through three times to clean out inert matter.

Evaluation of fall versus spring dormant planting of hardwood willow cuttings with and without pre-soaking treatment

Derek J. Tilley, Range Conservationist (Plants)

June 25, 2008

Study Number: IDPMC-T-0815-RI

Natural Resources Conservation Service
Plant Materials Center
Aberdeen, Idaho

Introduction

The benefits of pre-soaking willow and cottonwood cuttings prior to planting have been well documented (Edwards and Kissock 1975; Krinard and Randall 1979; Pezeshki et al 2005; Tilley and Hoag 2007). Pre-soaking increases stem-water content and results in improved survival and increased vigor, root and shoot biomass. However, all studies to date have examined pre-soaking followed by immediate planting in laboratory or field conditions in the spring where plants can immediately begin growing after planting. A literature review yielded no reports of tests evaluating the efficacy of soaking, followed by a fall-dormant planting. This may be partly due to the fact that spring planting is generally encouraged over fall dormant planting (Hoag 2007).

In this experiment we evaluated four treatments to determine if pre-soaking cuttings in the fall provided any establishment benefits over traditional planting methods. We compared cuttings planted in the fall following a 14 day pre-soaking treatment (F14), to fall planted with no pre-soaking (f0), spring planted following 14 day pre-soak (S14), and a non-soaked spring planting (S0).

Materials and Methods

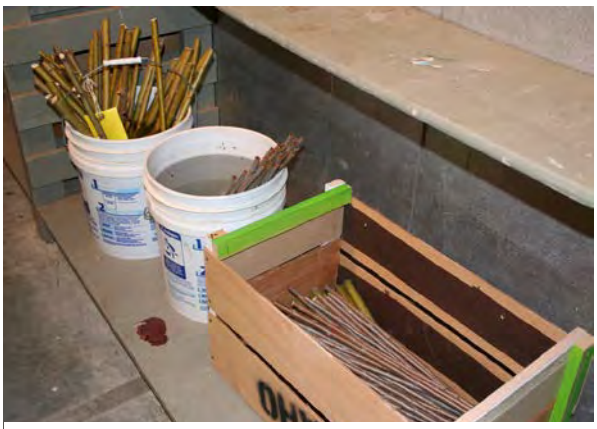


Figure 1. Dormant willow cuttings soaking (left) and stored without soaking (right) prior to fall planting.

Cuttings of peachleaf willow and coyote willow were harvested from the PMC willow cutting nursery while dormant on November 19, 2007 for the fall portion of the trial. Cuttings for the spring treatments were harvested dormant on March 10, 2008 for peachleaf willow and March 21, 2008 for the coyote willow. Cuttings were 20 inches long; peachleaf willow cuttings had a basal diameter of 1.5 to 2 cm (0.6- 0.8 in) and coyote willow cuttings had a basal diameter of 8 to 12 mm (0.3- 0.5 in). All side branches and terminal tips were trimmed at the time of harvest. Cuttings subjected to the soaking treatments were placed vertically in 5 gallon buckets filled 16 inches deep with water. The buckets were then placed in cold-dark storage at 4ºC for 14 days prior to planting. Plants not soaked were placed in cold-dark storage at 4ºC until planting (fig 1).

Fall cuttings were planted December 10, 2007 into 40 cubic inch conetainers filled with a perlite/vermiculite mix and placed outside to undergo natural temperatures and conditions (fig 2). Spring cuttings were planted into conetainers on April 7, 2008.

Figure 2. Cuttings planted into conetainers in the fall and left outside over winter.

After planting, flats containing the cuttings were placed in an outdoor 4' X 8' X 1' tank, for subsurface irrigation (fig 3). The ponds were initially filled so water rose 3 inches up the cones. Water levels were then manipulated to rise and fall providing adequate moisture for sprouting and growth.

The experiment was designed as a complete block with five replications of five cuttings per treatment.

On May19 (42 days after planting) the peachleaf willow cuttings were carefully removed from their cones and soil was washed away. Roots and shoots were removed and separated and air dried for four days until all moisture had been removed. Roots and shoots of plants within replications were combined and weighed. Live cuttings were totaled within each replication and divided by 5 for a percent survival.

Coyote willow cuttings were harvested on June 16 (70 days after planting) and weighed on June 24. Data were analyzed using an Analysis of Variance (ANOVA) followed by a Tukey's test to separate means if significance was detected at p=0.05.

Results

All cuttings in the peachleaf willow portion of the trial survived to harvest. Significant differences were detected between treatments for both root and shoot production. Pre-soaking in the fall for 14 days resulted in the highest production for both variables and had significantly greater root mass than the spring non-soaked treatment (1.91 g versus 1.18 g respectively), but did not differ significantly from the fall non-soaked or the 14 day spring pre-soaking treatment. Both fall treatments and the 14 day spring pre-soak had significantly greater shoot production than the spring non-soaked treatment. Shoot biomass for the fall 14 day soak was highest at 9.05g. The fall non-soaked and spring 14 day soaking

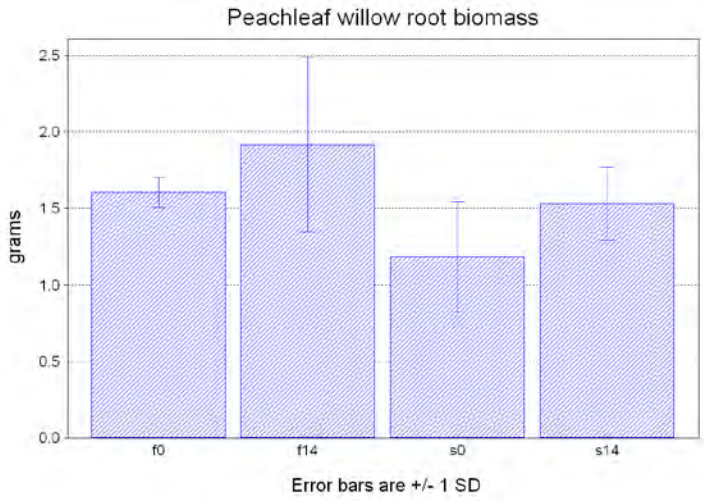
Figure3. Cuttings in 4x8x1 metal tank for irrigation and establishment.

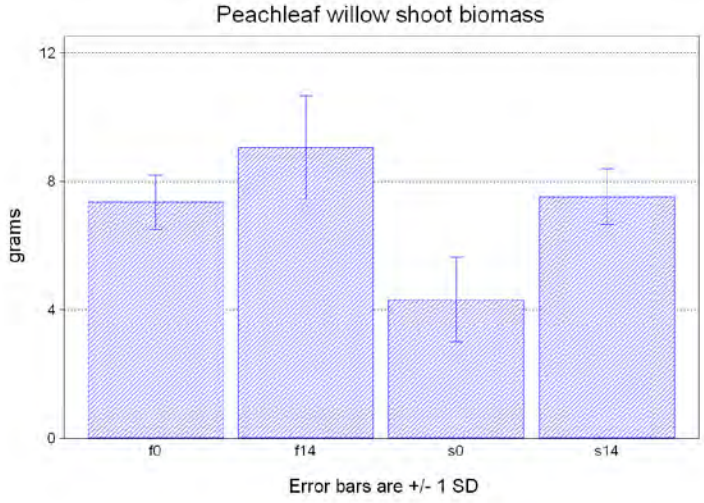
treatments had similar weights of 7.35 and 7.51 g respectively, while the spring non-soaked treatment had considerably lower shoot production with 4.32 g.

Table 1. Effects of soaking on peachleaf willow

	% Survival	Root biomass	Shoot biomass
Fall 0	100*	1.60 ab	7.35 a
Fall 14	100	1.91 a	9.05 a
Spring 0	100	1.18 b	4.32 b
Spring 14	100	1.53 ab	7.51 a
cv (0.05)	na	0.71	1.99

*not separable at p=0.05





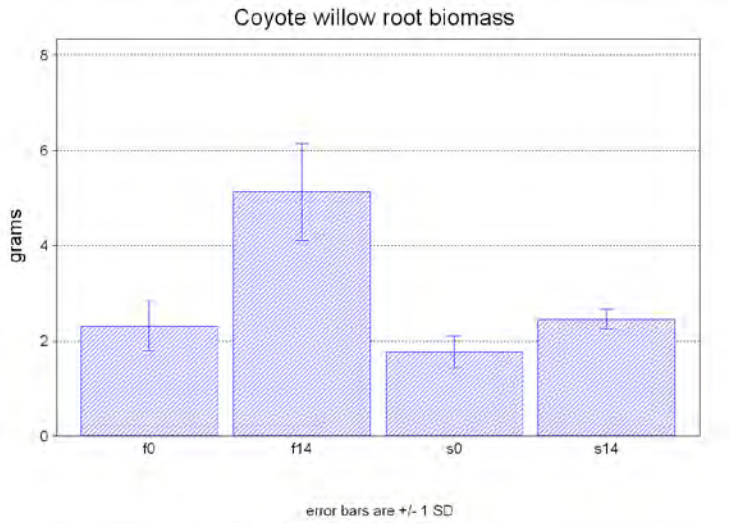
In the coyote willow trial the F14 treatment had slightly lower (though not significant) percent survival than the other three treatments. The F0, S14 and S0 all had 100% survival while the F14 treatment had an average of 92% survival. The F14 treatment had significantly greater root production than the other three treatments. F14 root production

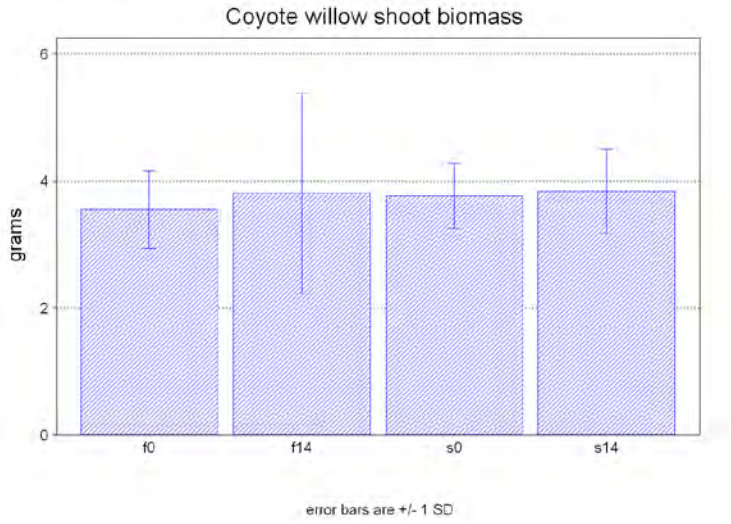
weighted 5.13 g, more than twice the root production of the next closest treatment, S14 with 2.46 g. F0 followed with 2.32 g, and S0 again had the lowest production with 1.77 g of roots. Shoot production between the four treatments was not statistically significant. Highest shoot production came from the S14 treatment with 3.84 g. F14 had 3.81 g and F0 and S0 had 3.55 and 3.77 g respectively.

Table 2. Effects of soaking on coyote willow

	% Survival	Root (g)	Shoot (g)
Fall 0	100*	2.32 b	3.55*
Fall 14	92	5.13 a	3.81
Spring 0	100	1.77 b	3.77
Spring 14	100	2.46 b	3.84
cv (0.05)	na	1.25	na

*not separable at p=0.05





Discussion

There are a number of reasons why spring plantings are more prevalent than fall plantings. Fall planted cuttings are not expected to sprout until the following growing season, thus there is reduced protection of the streambank until after the spring runoff. Additionally, fall collected cuttings are often believed to be under stress due to hot summer temperatures, reduced water availability, insects and disease. Yet with the aid of pre-soaking cuttings, this may not be the case.

Between planting and bud-break, all cuttings in the F14 group of both species showed signs of fungal infection with multiple black spots on the bare tips of each cutting. The F14 cuttings were also later in breaking bud dormancy than the cuttings in the other treatments and were believed to be dead early in the trial. It is unknown if the infection was the reason for the mortality of two coyote willow cuttings in the F14 treatment or not. Surprisingly, however, the F14 treatment performed equal to or better than all other treatments in root and shoot production.

This study shows the value of pre-soaking willow cuttings versus not pre-soaking, especially with regard to spring harvested materials. It is possible that cuttings harvested in the fall and planted dormant lose less water (and therefore maintain vigor) over the course of the winter than cuttings left on the tree until spring. Soaking the cuttings in the spring then restores the cutting water content to its pre-winter levels, providing similar results to those found with non-soaked fall harvested cuttings. Cuttings harvested and soaked in the fall may retain the increased moisture levels obtained from soaking and respond with greater root and shoot production the following spring. Pre-soaking in the fall may also cause cuttings to be in a better pre-rooting condition, resulting for some reason in better rooting vigor the next spring. Additional studies comparing cutting weights before and after soaking in the fall and spring should be performed to test this idea.

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Native Buckwheat Initial Evaluation Planting
October 10, 2008
Study Number: IDPMC-P-0815-RA
Derek J. Tilley, Range Conservationist (plants)
Natural Resources Conservation Service
Plant Materials Center
Aberdeen, Idaho

Introduction

There is increasing demand for releases of native forbs and sub-shrubs for use in revegetation efforts throughout western North America. Native forbs and sub-shrubs are important for increasing biodiversity, improving wildlife habitat and providing food for numerous birds and mammals. Currently native forbs and sub-shrubs are being emphasized for use in revegetating rangelands, especially in regions occupied by sage grouse. Sulphurflower buckwheat has been identified as a top priority native forb species which increases insect populations that are necessary for chick survival. Buckwheat species are also utilized in the xeriscaping market and have potential for roadside beautification and diversification projects. The goal of this trial is to identify one or more superior sulphurflower (*Eriogonum umbellatum*) and/or whorled (*E. heracleoides*) buckwheat accessions adapted for use in the Aberdeen PMC service area.

Materials and Methods

The Aberdeen, Idaho Plant Materials Center (IDPMC) assembled 39 collections of *Eriogonum* spp. from Idaho, California, Oregon and Wyoming (appendix 1). Collections were made primarily by employees of the Idaho NRCS, but collections were also received from the Lockeford NRCS Plant Materials Center in California, Oregon NRCS, Craters of the Moon National Monument and Preserve (USNPS), Bridger Teton National Forest (USFS), Rocky Mountain Research Station (USFS), Western Regional Plant Introduction Station and one private seed company (Comstock Seed, Gardnerville, NV). Of the 39 accessions, 21 were chosen to be included in the 2007 IEP based on the quality and quantity of the original seed collection. These included 16 accessions of whorled buckwheat and five accessions of sulphurflower buckwheat.

Average seed per pound values for each species were obtained by weighing 500 seeds from 32 accessions (appendix 2). Sulphurflower buckwheat ranged from 0.98 to 1.94g per 500 seeds or 117,000 to 231,000 seeds per pound with an average of 170,000 seeds per pound. Whorled buckwheat seed weights ranged from 1.06 to 1.98g per 500 seeds or 114,000 to 214,000 seeds per pound with an average of 171,000 seeds per pound.

The trial was designed as a randomized complete block in a single row of six foot wide weed barrier fabric in field 12 at the PMC Home Farm. The trial contained four replications beginning with rep one on the west end of the field. Holes were burned into the fabric using an acetylene torch and a spacing jig designed for 18 inch hole spacing. Each plot contained six holes. Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9.4 inches.

The trial was seeded on November 1, 2007. Soil in each hole was roughened lightly and then hand-seeded with 12-25 seeds followed by a light packing by foot. Seeding depth was surface to 1/8 inch. The trial was watered minimally in 2008 to reduce soil crusting and allow plants to break the soil surface. Following emergence no additional water was applied.

Buckwheat plots were evaluated for percent stand on August 4, 2008. Counts were made of the number of planted holes in each plot containing live plants, and then divided by six to provide percent establishment per plot. Diameters of all living plants from each accession were measured and averaged to provide a mean diameter per accession. Data were analyzed with Statistix 8.2 software using an Analysis of Variance to determine significance (α=0.05). Plant diameters were not tested for significance.

Results

Accession 9076543 whorled buckwheat, August 2008

No significant differences were detected between stand means for either species. Stand percentages were generally low. The best stand from the sulphurflower buckwheat accessions came from accession 9076549 with 20.8%. The largest average diameter was 7.31 inches from accession 9076550.

Table 2. Sulphurflower buckwheat

Accession No.	% Stand	Plant diameter[2] (Inches)
9076549	20.8[1]	5.31
9076550	16.7	7.31
9076554	16.7	6.81
9076560	8.3	4.31
9076514	4.2	1.31

[1] No significant difference
[2] Not tested for significance

Whorled buckwheat stands ranged from 4.2% (9076555) to 50.0% (9076543). Accession 9076543 also had the largest average plant diameter of 6.85 inches.

Table 1.Whorled buckwheat

Accession No.	% Stand	Plant diameter[2] (Inches)
9076543	50.0[1]	6.85
9076540	41.7	3.40
9076538	37.5	3.53
9076536	37.5	4.38
9076561	33.3	5.13
9076546	33.3	4.25
9076553	29.2	4.94
9076548	25.0	3.25
9076533	25.0	3.75
9076542	25.0	6.00
9076532	16.7	5.85
9076558	12.5	3.93
9076529	8.3	3.76
9076547	8.3	3.60
9076539	8.3	2.93
9076555	4.2	1.26

[1] No significant difference
[2] Not tested for significance

In 2009 the plots will be evaluated for seed production, vigor, and general appearance (aesthetic value) in addition to percent stand. This trial will continue to be evaluated through 2010 at which time decisions will be made on selecting accessions for potential release.

Appendix 1. Assemblage of collections

Acc. No.	Species	County, State	Date coll.	Collector, Affiliation	Wt. clean (g)
9076479	*E.* sp.	ID	2004	CMNM	29.47
9076514	ERUM	ID	2004	CMNM	28.01
9076560 [a]	ERUM	ID	2006	Shaw, USDA FS	31.79
9076561	ERHE2	ID	2005	CMNM	24.44
'Sierra'	ERUM ssp. *polyanthum*	Eldorado, CA	2003	Lockeford PMC, NRCS	1.8 lb
9076559	ERUM	Mono, CA	10 July 05	Comstock Seed	25.74
9076528	ERHE2	Washington, ID	27 July 06	Tilley, NRCS	6.68
9076529	ERHE2	Washington, ID	27 July 06	Tilley, NRCS	35.34
9076530	ERHE2	Washington, ID	27 July 06	Tilley, NRCS	9.30
9076531[bc]	*E. thymoides*	Adams, ID	27 July 06	Tilley, NRCS	Trace
9076532	ERHE2	Adams, ID	28 July 06	Tilley, NRCS	81.25
9076533	ERHE2	Valley, ID	28 July 06	Tilley, NRCS	116.92
9076534	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	9.75
9076535 [b]	ERUM	Elmore, ID	28 July 06	Tilley, NRCS	2.72
9076536	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	34.34
9076537	ERUM	Elmore, ID	28 July 06	Tilley, NRCS	9.69
9076538	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	122.30
9076539	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	21.58
9076540	ERHE2	Blaine, ID	29 July 06	Tilley, NRCS	21.22
9076541	ERUM	Butte, ID	29 July 06	Tilley, NRCS	13.28
9076542	ERHE2	Bonneville, ID	1 Aug 06	Tilley, NRCS	42.19
9076543	ERHE2	Bonneville, ID	1 Aug 06	Tilley, NRCS	53.55

9076544	ERHE2	Caribou, ID	1 Aug 06	Tilley, NRCS	16.60
9076545	ERHE2	Caribou, ID	1 Aug 06	Tilley, NRCS	12.55
9076546	ERHE2	Caribou, ID	1 Aug 06	Tilley, NRCS	36.92
9076547	ERHE2	Cassia, ID	1 Aug 06	Tilley, NRCS	45.90
9076548	ERHE2	Twin Falls, ID	1 Aug 06	Tilley, NRCS	56.30
9076549	ERUM	Teton, WY	25 July 06	Yegorova, USDA FS	1.8 lb
9076550	ERUM	Elmore, ID	14 Aug 06	Ogle, NRCS	37.10
9076551 [b]	ERUM	Clark, ID	28 July 06	Edgerton, NRCS	2.08
9076552 [b]	ERUM	Fremont, ID	27 July 06	Edgerton, NRCS	No seed
9076553	ERHE2	Madison, ID	5 Aug 06	Mickelson, NRCS	1.7 lb
9076554	ERUM	Franklin, ID	23 Aug 06	Jones, NRCS	26.19
9076555	ERHE2	Franklin, ID	23 Aug 06	Jones, NRCS	33.84
9076556 [d]	ERHE2	Franklin, ID	23 Aug 06	Jones, NRCS	--
9076557 [d]	ERUM	Franklin, ID	23 Aug 06	Jones, NRCS	--
9076558	ERHE2	Franklin, ID	23 Aug 06	Jones, NRCS	15.25
9076562	ERUM	Lake, OR	14 Aug 06	Corning, NRCS	6.16
9076563	ERHE2	Washington, ID	2002	WRPIS	10.0

[a] Increase field at IDPMC. Original collection from Slate Creek, ID.
[b] Not enough seed to include in trial.
[c] Seed given to Steve Love, U.I., for use in xeriscaping ornamental trial.
[d] 9076556 and 9076557 inadvertently combined at time of cleaning; left out of IEP.

Appendix 2. Seeds/lb

ERHE2	500 wt (g)	Seed/lb	ERUM	500 wt (g)	Seed/lb
9076528	1.06	214,150	9076537	0.98	231,633
9076529	1.38	164,493	9076541	1.29	175,969
9076530	1.12	202,679	9076549	1.08	210,185
9076532	1.65	137,576	9076550	1.16	195,690
9076533	1.09	208,257	9076514	1.10	206,364
9076534	1.28	177,344	9076559	1.94	117,010
9076536	1.17	194,017	'Sierra'	1.55	146,452
9076538	1.16	195,690	9076479	1.92	118,229
9076539	1.20	189,167	9076554	1.43	158,741
9076540	1.19	190,756	9076560	1.53	148,366
9076542	1.20	189,167			
9076543	1.23	184,553			
9076544	1.30	174,625			
9076545	1.30	174,625			
9076546	1.32	171,970			
9076547	1.37	165,693			
9076548	1.31	173,282			
9076553	1.32	171,970			
9076561	1.71	132,749			
9076555	1.36	166,912			
9076558	1.98	114.646			
9076563	1.18	192,372			

Buckwheat trial field map

R1 (west)	R2	R3	R4
548	532	555	543
533	514	549	540
553	553	532	554
538	533	538	558
529	538	536	560
542	536	542	538
539	546	540	548
560	558	558	546
514	550	543	514
549	542	548	536
558	549	547	550
554	561	560	549
547	548	550	542
561	560	553	529
536	555	554	533
540	540	529	555
546	543	533	539
543	547	561	561
532	539	546	553
555	529	539	532
550	554	514	547

*yellow =ERUM

(east)

OFF-CENTER ACTIVITIES

Orchard Display Nursery
Evaluation Summary (2005-2008) Final Report

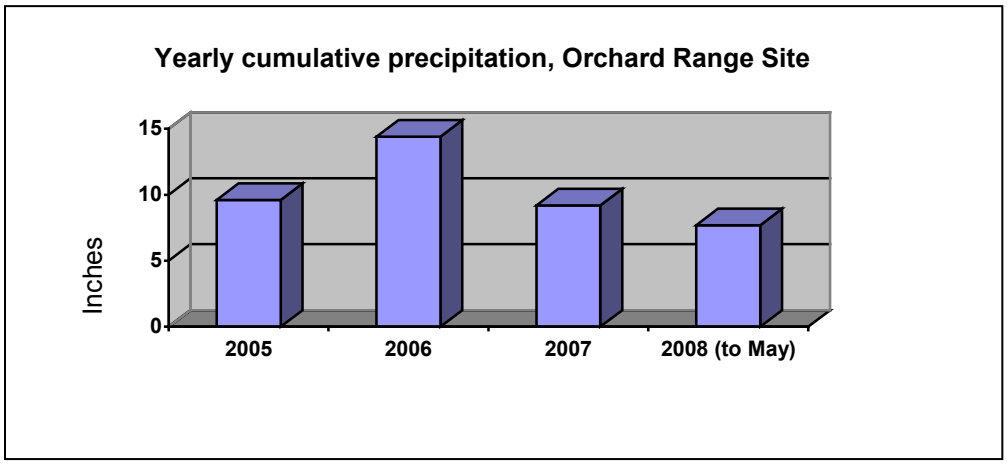
Derek J. Tilley, Range Conservationist (Plants)
Loren St. John, Team Leader Aberdeen Plant Materials Center
Daniel G. Ogle, Plant Materials Specialist

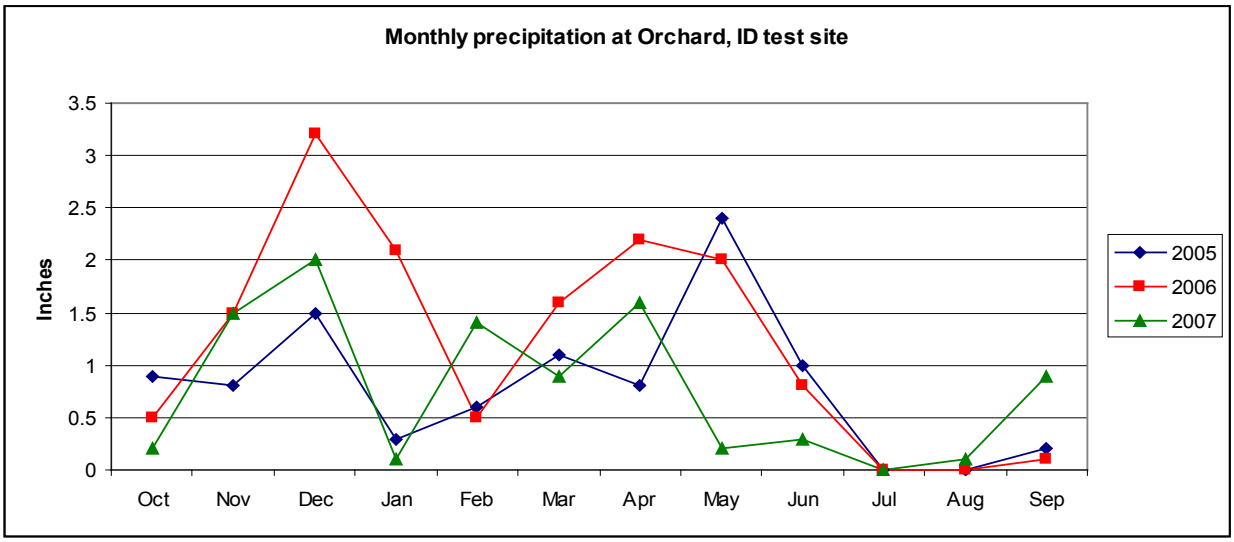
Introduction

The Orchard Display Nursery was planted on November 16, 2004 in cooperation with the Great Basin Native Plant Selection and Increase Project. The nursery includes 82 accessions of 27 native and introduced grass, forb and shrub species. Each accession was planted in 7 X 60 foot plots. See Tilley et al (2005) for descriptions of the species and accessions planted. The remaining area was planted to a cover crop mix of 50% Anatone bluebunch wheatgrass, 20% Bannock thickspike wheatgrass, 20% Magnar basin wildrye and 10% Snake River Plains fourwing saltbush.

Orchard test site on May 16, 2007

The test site is located on a loamy 10-12 inch precipitation ecological site that historically supported a Wyoming big sagebrush - bluebunch wheatgrass – Thurber's needlegrass plant community. Total precipitation at the Orchard Test Site for water year 2005 was 9.6 inches, 2006 was 14.4 inches and for 2007 was 9.2 inches. At the time of the 2008 evaluation on May, 5, the Orchard range site had received 7.70 inches of precipitation for water year 2008 (USDA 2008).





The Orchard display nursery was evaluated from 2005 to 2008. This report summarizes the evaluations conducted at the site.

Materials and Methods

Orchard display site in September 2004 prior to final mechanical seedbed preparation

The Bureau of Land Management (BLM) burned the site in the fall of 2002. The site was later sprayed by PMC staff in May 2003 and May 2004 with a Roundup/2, 4-D herbicide mix to create a weed free seedbed. Due to limited breakdown of dead grass clumps that would inhibit proper seed placement with a drill and to ensure a clean seedbed, the decision was made to cultivate the site with a culti-packer just prior to seeding. During the first evaluation most plots contained high numbers of Russian thistle (*Salsola* sp.) and moderate amounts of bur buttercup (*Ranunculus testiculatus* Crantz) plants. Russian thistle plants were approximately two to three inches tall and the buttercup plants had already flowered. At the time of the second evaluation, there was a heavy infestation of tumble mustard (*Sisymbrium altissimum* L.). Plots were consequently sprayed again on June 9, 2005 with 16 oz. 2, 4-D and 8 oz. Clarity per acre to control the mustard.

The first evaluation of the plots for initial establishment was conducted on April 27, 2005 using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40X41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The first grid was laid on the rows approximately two grid lengths (80 inches) into the plot. Counts were made of the cells that contained at least one plant. Grids were subsequently flipped and evaluated three more times giving a total of 80

evaluated cells. Total area for one grid is approximately 1m². Total area evaluated is therefore approximately 4m². A conservative estimate of plant density (plants/m²) is the total number of cells containing at least one plant divided by four. The second evaluation occurred on May 25, 2005. The 2006 evaluation was conducted on May 31, the 2007 evaluation took place on May 16 and the 2008 evaluation was completed on May 1. The methods followed in 2006 and 2007 were the same as described above; however, the frame was evaluated five times for a total of 100 cells or $5m^2$. Total counts were then divided by five for approximate plants/m^2. Numbers for approximate plants/m^2 were then divided by 10.8 to calculate approximate plants/ft^2. It is important to note that because cells with plants were counted and not number of plants per cell, the best possible score is 100 hits per five frames which converts to 20 plants/m^2 or 1.85 plants/ft^2. Actual plant density may be higher than the numbers indicated below. All tables have been arranged with accessions ranked from highest plant density to the lowest at the time of the final evaluation in 2008. Data were not analyzed for significance.

Native Grasses

There were forty-seven accessions of native grasses planted. Overall the native grasses established well considering the limited amount of precipitation received over the winter and early spring of 2005. Especially good stands were observed in the bluebunch wheatgrass and Snake River wheatgrass plots during 2005. There was a marked decrease in plant density between the first and second evaluations with some notable exceptions. Seven of nine bluebunch wheatgrass accessions and three of four Snake River wheatgrass accessions increased in density from the first evaluation to the second. This is possibly due to receiving 2.5 inches of precipitation during that period and/or from a lack of pressure by black grass bugs (*Labops* sp.). Most of the native grasses decreased steadily in density from 2005 to 2007.

In 2005 the best performing Indian ricegrass accession was White River, having a plant density of 0.56 plants/ft^2 during the first evaluation and 0.17 plants/ft^2 during the second evaluation. In 2006 through 2008 there were no plants of any Indian ricegrass accessions observed in the evaluation grids and very few seen within their respective plots.

In 2005 the squirreltail plots had as high as 0.54 plants/ft^2 with Fish Creek. In 2006 all squirreltail accessions had decreased. Fish Creek maintained the best plant density with 0.26 plants/ft^2. Densities remained essentially the same in 2007. In 2008 Fish Creek increased in density from 0.22 to 0.67 plants/ft^2.

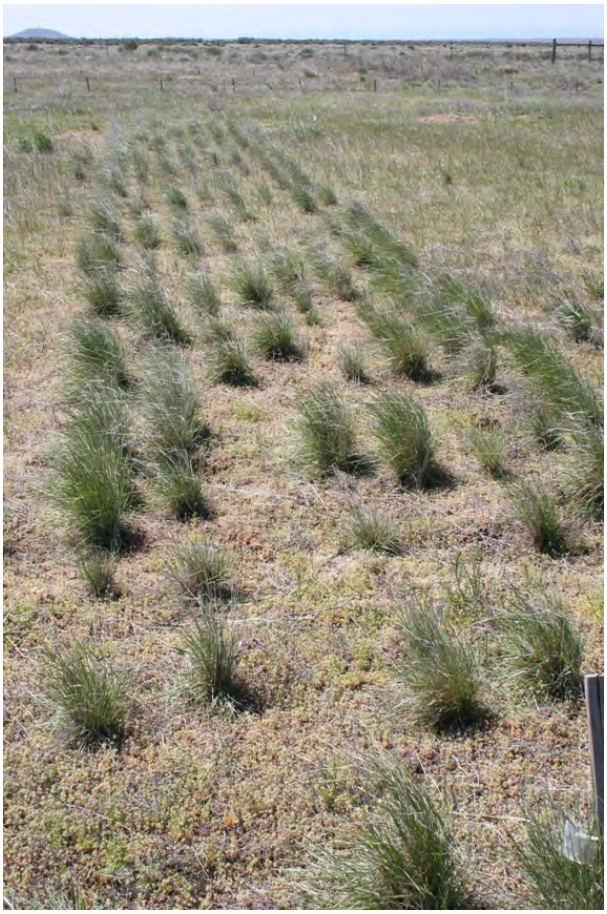
Bannock thickspike wheatgrass had a density of 1.04 plants/ft^2 and stayed essentially the same at the second evaluation of 2005. In 2006 Bannock had dropped to nearly half of the original density to 0.58 plants/ft^2. The 2007 evaluations showed small declines from established plots. In 2008 Bannock decreased to 0.28 plants/ft² and Schwendimar fell in density to 0.17 plants/ft².

Revenue and San Luis slender wheatgrass both showed zero plants/ft^2 in 2006. Pryor slender wheatgrass similarly dropped in density but had 0.02 plants/ft^2. In 2007 and 2008 no slender wheatgrass plants could be found in any of the evaluated grids.

The western wheatgrass accessions had less dramatic declines in density from 2005 to 2006, but still showed poor stands with Rodan having the highest density of 0.13 plants/ft^2. In 2007 and 2008 all accessions had zero plants surviving.

Plots of bluebunch wheatgrass in May 2008

The bluebunch wheatgrass accessions had the highest average densities of all the native grasses. All decreased slightly in density from 2005 to 2006, but still maintained good stands. P-12, Wahluke and Jim Creek all had densities over 1.00 plants/ft^2. Columbia, Anatone, P-7 and P-15 had densities between 0.50 and 1.00 plants/ft^2 while P-5 and Goldar both shared low densities. In 2007 densities were generally slightly lower, but still higher than all other species as a whole. The highest density recorded in 2007 was Jim Creek at 1.07 plants/ft^2. In 2008 Jim Creek, Wahluke, P-12 and P-7 had the best plant densities with 1.10, 1.10, 0.82 and 0.75 plants/ft^2 respectively.



SERDP Snake River wheatgrass plot in May 2008

Snake River wheatgrass accessions had good densities the establishment year with three accessions having densities greater than 1.00 plants/ft^2. Numbers declined slightly yet steadily over the next two years. In 2007 the best density was from SERDP with 0.70 plants/ft^2. In 2008 SERDP had risen in density to 0.80 plants/ft^2 making it the top performer of the group. Densities of other accessions remained essentially the same as 2007.

The basin wildrye accessions had fair to good stands in 2005, but decreased steadily from 2005 to 2008. U108-02 and Trailhead retained the highest densities in 2006 at 0.24 and 0.26 plants/ft^2 respectively. By 2007 the best density was achieved by Trailhead with 0.17 plants/ft^2. U108-02 and U100-01 had similar densities with 0.11 and 0.13 plants/ft^2 respectively. In

2008 basin wildrye had poor stands from all accessions, the best being 0.09 plants/ft² from U108-02.

Sheep fescue stands remained poor from 2005 to 2006 with Covar slightly increasing from 0.00 to 0.07 plants/ft^2. In 2007 Covar still had 0.07 plants/ft^2, and Initial Point had decreased to 0.00 plants/ft^2. In 2008 the fescues persisted with minimal stands.

Thurber's needlegrass had no plants in the evaluated grids for any year.

All five of the Sandberg bluegrass accessions increased in density from 2005 to 2006. The best stands were observed in the High Plains and Mountain Home plots with respective stands of 0.54 and 0.35 plants/ft^2. In 2007 all stands had been reduced to 0.0 plants/ft². In 2008 however, Hanford Source increased to 0.56 plants/ft² showing a stand that had been hidden under the dense weed canopy.

Native Grasses		4/27/05	5/25/05	5/30/06	5/16/07	5/1/08
Species	Name or accession	----------Plants/ft²----------				
Indian ricegrass	Rimrock	0.37	0.20	0.00	0.00	0.00
	White River	0.56	0.17	0.00	0.00	0.00
	Nezpar	0.42	0.17	0.00	0.00	0.00
	Ribstone	0.14	0.09	0.00	0.00	0.00
	Paloma	0.05	0.00	0.00	0.00	0.00
Squirreltail	Fish Creek	0.97	0.54	0.26	0.22	0.67
	Sand Hollow	0.37	0.20	0.19	0.20	0.24
	Toe Jam Creek	0.58	0.17	0.00	0.00	0.02
	Shaniko Plateau	0.81	0.52	0.06	0.09	0.00
	9019219	0.02	0.02	0.00	0.00	0.00
Thickspike wheatgrass	Bannock	1.04	1.07	0.58	0.43	0.28
	Schwendimar	0.69	0.52	0.39	0.24	0.17
	Critana	0.90	0.56	0.24	0.17	0.00
	Sodar	0.37	0.30	0.15	0.07	0.00
Slender wheatgrass	Revenue	1.00	0.93	0.00	0.00	0.00
	San Luis	0.60	0.69	0.00	0.00	0.00
	Pryor	0.30	0.30	0.02	0.00	0.00
Western wheatgrass	Rodan	0.28	0.35	0.13	0.00	0.00
	Rosana	0.05	0.20	0.04	0.00	0.00
	Arriba	0.16	0.15	0.06	0.00	0.00
Bluebunch wheatgrass	Jim Creek	0.83	1.02	1.02	1.07	1.10
	Wahluke	0.97	1.26	1.02	0.98	1.10
	P-12	1.34	1.59	1.04	0.89	0.82
	P-7	0.93	1.15	0.67	0.57	0.75
	Columbia	1.30	1.23	0.84	0.83	0.65
	Anatone	0.81	1.15	0.80	0.69	0.47
	P-15	0.60	0.93	0.54	0.50	0.41
	Goldar	0.51	0.37	0.33	0.19	0.24
	P-5	0.42	0.61	0.22	0.13	0.17
Snake River wheatgrass	SERDP	1.02	0.94	0.67	0.70	0.80
	Secar	1.00	1.11	0.76	0.56	0.54
	Expedition	1.27	1.44	0.54	0.41	0.34
	E-26	0.21	0.23	0.22	0.13	0.11
Basin wildrye	U108-02	0.56	0.57	0.24	0.11	0.09
	U100-01	0.53	0.41	0.11	0.13	0.06
	Trailhead	0.60	0.52	0.26	0.17	0.04

	Magnar	0.28	0.22	0.04	0.04	0.02
	U70-01	0.30	0.22	0.02	0.02	0.02
	Washoe	0.21	0.09	0.09	0.06	0.00
Sheep fescue	Covar	0.16	0.00	0.07	0.07	0.06
	Initial Point	0.21	0.04	0.02	0.00	0.02
Thurber's needlegrass	Thurber's	0.00	0.00	0.00	0.00	0.00
Sandberg bluegrass	Hanford Source	0.00	0.00	0.19	0.00	0.56
	Mountain Home	0.00	0.00	0.35	0.00	0.03
	High Plains	0.25	0.00	0.54	0.00	0.00
	Sherman	0.00	0.00	0.02	0.00	0.00
	Toole County, MT	0.00	0.00	0.04	0.00	0.00

Introduced Grasses

Although many of the introduced grass accessions had fair emergence, an outbreak of black grass bugs at the time of the first evaluation in 2005 was noted. The infestation appeared limited to the introduced grass section of the nursery. Plants were covered with yellow spots making the plants appear yellow-green overall. Although most of the stands of the introduced grasses decreased from the first to the second evaluation, many stands had recovered and increased by 2006 indicating that many plants thought to be dead during the second evaluation in 2005 were still alive. However, the plants of crested wheatgrass were very small when compared to the other wheatgrasses in the nursery and still appeared to be recovering from black grass bug pressure in 2007. The 2007 and 2008 evaluations showed most established plots with reduced densities, many accessions dropping out completely.

In 2006 all of the crested wheatgrass accessions increased in density or remained approximately where they were in 2005. Ephraim rose from 0.28 to 1.23 plants/ft^2; however, many of the plants were small in size due to the black grass bug infestation during the spring of 2005. In 2007 the best density was obtained from Nordan with 0.67 plants/ft^2. Ephraim had dropped from 1.23 to 0.02 plants/ft^2. In 2008 Nordan and Roadcrest had both increased in density to 0.88 and 0.71 plants/ft^2 respectively. The remaining crested wheatgrass plots had few remaining plants.

Both Siberian wheatgrass accessions similarly increased from 2005 to 2006, but decreased in 2007. In 2007 Vavilov was down to 0.26 plants/ft^2 and P-27 had 0.00 plants/ft^2. In 2008 Vavilov had rebounded to 0.54 plants/ft^2.

The three pubescent wheatgrass accessions decreased from 2005 to 2006 with the highest density in 2006 coming from Manska at 0.28 plants/ft^2. Manska continued to have the best density in 2007 with 0.13 plants/ft^2. Plant densities in 2008 remained low with Luna having the best stand with 0.22 plants/ft^2.

Rush intermediate wheatgrass, had 0.60 plants/ft^2 in 2005. Plant density decreased to 0.00 plants/ft^2 in 2006 and did not recover through 2008.

Prairieland and Eejay Altai wildrye had zero plants in 2006. Pearl Altai wildrye had 0.02 plants/ft^2. In 2007 Prairieland and Eejay again had 0.00 plants/ft^2 and Pearl increased slightly to 0.04 plants/ft^2. There were no live plants detected in 2008.

The Russian wildrye accessions all increased in density with the exception of Tetracan which decreased slightly. The best stand was recorded in the Bozoisky Select plot with 0.58 plants/ft^2. Bozoisky Select had the best stand in 2007 with 0.35 plants/ft^2. Bozoisky II had the next best rating with 0.26 plants/ft^2. In 2008 the Russian wildrye plots had poor stands. The top performer being Bozoisky Select with 0.11 plants/ft².

Introduced Grasses Species	Name or accession	4/27/05	5/25/05	5/30/06	5/16/07	5/8/08
		Plants/ft²				
Crested wheatgrass	Nordan	1.30	1.19	1.10	0.67	0.88
	Roadcrest	1.30	0.07	0.52	0.19	0.71
	Hycrest	0.39	0.24	0.15	0.07	0.04
	Ephraim	0.65	0.28	1.23	0.02	0.00
	CD-II	0.56	0.24	0.20	0.00	0.00
	Douglas	0.28	0.04	0.09	0.00	0.04
Siberian wheatgrass	Vavilov	0.65	0.20	0.61	0.26	0.54
	P-27	0.09	0.02	0.33	0.00	0.00
Pubescent wheatgrass	Luna	0.79	0.54	0.13	0.00	0.22
	Manska	0.69	0.65	0.28	0.13	0.09
	Greenleaf	0.60	0.59	0.15	0.09	0.02
Intermediate wheatgrass	Rush	0.60	0.56	0.00	0.00	0.00
	Pearl	0.35	0.15	0.02	0.04	0.00
Altai wildrye	Prairieland	0.56	0.39	0.00	0.00	0.00
	Eejay	0.16	0.28	0.00	0.00	0.00
Russian wildrye	Bozoisky Select	0.72	0.54	0.58	0.35	0.11
	Syn-A (Bozoisky II)	0.21	0.13	0.24	0.26	0.09
	Mankota	0.46	0.28	0.32	0.19	0.02
	Tetracan	0.42	0.20	0.17	0.07	0.04

Forbs and Shrubs

Despite some good stands in 2005, all of the forb and shrub accessions except for Eagle western yarrow had zero plants during the 2006 evaluation. Eagle had 0.07 plants/ft^2 in the frequency grids along with a small stand of plants at one end of the seeded plot. In 2007 more plants of Eagle had either germinated from the original seeding, or seed had spread from established plants. Plant density for Eagle in 2007 was 0.24 plants/ft^2. Snake River Plains fourwing saltbush also had a single plant found in the plots, increasing its density from 0.00 to 0.02 plants/ft^2. In 2008 Eagle was the only forb or shrub accession with plants detected in the evaluation with a density of 0.21 plants/ft².

Native/Introduced Forbs and Shrubs Species	Name or accession	4/27/05	5/25/05	5/30/06	5/16/07	5/8/08
		Plants/ft²				
Western yarrow	Eagle	0.51	0.50	0.07	0.24	0.21
	Great Northern	0.19	0.09	0.00	0.00	0.00
Utah sweetvetch	Timp	0.14	0.02	0.00	0.00	0.00
Firecracker penstemon	Richfield Selection	0.02	0.02	0.00	0.00	0.00
Scarlet globemallow		0.00	0.00	0.00	0.00	0.00
Lewis flax	Maple Grove	0.42	0.15	0.00	0.00	0.00
Blue flax	Appar	0.90	0.26	0.00	0.00	0.00
Wyoming big sagebrush		0.02	0.02	0.00	0.00	0.00

Fourwing saltbush	Snake River Plains	0.00	0.00	0.00	0.02	0.00
	Wytana	0.00	0.00	0.00	0.00	0.00
	Rincon	0.00	0.00	0.00	0.00	0.00
Gardner's saltbush	9016134	0.00	0.00	0.00	0.00	0.00
Winterfat	Hatch	0.28	0.17	0.00	0.00	0.00
	Northern Cold Desert	0.00	0.00	0.00	0.00	0.00
	Open Range	0.00	0.00	0.00	0.00	0.00
Forage kochia	Immigrant	0.00	0.00	0.00	0.00	0.00

Stand of Eagle western yarrow, 2007.

Cover Crop

The cover crop consisted of a four species mix which contained: 50% Anatone bluebunch wheatgrass, 20% Bannock thickspike wheatgrass, 20% Magnar basin wildrye and 10% Snake River Plains fourwing saltbush. Four grids were examined during the first evaluation in 2005, one on each side of the nursery, and five grids were evaluated at the time of the second evaluation in 2005 and the 2006 evaluation. Total plant density was estimated at 0.37 plants/ft^2 at the first evaluation and 0.57plants/ft^2 at the second evaluation. In 2006 the cover crop density was 0.13 plants/ft^2. Cover crop densities increased in 2007 up to 0.20 plants/ft^2. In 2008 the cover crop density was 0.04 plants/ft².

Discussion

Despite significant populations of Russian thistle, native and introduced grasses had fair to good emergence and plant density during the establishment year. Germination and emergence might have been better with more precipitation during March and April of 2005 but emergence was good with the rain that was received. The majority of the plots showed decreased stands from 2005 to 2006 and again into 2007. By 2008 densities had for the most part stabilized, those species not well adapted to the site had nearly all died out, while adapted accessions persisted.

The low precipitation at the site, especially the lack of moisture in July and August every year seems to have eliminated many of the less drought tolerant accessions.

One concern is the effect of black grass bugs on the introduced grasses. Plants subjected to black grass bug are normally affected by decreased seed yield and a reduction in palatability. Infestations rarely result in the death of established plants, but in poor water years establishing seedlings may be under enough stress for bug damage to kill the plants (Hammon and Peairs 2001). The second evaluation in 2005 indicated a loss in plant densities; however it appears that many of the plants survived, although stunted (low vigor), through 2006. In 2007 many more plants had died resulting in poor or no stands in many plots. In 2008 most accessions continued to decrease in plant density; however, a few accessions that had earlier proven adapted to the site conditions had small gains.

Snake River and bluebunch wheatgrasses had consistently good stands from essentially all accessions. Nordan and Roadcrest crested wheatgrass also performed well after recovering from black grass bug damage.

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Coffee Point Off-Center Evaluation (2006 planting)
2008 Progress Report
Derek J. Tilley, Range Conservationist (Plants)
Loren St. John, Team Leader
Natural Resources Conservation Service
Plant Materials Center
Aberdeen, Idaho

INTRODUCTION

In the fall of 2006, the Aberdeen Plant Materials Center (PMC) installed a multi-species off-center planting at the Coffee Point test site 25 miles northwest of Aberdeen, Idaho. Seed collections were assembled with the assistance of ARS Logan, UT; Bridger, MT PMC; Benson Seed Farm; University Nevada, Reno; Department of Defense; Geertson Seed Farm and Los Lunas, NM PMC. The trial contains 58 accessions of 23 species of native and introduced grasses, forbs and shrubs (table 1). Figure 1 shows a plot map of the planting. The goal of this trial is to evaluate the adaptability of new conservation releases in a low precipitation environment and compare their establishment, production and longevity against older traditionally used released plant materials.

The Coffee Point test site is located in Major Land Resource Area (MLRA) 11B, Snake River Plains of the Northwestern Wheat and Range region of the Intermountain West in what historically supported a Wyoming big sagebrush/bluebunch wheatgrass plant community. Climatic conditions are very dry with mean annual precipitation ranging from 8 to 12 inches, average air temperature is 43º F, and the frost free period is approximately 90 days. Soils at the site are the Splittop-Atomic complex with 2 to 8% slopes and effective rooting depth of 20 to 40 inches. The pH of the soil complex is 7.4 to 8.4. The elevation is 4,850 ft.

MATERIALS AND METHODS

Prior to site preparation we determined the pre-existing cover frequencies by running four 30 meter transects across randomly chosen portions of the test site on April 15, 2006. Intercept determinations were made at each meter. Pre-existing cover consisted of 38.3% litter; 28.3% bare ground; 15.8% P-27 Siberian wheatgrass; 14.2% Hycrest crested wheatgrass and 3.3% Immigrant forage kochia.

The seed bed was prepared with chemical treatments of 16 oz 2,4-D and 64 oz Roundup per acre applied on May 2, 2005, August 1, 2005 and May 17, 2006. The site was disked on August 3, 2006. The trial was planted on November 20, 2006 with a modified Tye Drill with a width of 80 inches (8 spouts at 10” spacing). Experimental design was a randomized complete block with 4 replications. Each plot was one drill width wide (80 in) and 20 ft long. Species were arranged into blocks with the exception of introduced grasses, forbs and shrubs making up one block each. Seeding depths were dependent on species and were planted according to Ogle et al (2006). Species were seeded at a target rate of 20 to 30 pure live seeds (PLS) per ft² for large seeded species (<500,000 seeds per pound) and 40 to 50 PLS/ft² for smaller seeded species (>500,000 seeds/lb). PLS was determined by seed lab results or, when lab results were not available, PLS was estimated visually or the PLS from

other accessions were averaged. All seed was mixed with rice hulls as an inert carrier for improved seed flow according to St. John et al (2005) with the exception of fourwing and Gardener's saltbush. A cover crop of 50% Anatone bluebunch wheatgrass, 20% Bannock thickspike wheatgrass, 20% Magnar basin wildrye and 10% Snake River Plains fourwing saltbush was planted in the prepared areas surrounding the trial.

Establishment year evaluations were conducted on April 30 and May 1, 2007 and again on September 7, 2007 using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40X41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The first grid was laid on the rows approximately 1 ft into the plot. Counts were made of the cells that contained at least one plant. Grids were subsequently advanced one grid length in the plot and evaluated four more times giving a total of 100 evaluated cells. Density evaluations for 2008 took place on April 28 in the same manner as 2007. In August 2008 forage samples were taken from those species blocks judged to have enough production to warrant evaluation: thickspike wheatgrass, slender wheatgrass, and the introduced grass species. A 2'x 6' metal frame was placed in the center of each plot, and all above ground biomass was hand clipped and placed in paper grocery sacks. Forage samples were air dried for two weeks and weighed. Data were then converted to lbs/acre. All tables have been arranged with accessions ranked from highest plant density to the lowest at the time of the first evaluation. Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$. If significance was detected, means were separated using a Tukey HSD all pairwise comparison.

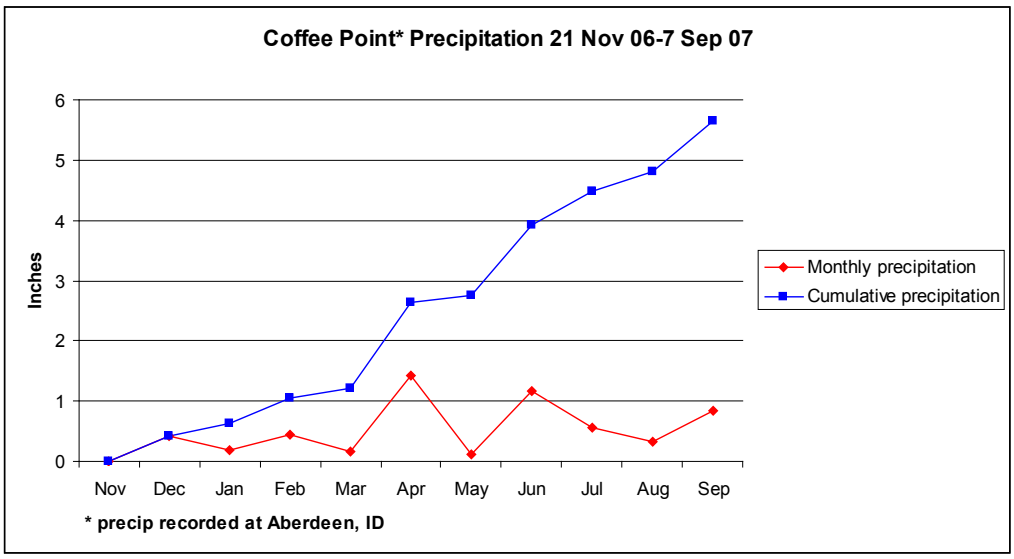
ZEBA

Also included in the planting are single observational plots of Appar blue flax, Goldar bluebunch wheatgrass, Magnar basin wildrye and Nezpar Indian ricegrass treated with ZEBA coating. ZEBA is a super-absorbent cornstarch based polymer. When saturated, the ZEBA molecules form a hydrogel that is able to absorb up to 400 times its original weight and holds and releases water for use by plants as needed. The reported result is faster germination, quicker emergence, consistent growth and higher, better-quality yields using less water. ZEBA plots will not be included in any statistical analysis and are only for observational purposes.

RESULTS

At the time of the first evaluation in the spring of 2007, there was major crusting of the soil surface to about 0.5 in depth. Soil moisture conditions below the soil crust were good and most species had managed to break through the crust or had germinated inside the cracks in the soil. Most species had reached 1 to 4 true leaves by the first evaluation. Weed control from the chemical and mechanical treatments was excellent. Young plants of prickly lettuce (*Lactuca serriola*), white-stem blazing star (*Mentzelia albicaulus)*, flixweed (*Descurainia sophia*), lupine (*Lupinus* sp.), tumble mustard (*Sisymbrium altissimum*) and Russian thistle (*Salsola* kali) were common throughout the test site, but were not in such numbers as would present a problem with competition.

Rainfall during the establishment year was lower than normal. In the 2007 water year, less than 6 inches of precipitation accumulated at Aberdeen. Spring rains in April helped establishment, but sparse summer rains caused many germinants to die by September. Water year 2008 was also lower than normal in precipitation. From October 1, 2007 through September 30, 2008, Aberdeen only received 4.45 inches of rain.



SPECIES DISCUSSION

In the spring 2007 evaluation, basin wildrye densities ranged from 0.06 plants/ft² (Topinish and Jim Creek) to 0.24 plants/ft ² (Trailhead). Densities dropped to 0.00 to 0.06 plants/ft ² at the time of the fall evaluation. Plant densities remained low from the 2008 evaluation.

Basin wildrye

		Density (plants/ft ²)		
Accession	% PLS	5/07	9/07	4/08
Trailhead	86.6	0.24[a]	0.06 [a]	0.04 [a]
L-46	74.4	0.22	0.03	0.06
L-45	81.7	0.21	0.01	0.08
Magnar	89.6	0.15	0.01	0.03
Washoe	83.9	0.08	0.02	0.01
Gund	89.9	0.08	0.01	0.04
Jim Creek	83.6	0.06	0.01	0.01
Topinish	85.8	0.06	0.00	0.01

[a]Not significant at $p<0.05$

Although no significant differences were detected between the Sandberg bluegrass accessions, at the spring 2007 evaluation, 9081633, an accession being investigated by the Bridger, MT PMC had better overall establishment than all other accessions. 9081633 continued to have the highest density in the fall evaluation, 0.06 plants/ft ², which was

significantly higher than all other accessions. In 2008 there was again no significant difference between means. High Plains Sandberg bluegrass increased from 0.00 plants/ft ² to 0.06 plants/ft ², equaling accession 9081633 for the top performer.

Sandberg bluegrass

		Density (plants/ft ²)		
Accession	% PLS	5/07	9/07	4/08
9081633	86.0	0.13 [a]	0.06 a	0.06 [a]
High Plains	95.0	0.07	0.00 b	0.06
Wallowa	83.2	0.02	0.05 b	0.02
Duffy	79.0	0.05	0.00 b	0.01
Mtn. Home	85.0	0.05	0.00 b	0.00
Critical value (0.05)			0.05	

[a]Not significant at p<0.05

In the bluebunch wheatgrass trial no significance was detected between density means for the spring or fall evaluation during 2007. Plant densities in the spring ranged from 0.01 plant/ ft² to 0.37 plants/ft². The top performer was P-19, a test accession from the ARS (0.37 plants/ft ²). Plant densities generally stayed the same between the spring and fall evaluations indicating good adaptability of the species to the site conditions. The 2008 evaluation yielded significant differences in plant densities. P-19 had the highest density with 0.26 plants/ft ², significantly greater than P-27 with 0.06 plants/ft ².

Bluebunch wheatgrass

		Density (plants/ft ²)		
Accession	% PLS	5/07	9/07	4/08
P-19	92.9	0.37[a]	0.37 [a]	0.26 a
Anatone	88.1	0.33	0.29	0.22 ab
P-24	91.2	0.28	0.28	0.22 ab
9081636	92.0	0.27	0.17	0.12 ab
P-22	85.3	0.24	0.28	0.20 ab
Wahluke	87.3	0.24	0.25	0.18 ab
Goldar	90.6	0.13	0.13	0.10 ab
P-27	87.4	0.11	0.09	0.06 b
P-7	89.4	0.11	0.12	0.11 ab
P-32	86.5	0.01	0.12	0.10 ab
[a]Not significant at p<0.05				0.17

Snake River wheatgrass densities were generally higher than those of bluebunch wheatgrass indicating, at least in this trial, greater adaptation to low precipitation conditions. The highest establishment density was 0.50 plants/ft ² achieved by SERDP, and the lowest was 0.32 from E-46 during 2007. Densities decreased between the spring and fall evaluations. SERDP continued to have the highest density (0.35 plants/ft ²). In 2008

SERDP had increased slightly to 0.38 plants/ft ², but there were still no detectable significant differences between means.

Snake River wheatgrass

Accession	% PLS	Density (plants/ft²) 5/07	9/07	4/08
SERDP	90.0	0.50[a]	0.35 [a]	0.38 [a]
E-51	91.1	0.39	0.29	0.30
E-45	94.5	0.33	0.18	0.18
E-46	96.3	0.32	0.27	0.26

[a]Not significant at p<0.05

Thickspike and streambank wheatgrass exhibited good drought tolerance and seedling vigor with spring plant densities between 0.84 and 0.98 plants/ft² during 2007. No significant differences were detected between means. Densities remained high through the fall evaluation, with all accessions having densities between 0.66 and 0.78 plants/ft². Plant densities of thickspike and streambank wheatgrass remained high in 2008. Sodar streambank wheatgrass had the best plant density with 0.83 plants/ft ², though that did not differ significantly from the other accessions. In 2008 forage yields were measured in the thickspike and streambank wheatgrass plots. The highest yielding accession was Bannock thickspike wheatgrass with 151 lb/ac. No significant differences were detected between forage yield means.

Thickspike and
streambank wheatgrass

Accession	% PLS	Density (plants/ft²) 5/07	9/07	4/08	Forage (lb/ac) 8/08
Sodar	96.5	0.98[a]	0.78 [a]	0.83 [a]	137 [a]
Critana	90.0	0.86	0.67	0.74	133
Bannock	94.3	0.84	0.66	0.73	151

[a]Not significant at p<0.05

Western wheatgrass is typically recommended for use in sites receiving 12 inches or more annual precipitation and is not well adapted to the conditions faced at Coffee Point. Although some plants did germinate from each of the accessions tested. Densities were very low in 2007, 0.03 to 0.05 plants/m² in the spring and slightly lower in the fall. In 2008 western wheatgrass densities remained very low with Rosana having the highest density of 0.07 plants/ft ².

Western wheatgrass

Accession	% PLS	Density (plants/ft²) 5/07	9/07	4/08
Rosana	90.0	0.05[a]	0.02 [a]	0.07 [a]
9076517	90.0	0.03	0.03	0.03
9081630	85.0	0.03	0.03	0.01

[a]Not significant at p<0.05

Among the slender wheatgrass accessions, First Strike slender wheatgrass from the Department of Defense and ARS had significantly greater plant densities than Copperhead from the MT PMC during 2007. First Strike was developed for superior traits in germination and establishment for use on military training grounds. The other tested accession, Pryor did not differ significantly in establishment from of the other accessions. At the fall evaluation, the ranking remained constant, although densities decreased for all accessions. In 2008 slender wheatgrass densities of accession First Strike and Pryor increased slightly to 0.45 and 0.34 0.07 plants/ft ² respectively, both significantly greater than Copperhead (0.08 plants/ft ²). In 2008 accession First Strike yielded 143 lb/ac of forage, and Pryor had an average forage yield of 75 lb/ac.

Slender wheatgrass

Accession	% PLS	Density (plants/ft²) 5/07	9/07	4/08	Forage (lb/ac) 8/08
First Strike	90.0	0.53 a	0.37 a	0.45 a	143 a
Pryor	95.9	0.46 ab	0.30 ab	0.34 a	75 ab
Copperhead	85.0	0.23 b	0.08 b	0.08 b	0 b
Critical value (0.05)		0.28	0.28	0.18	86

In the bottlebrush squirreltail trial, accession 9019219, test material from the MT PMC had an establishment density of 0.65 plants/ft² during 2007and was significantly greater than the plant density of Toe Jam Creek (0.20 plants/ft²). Fall densities remained essentially the same as spring. Accession 9019219 is likely the subspecies *elymoides* and is currently being tested by Bridger PMC in Montana, while Toe Jam Creek is subspecies c*alifornicus* and was collected in a higher precipitation area near Elko, Nevada. In 2008 squirreltail density means were not separable statistically. Accession 9019219 had 0.58 plants/ft ² and Toe Jam Creek had a density of 0.20 plants/ft ².

Bottlebrush squirreltail

Accession	% PLS	Density (plants/ft²) 5/07	9/07	4/08
9019219	85.0	0.65 a	0.57 a	0.58[a]
Toe Jam Creek	92.2	0.20 b	0.15 b	0.20
Critical value (0.05)		0.32	0.37	

[a]Not significant at p<0.05

Shrub densities were low and were not separable statistically in the spring 2007 evaluation. Most accessions had meager amounts of germinants; however Snake River Plains fourwing saltbush and the accession of Gardner's saltbush from the MT PMC both had fair establishment with 0.17 and 0.15 plants/ft² respectively. In the fall evaluation the saltbush accessions continued to have relatively good densities (0.19 for Gardner's and 0.13 for Snake River Plains). Other accessions had negligible establishment. In 2008 Snake River Plains fourwing saltbush and Gardener's saltbush both had densities of 0.19 plants/ft ². Open Range winterfat and Wyoming big sagebrush both had minimal establishment with densities of 0.06 and 0.01 plants/ft ² respectively.

Shrubs

		Density (plants/ft²)		
Accession	% PLS	5/07	9/07	4/08
Snake River Plains fourwing saltbush	44.5	0.17[a]	0.13 ab	0.19 a
Gardener's saltbush, 9016134	30.0	0.15	0.19 a	0.19 a
Open Range winterfat	80.8	0.02	0.04 bc	0.06 ab
Wytana fourwing saltbush	45.0	0.01	0.00 c	0.00 b
Northern Cold Desert winterfat	85.2	0.00	0.00 c	0.00 b
Wyoming big sagebrush	21.3	0.00	0.01 bc	0.01 b
Critical value (0.05)			0.13	0.15

[a]Not significant at $p<0.05$

In the forb trial, only Maple Grove Lewis flax and the test accession of Phacelia, 9081632, from the MT PMC had fair establishment. Maple Grove had a plant density of 0.45 plants/ft² and was significantly greater than all other accessions with the exception of Phacelia which had a density of 0.28 plants/m² during 2007. All other accessions had essentially zero plants emerge. In the fall, Maple Grove continued to have the best density (0.20 plants/ft²). Most of the Phacelia plants had died by the fall evaluation, and Cedar Palmer penstemon had an increase in density, from 0.00 to 0.06 plants/ft². In 2008 the only forbs with surviving plants in the plots were Maple Grove Lewis flax and Great Northern western yarrow. Maple Grove had significantly better plant density than all other accessions with 0.36 plants/ft ².

Forbs

Accession	% PLS	Density (plants/ft²) 5/07	9/07	4/08
Maple Grove Lewis flax	93.0	0.45 a	0.20 a	0.36 a
Phacelia	81.8	0.28 ab	0.00 b	0.00 b
Great Northern w. yarrow	90.0	0.01 b	0.00 b	0.01 b
Cedar Palmer penstemon	95.0	0.00 b	0.06 ab	0.00 b
Eagle w. yarrow	90.0	0.00 b	0.01 b	0.00 b
Richfield firecracker penstemon	92.2	0.00 b	0.00 b	0.00 b
Antelope prairie clover	98.0	0.00 b	0.00 b	0.00 b
Old Works penstemon	95.0	0.00 b	0.00 b	0.00 b
Stillwater prairie coneflower	94.5	0.00 b	0.00 b	0.00 b
Critical value (0.05)		0.34	0.18	0.17

As a group, the introduced grasses outperformed all others with regard to establishment densities. All performed well with the lowest density coming from Bozoisky II Russian wildrye with a density of 0.54 plants/ft² during 2007. The best density was achieved by Vavilov II, a new release in 2008 of Siberian wheatgrass from the ARS, DOD and NRCS which had 1.48 plants/ft². Fall densities were generally slightly lower than in the spring, but all accessions maintained good plant densities. Vavilov II again had a significantly higher density than all other accessions (1.46 plants/ft²). In 2008 Vavilov II densities remained significantly greater than all other accessions with 1.53 plants/ft ². Forage yields of Vavilov II were also significantly greater than the other tested accessions. Vavilov II yielded 1176 lb/ac of forage, while the next closest yield came from Vavilov with 528 lb/ac.

Introduced grasses

Accession	% PLS	Density (plants/ft²) 5/07	9/07	4/08	Forage (lb/ac) 8/08
Vavilov II Siberian wheatgrass	90.0	1.48 a	1.46 a	1.53 a	1176 a
Vavilov Siberian wheatgrass	90.0	0.74 b	0.68 b	0.75 b	528 b
Mustang Altai wildrye	90.0	0.75 b	0.58 b	0.70 b	56 b
Bozoisky Select Russian wildrye	90.7	0.70 b	0.65 b	0.65 b	189 b
Bozoisky II Russian wildrye	90.0	0.54 b	0.59 b	0.63 b	168 b
Critical value (0.05)		3.70	0.42	0.39	527

Zeba Initial Evaluation

We also included one plot each of Magnar basin wildrye, Goldar bluebunch wheatgrass, Appar blue flax and Nezpar Indian ricegrass which were treated with Zeba® moisture retention seed coating. Because there was only one plot of each accession, these plots could not be analyzed statistically and only general observations can be made. The treated Magnar seed had a mean density of 0.71 plants/ft² as compared with 0.15 plants/ft²

achieved in the untreated plots during 2007. Likewise, the treated Goldar plot had an average plant density of 0.43 plants/ft² while the untreated plots averaged only 0.13 plants/ft². Appar and Nezpar were not included in the main trial, so a comparison cannot be made, however, the results achieved with Magnar and Goldar are favorable. In the fall evaluation, all densities had decreased with the exception of Nezpar which increased from 0.09 to 0.15 plants/ft². From 2007 to 2008 there were increases in plant densities for all accessions except Nezpar. The top plant density was recorded by Appar blue flax with 0.43 plants/ft ².

Zeba®

		Density (plants/ft²)		
Accession	% PLS	5/07	9/07	5/08
Magnar	87.3	0.71[a]	0.24[a]	0.30[a]
Goldar	92.0	0.43	0.32	0.35
Appar	91.3	0.33	0.26	0.43
Nezpar	79.3	0.09	0.15	0.04

[a] Means not separated

SUMMARY

Meager precipitation in the first two seasons provided good conditions to test the assembled accessions under extreme drought conditions. Several species and accessions proved unable to establish and survive at the Coffee Point test site. All three species of introduced grasses had good establishment and survival into the 2008 season. Native species that contained good performing accessions included thickspike and streambank wheatgrass, slender wheatgrass, Snake River wheatgrass and bottlebrush squirreltail. Of the forbs, only Maple Grove Lewis flax had a fair stand in 2008. In the shrub evaluation, Snake River Plains and Gardener's saltbush both had nice looking stands.

The plots will be evaluated again in 2009 for density and forage production. Subsequent evaluations will take place in 2011 (five year) and 2016 (ten year) to measure long-term persistence and forage yield.

REFERENCES

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Table 1. List of species and accessions

Species	Accession	Seed source
Basin wildrye	Trailhead	MTPMC
	Washoe	MTPMC
	Topinish	Benson Seed Farm
	Jim Creek	Benson Seed Farm
	Gund	UNR
	Magnar	IDPMC
	L-45	ARS
	L-46	ARS
Sandberg bluegrass	High Plains	MTPMC
	Mountain Home	FS
	Duffy Creek	Benson Seed Farm
	Wallowa	Benson Seed Farm
	9081633	MTPMC
Bluebunch wheatgrass	P-7	ARS
	P-32	ARS
	Wahluke	Benson Seed Farm
	9081636	MTPMC
	Anatone	IDPMC
	Goldar	IDPMC
	P-19	ARS
	P-24	ARS
	P-22	ARS
	P-27	ARS
Snake River wheatgrass	SERDP	ARS
	E-45	ARS
	E-46	ARS
	E-51	ARS
Thickspike wheatgrass	Critana	MTPMC
	Bannock	IDPMC
	Sodar	IDPMC
Western wheatgrass	Rosana	MTPMC
	9081630	MTPMC
	9076517	DOD/ARS
Slender wheatgrass	Pryor	MTPMC
	First Strike	DOD/ARS
	Copperhead	MTPMC
Bottlebrush squirreltail	9019219	MTPMC
	Toe Jam Creek	ARS
Shrubs	Wytana fourwing saltbush	MTPMC
	SRP fourwing saltbush	IDPMC
	9016134 Gardner saltbush	MTPMC
	N. Cold Desert winterfat	IDPMC

	Open Range winterfat	MTPMC
	Wyoming big sagebrush	BLM
Forbs	Great Northern w. yarrow	MTPMC
	Eagle w. yarrow	FS and Geertson
	Antelope P. clover	MTPMC
	Stillwater coneflower	MTPMC
	9081632 Phacelia	MTPMC
	Old works penstemon	MTPMC
	Cedar Palmer penstemon	NMPMC
	Maple Grove Lewis flax	IDPMC
	Richfield penstemon	IDPMC
Intro. Grasses	Bozoisky Russian wildrye	ARS
	Bozoisky II R. wildrye	ARS
	Vavilov Siberian wheatgrass	ARS
	Vavilov II S. wheatgrass	IDPMC
	Mustang Altai wildrye	ARS
ZEBA	Nezpar Indian ricegrass	IDPMC
	Magnar basin wildrye	IDPMC
	Goldar b. wheatgrass	IDPMC
	Appar blue flax	IDPMC

34’	20’				14’					34’
1.	Trailhead	Washoe	Jim crk	Magnar	1.	Rosanna	9076517	9081630	Rosanna	1.
2.	Washoe	Jim crk	Topinish	L-45	2.	9081630	Rosanna	Rosanna	9076517	2.
3.	Topinish	Gund	Trailhead	Washoe	3.	9076517	9081630	9076517	9081630	3.
4.	Jim crk	L-45	L-46	Topinish	4.	Pryor	Pryor	First Strike	Copper	4.
5.	Gund	Magnar	Washoe	L-46	5.	First Strike	Copper	Copper	Pryor	5.
6.	Maganr	Trailhead	Gund	Jim crk	6.	Copper	First Strike	Pryor	First Strike	6.
7.	L-45	L-46	L-45	Gund	7.	9019219	Toe jam	9019219	Toe jam	7.
8.	L-46	Topinish	Magnar	Trailhead	8.	Toe jam	9019219	Toe jam	9019219	8.
9.	High plains	Mt home	Wallowa	Duffy	9.	Wytana	SRP	Gardner’s	Open range	9.
10.	Mt home	Wallowa	Duffy	High plains	10.	SRP	Gardner’s	WY sage	NCD	10.
11.	Duffy	9081633	High plains	9081633	11.	Gardner’s	Open range	NCD	WY sage	11.
12.	Wallowa	Duffy	9081633	Mt home	12.	NCD	Wytana	Open range	Gardner’s	12.
13.	9081633	High plains	Mt home	Wallowa	13.	Open range	WY sage	SRP	Wytana	13.
14.	p-7	p-32	Goldar	Anatone	14.	WY sage	NCD	Wytana	SRP	14.
15.	p-32	9081636	p-27	Goldar	15.	Great northern	Eagle	Old works	Stillwater	15.
16.	Wahluke	p-7	9081636	p-32	16.	Eagle	Phacelia	m. grove	Old works	16.
17.	9081636	p-27	p-19	p-22	17.	Antelope	Great northern	Richfield	Antelope	17.
18.	Anatone	p-24	p-32	p-19	18.	Stillwater	Cedar	Phacelia	Great northern	18.
19.	Goldar	p-22	p-24	Wahluke	19.	Phacelia	M. grove	Stillwater	M. grove	19.
20.	p-19	Goldar	Anatone	p-7	20.	Old works	Stillwater	Antelope	Richfield	20.
21.	p-24	Wahluke	p-22	p-27	21.	Cedar	Antelope	Great northern	Cedar	21.
22.	p-22	p-19	p-7	p-24	22.	Maple grove	Richfield	Cedar	Eagle	22.
23.	p-27	Anatone	Wahluke	9081636	23.	Richfield	Old works	Eagle	Phacelia	23.
24.	SERDP	e-45	e-51	e-46	24.	Bozoisky	Vav II	Mustang	Vavilov	24.
25.	E-45	e-46	Serdp	e-51	25.	Boz II	Bozoisky	Vavilov	Mustang	25.
26.	E-46	Serdp	e-45	e-45	26.	Vavilov	Mustang	Vav II	Bozoisky	26.
27.	E-51	e-51	e-46	SERDP	27.	Vav II	Vavilov	Boz II	Vav II	27.
28.	Critana	Bannock	Bannock	Sodar	28.	Mustang	Boz II	Bozoisky	Boz II	28.
29.	Bannock	Critana	Sodar	Critana	29.	ZEBA Nezpar	ZEBA Magnar	ZEBA Goldar	ZEBA Appar	29.
30.	Sodar	sodar	critana	bannock	30.	blank	blank	blank	blank	30.
	20’									

Figure 1. Plot map; Coffee Point, 2006

→ NE

Skull Valley Off-Center Evaluation (2007 Planting)
2008 Progress Report
Derek J. Tilley, Range Conservationist (Plants)
Loren St. John, Team Leader
Natural Resources Conservation Service
Plant Materials Center
Aberdeen, Idaho


Skull Valley test site, May 2006

Introduction

Commercially available plant releases and test materials of basin wildrye, Sandberg bluegrass, bluebunch wheatgrass, Snake River wheatgrass, thickspike wheatgrass, western wheatgrass, slender wheatgrass, bottlebrush squirreltail, Indian ricegrass, selected warm season grasses, shrubs, forbs and introduced grasses are being evaluated in replicated studies at the Skull Valley, UT off-center test site, 25 miles west southwest of Tooele, UT. The trial contains 72 accessions of 23 species of native and introduced grasses, forbs and shrubs. For a full list of species and accessions tested see the appendix following this report. The goal of this trial is to evaluate the adaptability of numerous new conservation releases and potential releases in a low precipitation environment and compare their establishment, production and longevity against more traditionally used releases.

All of the species being tested are commonly used in rangeland restoration plantings in the IDPMC service area. New materials have become available from various sources. These materials have documented performance in small scale trials or in seed production conditions, but many need further testing in the arid environmental conditions commonly encountered in the Intermountain West.

The Skull Valley Off-Center Test Site (approximately 1.5 acres) is located about 1 mile east of the Ensign Ranch North Ranch headquarters in the foothills of the Stansbury Mountains. The site is located in the SE ¼, SE ¼, NW ¼ of Section 27, T3S, R8W. This test site is located on the Hiko Peak gravelly loam soil series. The typical soil profile is a very deep (>60 inch), well drained gravelly loam. The site receives an average of 8 to 12 inches of precipitation annually. Mean air temperatures range from 45 to 50º F with 100 to 150 frost free days. Elevation at the site is approximately 4600 feet. The test site is located on the ecological site 028AY215UT, which historically supported a Wyoming big sagebrush - bluebunch wheatgrass plant community. The test site is fenced to exclude livestock grazing.

Materials and Methods

The seed bed was prepared with chemical treatments of 16 oz 2, 4-D and 64 oz Roundup per acre applied on May 16, 2006, and June 26, 2007. The site was disked by the landowner in April 2007. The seedbed was very dry and just prior to seeding the site was gone over once with a packer to smooth the seedbed. The trial was planted on November 14, 2007 with a modified Tye Drill with a width of 80 inches (8 spouts at 10" spacing).

Experimental design is a randomized complete block with 3 replications. Each plot is one drill width wide (80 in) and 18 ft long. Each species was arranged into a separate block; introduced grasses, shrubs and forbs also each formed a separate block (a plot map is provided in the appendix). Seeding depths are dependent on species and are planted according to Ogle et al (2007). Species were seeded at a target rate of 20 to 30 pure live seeds (PLS) per ft² for large seeded species (<500,000 seeds per pound) and 40 to 50 PLS/ft² for smaller seeded species (>500,000 seeds/lb). PLS was determined by seed lab results or, when lab results were not available, PLS was estimated visually or the PLS from other accessions were averaged to determine unknown PLS. All seed was mixed with rice hulls as an inert carrier to ensure better seed flow according to St. John et al (2005) with the exception of fourwing saltbush and Gardner saltbush. A cover crop mix of 50% Anatone bluebunch wheatgrass, 20% Bannock thickspike wheatgrass, 20 percent Magnar basin wildrye and 10% Snake River Plains fourwing saltbush was planted in the prepared areas surrounding the trial.

The plots were evaluated for initial establishment on May 21, 2008 using a frequency grid as described by Vogel and Masters (2001). The grid measured approximately 40 x 41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The grid was placed five times within the plot giving a total of 100 evaluated cells. Counts were made of the cells that contained at least one plant.

On August 26, 2008 the site was again evaluated as described above. However, after a visual evaluation of the site it was apparent that entire blocks of species had essentially zero living plants. Thus, the August evaluations were only conducted on those species with visible and measureable stands: introduced grasses, bluebunch wheatgrass, and Snake River wheatgrass.

Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$. If significance was detected, means were separated using a Tukey HSD all pairwise comparison. The grass plots will be clipped the second and fourth year of establishment to determine air-dry forage production.

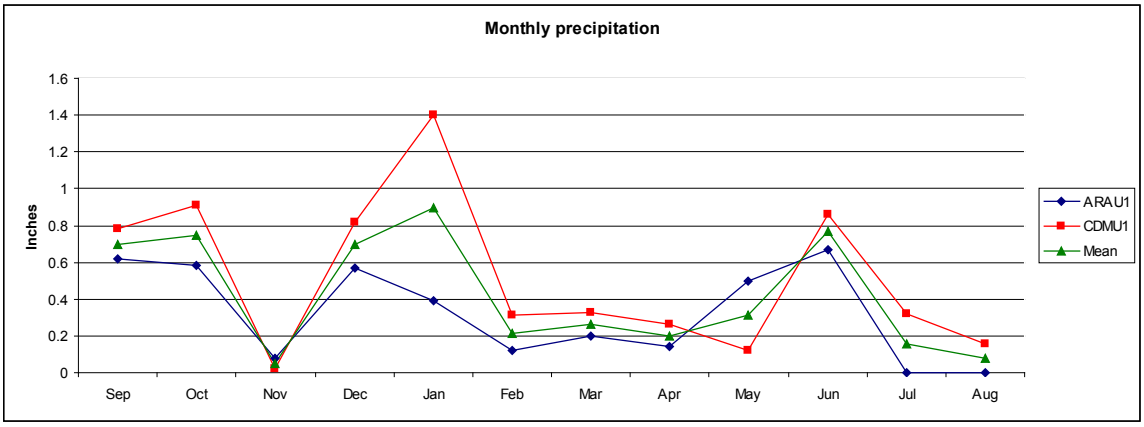
Skull Valley test site, August 2008

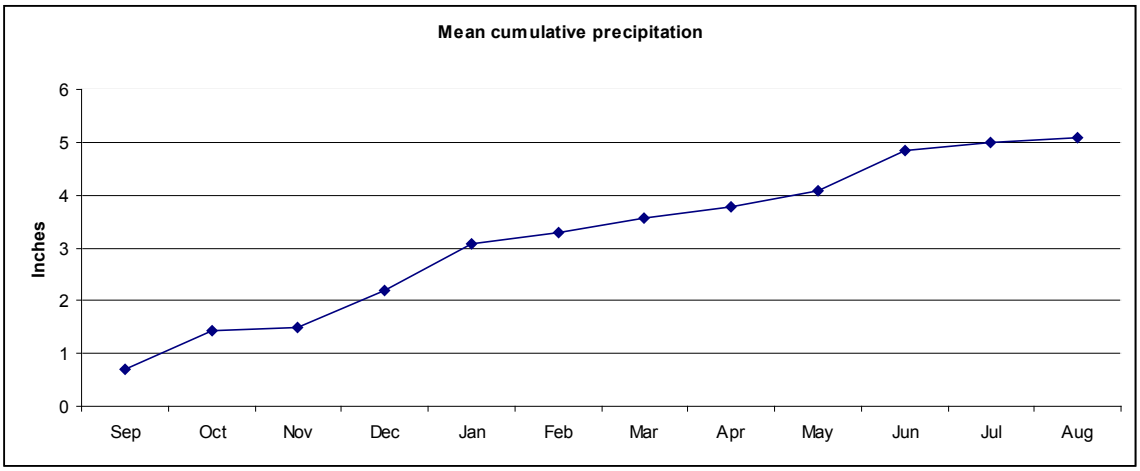
Weather

The two closest weather stations to the Skull Valley site are the Aragonite (ARAU1) and Cedar Mountain (CDMU1) stations. Aragonite is located 16 miles WNW of the site at 40.5983, -113.0217 degrees and 5,030' elevation. The Cedar Mountain station is approximately 15 miles S of the site at 40.3008, -112.7767 and 4,650' elevation. Monthly precipitation totals were taken from each site from September 1, 2007 through August 31, 2008. Cumulative precipitation data represents the mean precipitation of both stations. All weather data was obtained from MesoWest (2008).

Total estimated cumulative precipitation for the site from September 2007 through August of 2008 was 5.08 inches, significantly less than the 8 to 12 inches typically seen in the region. Most of the precipitation occurred as snow falling in November and December and January. The site also may have received a fair amount of rainfall in May

and June. The meager precipitation received in March and April resulted in low plant establishment densities recorded at the May evaluation.





Results

Skull Valley faced below average precipitation during the establishment phase of the study which severely limited germination. All species had very low establishment rates in the spring followed by even lower stand survival in late-summer. The best stand during the May evaluation came from Nordan crested wheatgrass with only 0.69 plants/ft² followed by Vavilov II and Vavilov Siberian wheatgrass with 0.65 and 0.50 plants/ft² respectively. The best performers of the native accessions were obtained by E46 Snake River wheatgrass (0.43 plants/ft²) and bottlebrush squirreltail accession 9019219 with 0.32 plants/ft². Many accessions, including entire blocks of shrubs, Sandberg bluegrass and the warm season grasses had zero germinants. By August we couldn't find enough plants in several blocks to justify evaluating with the density grids. Only the introduced grasses, bluebunch wheatgrass and Snake River wheatgrass plots were evaluated. Stands in these plots were as a rule greatly reduced, though in no case were the plants completely eliminated. No plant density means in any evaluation group could be separated statistically at $p \leq 0.05$.

Introduced grasses

The introduced grasses showed a greater ability to germinate and establish in the dry conditions encountered at the Skull Valley test site than the vast majority of the native accessions. The best initial establishment density came from Nordan crested wheatgrass (0.69 plants/ft²) followed by Vavilov II with 0.65 plants/ft². Vavilov II however appeared to have greater drought resistance after establishment by having the highest average plant density at the August evaluation with 0.40 plants/ft² compared to 0.22 plants/ft² from Nordan.

Introduced grasses

	Plants/ft²	
Accession	5/2008	8/2008
Nordan	0.69	0.22
Vavilov II	0.65	0.40
Vavilov	0.50	0.18
CD II	0.43	0.18
Roadcrest	0.36	0.19
Ephraim	0.27	0.06
Bozoisky II	0.24	0.05
Mustang	0.20	0.01
Bozoisky	0.11	0.01
P=	0.08	0.07

Bluebunch wheatgrass

The bluebunch wheatgrass accessions had much lower stand density values than those of the introduced grass species. The highest establishment densities of bluebunch came from Anatone (0.25 plants/ft²) and Goldar (0.21 plants/ft²). Anatone again had the best density at the time of the August evaluation with 0.11 plants/ft², while Goldar had essentially dropped to zero remaining plants (0.01 plants/ft²).

Bluebunch wheatgrass

	Plants/ft²	
Accession	5/2008	8/2008
Anatone	0.25	0.11
Goldar	0.21	0.01
P7	0.11	0.03
Wahluke	0.10	0.04
P32	0.09	0.09
P27	0.07	0.03
9081636	0.03	0.03
P=	0.26	0.45

Snake River wheatgrass

Mean densities of Snake River wheatgrass accessions were slightly better than those of bluebunch wheatgrass. E46 had an initial density of 0.43 plants/ft² in May and dropped to

0.18 plants/ft² at the August evaluation. Discovery also performed relatively well with 0.25 plants/ft² in May and 0.15 plants/ft² in August.

Snake River wheatgrass

Accession		Plants/ft² 5/2008	8/2008
E46		0.43	0.18
Discovery		0.25	0.15
SERDP		0.17	0.09
Secar		0.13	0.07
E49		0.06	0.02
	P=	0.09	0.16

Indian ricegrass

The Indian ricegrass accessions had poor establishment, the best density being 0.09 plants/ft² from Nezpar. No evaluation was conducted in August because no plants were observed in the plots.

Indian ricegrass

Accession		Plants/ft² 5/2008
Nezpar		0.09
9024739		0.07
9024741		0.07
CSU-10		0.06
Rimrock		0.03
	P=	0.59

Bottlebrush squirreltail

The two bottlebrush squirreltail accessions had fair establishment densities with 0.32 plants/ft² and 0.24 plants/ft² from accession 9019219 and Toe Jam Creek respectively. The walk through evaluation in August yielded no plants. It is possible that surviving plants may become visible next spring.

Bottlebrush squirreltail

Accession		Plants/ft² 5/2008
9019219		0.32
Toe Jam Creek		0.24
	P=	0.67

Basin wildrye

Basin wildrye establishment was low with all accessions having mean plant densities of 0.10 plants/ft² or less. No evaluation was conducted in August, because no plants were observed in the plots.

Basin wildrye

Accession	Plants/ft² 5/2008
Magnar	0.10
Topinish	0.09
Trailhead	0.09
Continental	0.07
Gund	0.06
Jim Creek	0.02
Washoe	0.02
P=	0.83

Slender wheatgrass

Slender wheatgrass appeared to be poorly suited to the conditions at Skull Valley. The highest establishment density was 0.03 plants/ft² from First Strike. No plants were observed in August.

Slender wheatgrass

Accession	Plants/ft² 5/2008
First Strike	0.03
Pryor	0.01
San Luis	0.01
Adanac	0.00
Copperhead	0.00
P=	0.36

Thickspike wheatgrass

Critana thickspike wheatgrass had fair establishment with 0.25 plants/ft². No evaluation was conducted in August, because no plants were observed.

Thickspike wheatgrass

Accession	Plants/ft² 5/2008
Critana	0.25
Bannock	0.14
Sodar	0.04
P=	0.11

Western wheatgrass

All western wheatgrass accessions did poorly with Rosanna obtaining the highest average density at 0.09 plants/ft². No plants were observed in the plots in August.

Western wheatgrass

Accession	Plants/ft² 5/2008
Rosanna	0.09
Ariiba	0.04
DOD	0.02
9081630	0.01
P=	0.35

Forbs

None of the forbs evaluated at Skull Valley were sufficiently drought tolerant to produce any sort of stand. A few plants were detected in the Phacelia, Maple Grove Lewis flax and Antelope prairie clover in the May evaluation, but none had persisted into the summer.

Forbs

Accession	Plants/ft² 5/2008
Phacelia	0.03
Maple grove	0.03
Antelope	0.01
Appar	0.00
Cedar	0.00
Eagle	0.00
Great Northern	0.00
Old works	0.00
Richfield	0.00
Stillwater	0.00
P=	0.24

Sandberg bluegrass, warm season grasses and shrubs

No germinated plants were found in any plot of Sandberg bluegrass, warm season grasses or the shrubs at either the May or August evaluation.

Discussion

The extreme arid environment at the Skull Valley test site exemplifies the difficulties faced by conservationists attempting to re-vegetate disturbed rangelands in the Intermountain West. Few choices of plant materials exist that are capable of establishing and persisting under below average rainfall conditions such as those encountered during the 2008 growing season.

The best performing species of the 2008 evaluations were the introduced grass species crested wheatgrass and Siberian wheatgrass. Some accessions of the native species bluebunch wheatgrass and Snake River wheatgrass achieved fair establishment and limited persistence, but not in numbers that inspire confidence in land managers.

The plots will be evaluated for density and forage production multiple years until the conclusion of the study, scheduled for 2027.

References

MesoWest. 2008. University of Utah. SLC, UT. http://www.met.utah.edu/mesowest/. Accessed September 23, 2008.

Ogle, D., St. John, L., Stannard, M. and L. Holzworth. 2007. Technical Note No. 24: Grass, grass-like, forb, legume and woody species for the Intermountain West. USDA-NRCS, Boise, ID; Bozeman, MT and Spokane, WA. ID-TN 24. 41p.

St. John, L., Ogle, D., Tilley, D., Majerus, M. and L. Holzworth. Technical Note No. 7: Mixing seed with rice hulls. USDA-NRCS, Boise, ID. ID-TN 7. 14p.

Vogel, K.P. and R.A. Masters. 2001. Frequency grid-a simple tool for measuring grassland establishment. Journal of Range Management 54(6): 653-655.

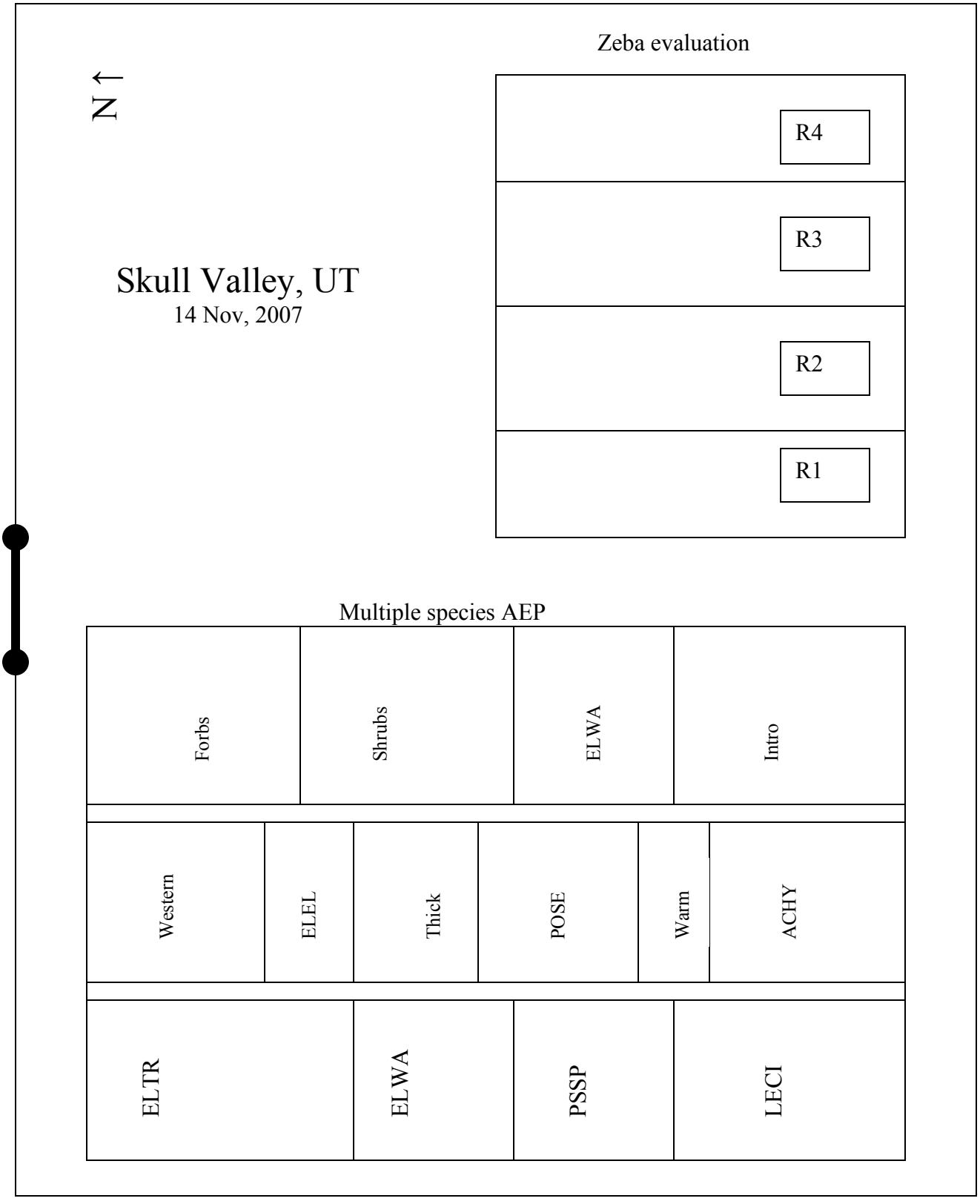
IDPMC Study Numbers

IDPMC-P-0802-RA	Skull Valley - Basin Wildrye Off-Center Evaluation (OCE)
IDPMC-P-0803-RA	Skull Valley - Sandberg bluegrass OCE
IDPMC-P-0804-RA	Skull Valley - Bluebunch Wheatgrass OCE
IDPMC-P-0805-RA	Skull Valley - Snake River Wheatgrass OCE
IDPMC-P-0806-RA	Skull Valley - Thickspike wheatgrass OCE
IDPMC-P-0807-RA	Skull Valley - Western Wheatgrass OCE
IDPMC-P-0808-RA	Skull Valley - Slender Wheatgrass OCE
IDPMC-P-0809-RA	Skull Valley - Bottlebrush Squirreltail OCE
IDPMC-P-0810-RA	Skull Valley - Shrubs OCE
IDPMC-P-0811-RA	Skull Valley - Forbs OCE
IDPMC-P-0812-RA	Skull Valley - Introduced Grass OCE
IDPMC-P-0813-RA	Skull Valley – Indian Ricegrass OCE
IDPMC-P-0814-RA	Skull Valley – Warm Season Grass OCE

List of species and accessions

Species	Accession	Source
Basin wildrye	Magnar	ID PMC
Basin wildrye	Washoe	MT PMC
Basin wildrye	Trailhead	MT PMC
Basin wildrye	Gund	NV DWR
Basin wildrye	Topinish	BFI
Basin wildrye	Jim creek	BFI
Basin wildrye	Continental	ARS Logan
Bluebunch WG	Wahluke	BFI
Bluebunch WG	P-27	ARS Logan
Bluebunch WG	P-32	ARS Logan
Bluebunch WG	Anatone	ID PMC
Bluebunch WG	P-7	ARS Logan
Bluebunch WG	Goldar	ID PMC
Bluebunch WG	9081636	MT PMC
Snake River WG	Secar	WA PMC
Snake River WG	SERDP	ARS Logan
Snake River WG	E-46	ARS Logan
Snake River WG	Discovery	ARS Logan
Snake River WG	E-49	ARS Logan
Slender WG	San Luis	NM PMC
Slender WG	Revenue	Canada
Slender WG	First Strike	DOD
Slender WG	Copperhead	MT PMC
Slender WG	Pryor	MT PMC
Thickspike WG	Bannock	ID PMC
Thickspike WG	Sodar	ID PMC
Thickspike WG	Critana	MT PMC
Indian Ricegrass	CSU-10	NM PMC
Indian Ricegrass	9024741	UCEPC
Indian Ricegrass	9024715	UCEPC
Indian Ricegrass	9024739	UCEPC
Indian Ricegrass	Nezpar	ID PMC
Indian Ricegrass	Rimrock	MT PMC
Blue grama	Hachita	NM PMC
Blue grama	Alma	NM PMC
Galletta	Viva	NM PMC
Sandberg bluegrass	Duffy Creek	BFI
Sandberg bluegrass	Mountain Home	FS
Sandberg bluegrass	High Plains	MT PMC
Sandberg bluegrass	9081633, big blue	MT PMC
Sandberg bluegrass	Wallowa	BFI
Sandberg bluegrass	Sherman	WA PMC
Sandberg bluegrass	Duffy Creek	BFI
Sandberg bluegrass	Wallowa	BFI
Squirreltail	9019219	MT PMC
Squirreltail	Toe Jam Creek	ARS Logan

Western WG	DOD	ID PMC
Western WG	Rosana	MT PMC
Western WG	9081630	MT PMC
Western WG	Arriba	CO PMC
Introduced Grasses	CD II	ARS Logan
Introduced Grasses	Roadcrest CWG	ARS Logan
Introduced Grasses	Ephraim CWG	ID PMC
Introduced Grasses	Nordan CWG	ND PMC
Introduced Grasses	Bozoisky Russian WR	ARS Logan
Introduced Grasses	Mustang Altai WR	ARS Logan
Introduced Grasses	Vavilov Siberian WG	ARS Logan
Introduced Grasses	Vavilov II Siberian WG	ID PMC
Introduced Grasses	Bozoisky II Russian WR	ARS Logan
Shrubs	Wytana Fourwing Saltbush	MT PMC
Shrubs	Open Range Winterfat	MT PMC
Shrubs	Wyoming big sagebrush	Commercial
Shrubs	SRP Fourwing Saltbush	ID PMC
Shrubs	NCD Winterfat	ID PMC
Forbs	Old Works Penstemon	MT PMC
Forbs	Maple Grove Lewis Flax	ID PMC
Forbs	Appar Blue Flax	ID PMC
Forbs	Richfield Eaton’s Penstemon	ID PMC
Forbs	Cedar Palmer Penstemon	NM PMC
Forbs	Phacelia	MT PMC
Forbs	Antelope Prairie Clover	MT PMC
Forbs	Stillwater Prairie Coneflower	MT PMC
Forbs	Eagle Western Yarrow	Geertson Seed Farms
Forbs	Great Northern WesternYarrow	MT PMC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Skull Valley, UT
14 Nov, 2007
Zeba evaluation
R4
R3
R2
R1
Multiple species AEP
Forbs
Shrubs
ELWA
Intro
Western
ELEL
Thick
POSE
Warm
ACHY
ELTR
ELWA
PSSP
LECI

Skull Valley, UT Plot Map, 2007

101-CD II	201-Boz II	301-Nordan	CSU-10	9024739	9024715	Magnar	Washoe	Trailhead
102-Roadcrest	202-Vav I	Vav II	9024741	Rimrock	Nezpar	Washoe	Gund	Continental **2bu**
103-Ephraim	Nordan	Roadcrest	9024715	CSU-10	9024741	Trailhead	Magnar	Gund
Nordan	Mustang	Boz II	9024739	9024741	Rimrock	Gund	Jim Crk	Topinish
Boz I	CD II	Vav I	Nezpar	9024715	9024739	Topinish	Trailhead	Jim Crk
Mustang	Vav II	CD II	Rim Rock	Nezpar	CUS-10	Jim Crk	Continental **2bu**	Magnar
Vav I	Ephraim	Boz I	Alma **2bu**	Hachita **2bu**	Viva	Continental **2bu**	Topinish	Washoe
Vav II	Roadcrest	Ephraim	Hachita **2bu**	Alma **2bu**	Hatchita **2bu**	Wahluke	P32	P32
Boz II	Boz I	Mustang	Viva	Viva	Alma **2bu**	P27	Anatone	P7
101-Wyoming	201-301-Open	SRP **2bu**	Duffy Crk	High Plains	9081633	P32	Wahluke	9081636
102-NCD	Wytana	Wyoming sage	Mt Home	Wallowa	Sherman	Anatone	9081636	P27
103-Open	Wyoming sage	Wytanta	High Plains	Duffy Crk	Duffy Crk	P7	Goldar	Wahluke
Wytana	SRP **2bu**	NCD	9081633	Sherman	Wallowa	Goldar	P27	Goldar
SRP **2bu**	NCD	Open range	Wallowa	9081633	Mt Home	9081636	P7	Anatone
Great Northern	Old works	Richfield	Sherman	Mt Home	High Plains	Secar	E-46	E-49
Richfield	Maple grove	Appar	Bannock	Critana	Sodar	SERDP	Secar	E-46
Antelope	Appar	Eagle	Sodar	Bannock	Critana	E-46	E-49	SERDP
Old works	Richfield	Stillwater	Critana	Sodar	Bannock	E-21	E-21	Secar
Eagle	Cedar	Phacelia	Toe Jam	9019219	Toe Jam	E-49	SERDP	E-21
Stillwater	Phacelia	Antelope	9019219	Toe Jam	9019219	San Luis	Copperhead	DOD
Maple Grove	Eagle	Great Northern	DOD	Arriba	9081630	Adanac	San Luis	Copperhead
Cedar	Great northern	Old works	Rosanna	9081630	Arriba	DOD	Pryor	San Luis
Appar	Stillwater	Maple Grove	9081630	DOD	Rosanna	Copperhead	Adanac	Pryor
Phacelia	antelope	Cedar	Arriba	Rosanna	DOD	Pryor	DOD	Adanac

Stake row

Stake row

Stake row

Stake row

Stake row

Stake row

N ↑

Gate

Plots=7*18'=126ft²*3 reps=.009ac. Breaks=1 drill width (7ft). Borders on N,S, and W=20'. Trial is 24 plots across (168'). Total length = (9*18) + (2*7) + 20 (west end) = 196'. Exclosure area (west side) is approx 210 x 210'.

Zeba® Seed Coating and Soil Amendment Product Evaluation
Study Number: IDPMC-T-0801-RA
Progress Report September 2008
Derek J. Tilley

Introduction

Zeba®, a product produced by Absorbent Technologies, Inc (ATI) is a superabsorbent cornstarch based polymer that is used as a seed coating or soil amendment. The product is designed to hold and release water for use by plants multiple times throughout the growing season. Zeba is reported to be capable of absorbing up to 400 times its original weight in water and to slowly release encapsulated moisture in response to plant root suction. The hydrogel can also rehydrate and store additional water as moisture enters the soil, a process that can be repeated numerous times before Zeba loses effectiveness. The claimed result is faster germination, quicker emergence, better plant establishment, consistent growth and higher, better-quality yields using less water. Zeba has been employed extensively in turf, nursery and other agricultural settings, but has been tested very little for rangeland restoration projects.

Trade names are used solely to provide information. Mention of a trade name does not constitute a guarantee of the product by the USDA-NRCS nor does it imply endorsement over comparable products that are not named.

To test the efficacy of Zeba for use in rangeland seeding projects, the Aberdeen PMC established a study at Skull Valley, UT, 45 mi SW of Salt Lake City, UT on the Ensign Ranch. The site is located on a west facing slope with 2 to 4% slopes. Soils at the site are a semi-desert gravelly loam. The soils are described as being approximately 60 inches deep. However during site preparation we detected a hardpan at approximately 6 to 8 inches (likely due to past uses of the site). The natural plant community is a Wyoming big sagebrush- grass- forb community consisting of approximately 45% shrubs, 45% perennial grasses and 10% forbs. Dominant grass species include bluebunch wheatgrass, Indian ricegrass and bottlebrush squirreltail. The site receives an average of 8 to 12 inches of precipitation annually. Mean air temperatures range from 45 to 50º F with 100 to 150 frost free days.

Materials and Methods

For this study two grass species native to the site were utilized. They included Anatone Germplasm bluebunch wheatgrass and 'Nezpar' Indian ricegrass.

Three Zeba treatments were tested in this study; two treatments were different formulations of seed coating, Zeba standard and Zeba plus an experimental compound. The third treatment was Farm, a granular soil amendment which is applied through the drill along with the seed.

For the coated seed treatments, 400 coated seeds were counted and weighed to find the number of seeds/per pound. In both coating treatments for each species there were approximately 40,000- 45,000 seeds/lb. From this it was determined that 25 lb coated

seed per acre yielded approximately 25 seeds/ft². One cup of seed from each treatment and species was then weighed to determine bushel weights which could be used to calculate rice hull mix percentages according to St. John et al (2005). Bushel weights used were: non-coated Anatone (21.7 lb/bu); Zeba coated Anatone (27.0 lb/bu); Zeba plus compound coated Anatone (28.8 lb/bu); non-coated Nezpar (56.5 lb/bu); Zeba coated Nezpar (58.7 lb/bu); Zeba plus compound coated Nezpar (59.1 lb/bu). The Farm soil amendment was mixed with seed and rice hulls and planted at a rate of 2.5 lb/ac in addition to the seed. A bushel weight of 41.0 lb/bu for the Farm amendment was used to calculate the rice hull mixture. Non-treated seed was planted at 7 lb PLS/ac (with rice hulls) for bluebunch wheatgrass and 5 lb PLS/ac (with rice hulls) for Indian ricegrass following Ogle et al (2006).

The planting site was treated in 2006 with 4.3 oz roundup and 1 oz 2,4-D/gallon at a rate of 15 gallons/acre in 2006 to reduce weed pressure. The site was then disked during mid April 2007. On June 25, 2007 the site was again sprayed with the same herbicide treatment as in 2006 to control weeds which had germinated following spring rains. The dominant weeds present were foxtail barley (*Hordeum murinum*), tansy mustard (*Descurainia sophia*) and a few patches of field bindweed (*Convolvulus arvensis*). The site was cultivated one additional time and packed just prior to planting.

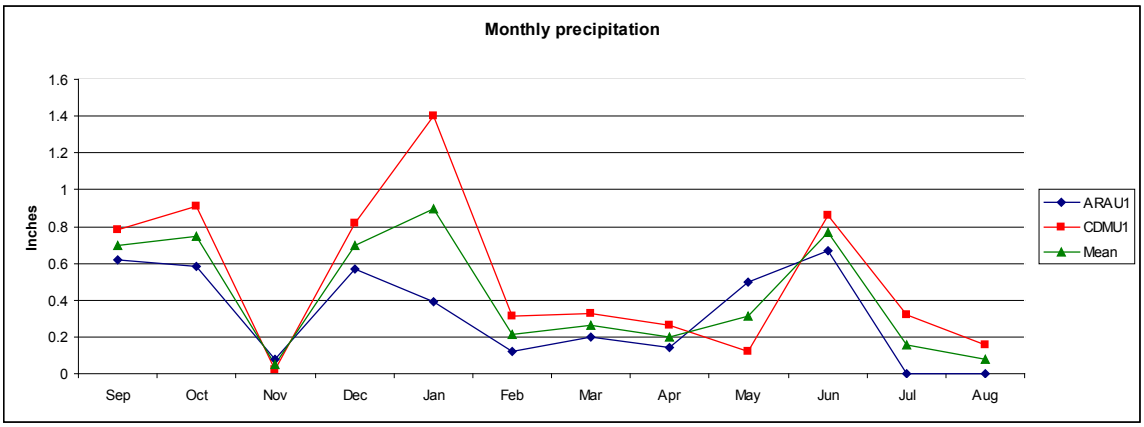
Plots were planted on November 14, 2007 into 7 x 20 foot plots in a randomized complete block design with four replications. Plots were seeded with 10 inch row spacing using a modified Tye drill. Bluebunch wheatgrass was seeded to a depth of about 0.5 inch and Indian ricegrass was seeded to a depth of approximately 1.0 inch.

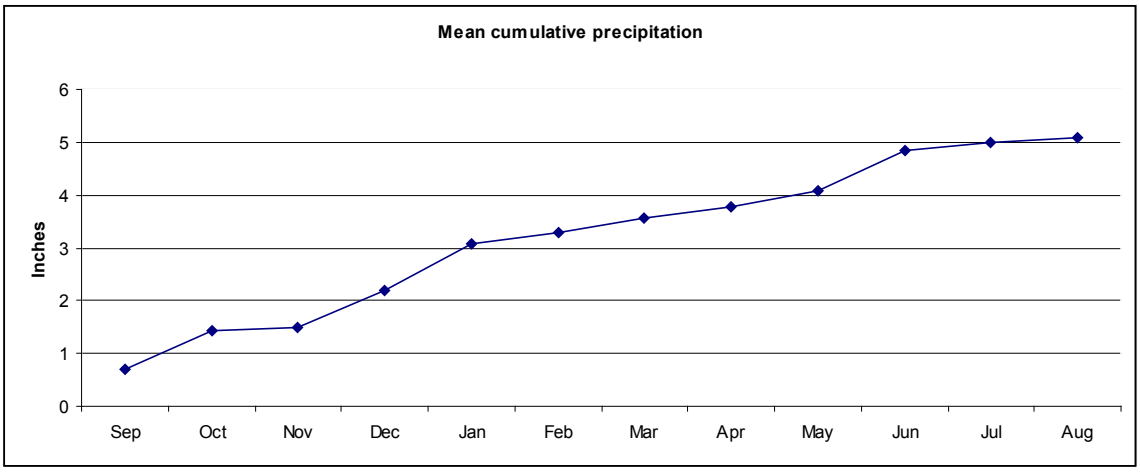
The plots were evaluated for initial establishment on May 21, 2008 and again on August 26, 2008 to determine season long persistence. Evaluations were conducted using a frequency grid as described by Vogel and Masters (2001). The grid measured approximately 40 x 41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The grid was placed five times within the plot giving a total of 100 evaluated cells. Counts were made of the cells that contained at least one plant. Decrease in stand densities was conducted on a per plot basis. Plots which contained zero plants in the spring and had zero plants in the fall were omitted from the data set, and not counted as "no change in density." Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$. If significance was detected, means were separated using a Tukey HSD all pairwise comparison.

Weather

The two closest weather stations to the Skull Valley site are the Aragonite (ARAU1) and Cedar Mountain (CDMU1) stations. Aragonite is located 16 miles WNW of the site at 40.5983, -113.0217 degrees and 5,030' elevation. The Cedar Mountain station is approximately 15 miles S of the site at 40.3008, -112.7767 and 4,650' elevation. Monthly precipitation totals were taken from each site from September 1, 2007 through August 31, 2008. Cumulative precipitation data represents the mean precipitation of both stations. All weather data was obtained from MesoWest (2008).

Total estimated cumulative precipitation for the site from September 2007 through August of 2008 was 5.08 inches, significantly less than the 8 to 12 inches typically seen in the region. Most of the precipitation occurred as snow falling in November and December and January. The site also may have received a fair amount of rainfall in May and June. The meager precipitation received in March and April resulted in low plant establishment densities recorded at the May evaluation.





Results

Indian ricegrass

All Zeba treatments provided greater mean plant densities than the control in the Indian ricegrass plots, however, no significant differences could be detected in the initial establishment evaluation ($p=0.28$). Zeba gave the highest densities in the Indian ricegrass plots with 0.46 plants/ft² (table 1), which was 3.5 times greater density than the control plots (0.13 plants/ft²). Zeba plus compound had the second highest density (0.40 plants/ft²), then the Farm amendment followed by control with 0.25 and 0.13 plants/ft² respectively. Two of the four plots in the Zeba plus compound treatments had essentially no seedlings, while the other two replications had very high densities. This added a large

amount of error to the statistical analysis, not allowing means to be separated. However, if the Zeba plus compound data are removed from the analysis, the Zeba treatment has significantly greater plant density than the control treatments (p=0.01).

The fall evaluation again revealed no statistical significance (p=0.75), but all treatments still had higher plant densities than the control. The greatest density came from the Farm treatment with 0.13 plants/ft². The Zeba plus compound and Zeba treatments both had densities of 0.10 plants/ft² while the control had only 0.03 plants/ft².

All treatments decreased in stand densities between the spring and fall evaluation, however no significant differences were detected between treatments (p=0.55). The control, Zeba plus compound and Zeba plots all had a decrease of 80% or greater. The Farm treated plots however had only a 56.3% decrease.

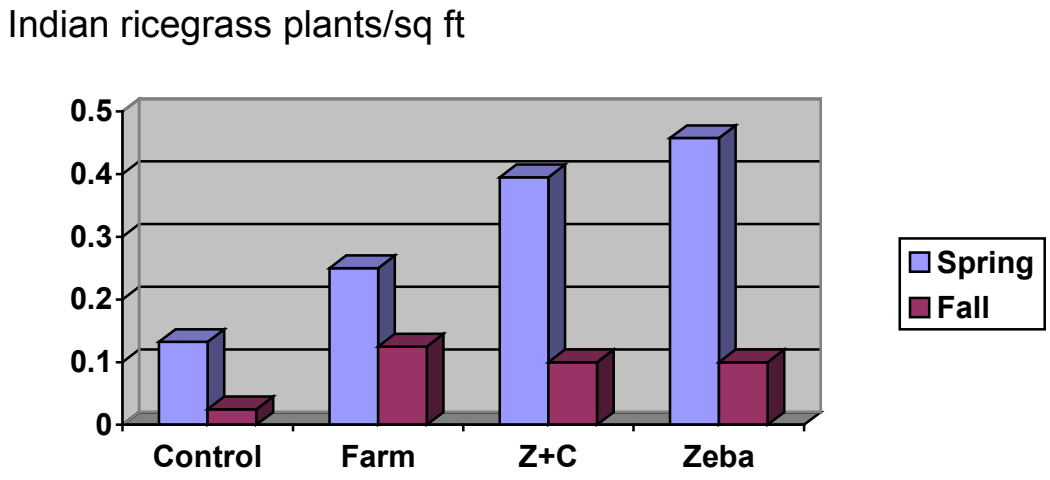


Table 1. Indian ricegrass

Treatment	Plant density (plants/ft²) Spring	Fall	% decrease
Control	0.13	0.03	88.1
Farm	0.25	0.13	56.3
Zeba + compound	0.40	0.10	83.4
Zeba	0.46	0.10	80.0

Bluebunch wheatgrass

In the bluebunch wheatgrass trial there was again no statistical significance between treatments in the spring or fall evaluation (p=0.36 and 0.17 respectively). The two seed coating treatments however had greater average establishment densities than the control in the spring evaluation. The Zeba plus compound treatment had slightly better average densities than Zeba (0.70 plants/ft² versus 0.66 plants/ft²). The control plots had an average plant density of 0.50 plants/ft², while the Farm amendment had a mean density of 0.38 plants/ft².

In the fall evaluation the Zeba plus compound and Zeba treatments still had the highest plant densities with 0.35 and 0.38 plants/ft² respectively. The Farm amendment and control plots each had a mean density of 0.20 plants/ft².

As with the Indian ricegrass trail, all bluebunch densities decreased from spring to fall. The greatest decrease in density was observed in the control plots (60.0%). The smallest decrease came from the Zeba treatment with 42.4% decrease from spring to fall. The Zeba plus compound and Farm treatments had similar decreases with 50.0 and 47.4% decrease respectively. No significant differences in percent decrease were detected between treatments (p=0.64).

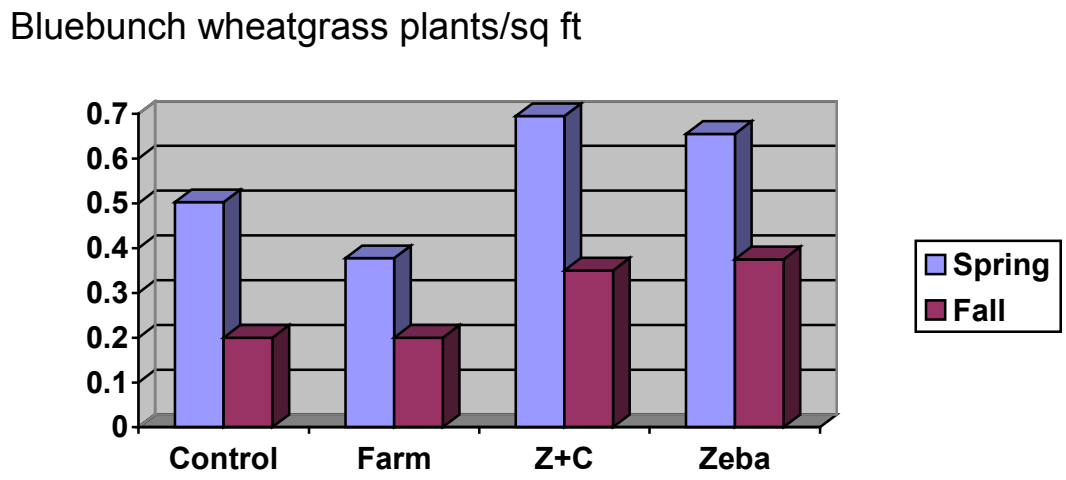


Table 2. Bluebunch wheatgrass

	Plant density		
Treatment	Spring	Fall	% decrease
Control	0.50	0.20	60.0
Farm	0.38	0.20	47.4
Zeba + compound	0.70	0.35	50.0
Zeba	0.66	0.38	42.4

Discussion

Limited precipitation during the winter and establishment period at Skull Valley resulted in low establishment densities. All Zeba treatments, with the exception of the Farm amendment in the bluebunch wheatgrass trial, had greater average plant densities than the non-treated control. Among both species the Zeba plus compound and Zeba seed coating treatments had greater plant densities than the control and Farm treatment in the initial establishment evaluation. At the fall evaluation the Farm treatment in the Indian ricegrass trial had a slightly greater plant density than the other Zeba treatments. It is conceivable under the low water conditions at the site that seed coating treatments (Zeba and Zeba plus compound) provided immediate water availability and improved germination.

The Farm soil amendment mixed in the row is thought to provide moisture to elongated roots following establishment, but not necessarily immediate water for germination. The smaller percent decrease in the farm treated plots of Indian ricegrass versus other treatments may reflect this hypothesis. If it is true, Farm treatment may provide better long-term survival than the control or coated treatments. However, quicker germination induced by the improved moisture surrounding the seed coat in the case of coated seed may allow roots to grow longer and deeper providing access to additional soil moisture later in the season. A combination of coated seed mixed with the Farm treatment may provide the benefits of both products. Further evaluations are needed to verify this.

The cost of using Zeba may also be a factor in range restoration plantings. The price of Zeba seed coating varies significantly, subject to the type of seed, volume and market. For the purpose of this trial, the cost for coating the seed with Zeba was $0.64/coated pound, including $0.30/lb for materials and $0.34/lb for processing, while retail cost for the Farm amendment runs around $8.00/lb or approximately $20.00 per acre at the trial use rate of 2.5 lb/ac. Zeba coating costs are based on coating 100 lb of seed.

The data gathered from this initial evaluation are encouraging and warrant additional testing of these products.

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FIELD PLANTING, DEMONSTRATION AND DISTRICT SEED INCREASE EVALUATION SUMMARIES

PLANT MATERIALS

2008

IDAHO EVALUATION SUMMARIES

FIELD, DSI and DEMONSTRATION PLANTINGS

IDAHO DIVISION I
PLANT MATERIALS PLANTINGS

FIELD OFFICE: BONNERS FERRY

ID99005 Paul Headings Regar meadow brome - Field Plantings (2). Materials ordered February 22, 1999. Field 1–pure stand of Regar. Field 2-mixed stand of Regar and alfalfa. Purpose – demonstration planting to document growth patterns, production, and forage quality. Site characteristics – MLRA E43b, silt loam soils, 5-10 percent slopes, north aspect, 2300 feet elevation, 24 inch precipitation zone, non-irrigated, T62N R1E NW ¼ Section 2. FY99 planted spring 1999. FY00 due to dry years 1999 and 2000 stand establishment was slow, but excellent stands in each field are establishing. Plantings average 3 tons per acre. FY01 Planting 1 - The "pure" stand of Regar Brome planting averaged 2 ton/acre. A forage analysis indicted the crude protein to be 8.75%. The forage grass for hay is fine leaves and stems. The hay feeds well to animals. In hot dry weather, the "windrows" have to be carefully harvested and cured to avoid damaging brittle leaves and stems. The crop can be "pulverized" easily. The average bale weight was 103 pounds. The owner applied 110 lbs. 40-0-0 to enhance production and will increase application rates up to 200 lbs/acre 40-0-0. There were no second cuttings since the field was planted three years ago due to poor to fair moisture conditions. Planting 2 - The Regar/Agate alfalfa mixture established well. The first cutting has grass present and makes great cattle feed. The second cutting has very little grass within the alfalfa due to slow recovery. This may be due to dry weather conditions. Also, this may be a good attribute for the producer who can sell hay with grass and no grass. FY01 Planting 1 - The "pure" stand of Regar has an excellent stand with 5 plants per square foot, good vigor, and 4000 pounds per acre production. Landowner applied 220 lbs. 40-0-0 in early spring. Planting 2 - Regar/alfalfa mixture has a good stand with 2 Regar/5 alfalfa plants per square foot, fair to good vigor, and 7000 pounds per acre production. FY06 The field is still in production. It has been an excellent hay crop averaging 4 tons/ac dryland over the 10 year period with one year producing 5.5 tons/ac. Landowner applies 300 pounds/ac of Nitrogen each spring. This grass needs to be managed for harvesting - cut and windrow at 50% cured. 80% cured results in loss of leaves because it is too brittle because of fine leaves. Cooperator also reports Regar also does well when planted with alfalfa, is easy to manage and he is very happy with it. **Next evaluation 2009.**

ID00016 Boundary Creek WRP – cropland area planted to permanent perennial species field planting. A mix of Alkar tall wheatgrass, Greenar intermediate wheatgrass, Ranger alfalfa, birdsfoot trefoil, red clover, Sherman big bluegrass, tufted hairgrass, orchardgrass, and timothy at critical area planting rates was dormant planted on 1000 acres in late fall 1999. A 42 feet air-seeder with fertilizer attachment planted mix with 2000 units per acre of nitrogen, phosphorus, potassium, and sulfur applied 1 inch below and to side of seed. FY00 excellent stand is establishing with some species as tall as 3-4 feet by early July. In October wild oats were present throughout stand. FY01 The permanent wildlife planting mixture established well utilizing the 42-foot air seeder. The drill was calibrated with the producer based upon 14.2 lbs. PLS/acre. A "flush" of wild oats occurred the first year. The stand was seeded the 1st week of November 1999. The "so called dormant planting" resulted in some sprouting of clovers due to a warmer than normal late fall. As a result, some mortality occurred in the clovers. An excellent stand of Alkar tall wheatgrass, Greenar intermediate wheatgrass, birdsfoot trefoil, Ranger alfalfa, Latar orchardgrass, timothy and clover exists. The Sherman big bluegrass is "spotty" due to becoming overpowered by the other species in the mix. There are some ridges in the field with quackgrass, which is good cover. The IDF&G is actively spot spraying the Canadian thistle. They plan to obtain a boom sprayer in order to treat the acreage more uniformly. FY02 The overall stand is good to excellent with the primary species including Alkar tall wheatgrass, Greenar intermediate wheatgrass, Latar orchardgrass and redtop. Some birdsfoot trefoil, clover, timothy, and alfalfa are present in scattered locations. Tufted hairgrass and Sherman big bluegrass were not found. FY04 prescribed burned fall 2004 (15 acres) to rejuvenate existing stand – resulted in excellent response in plant vigor. Stand is primarily Latar, Alkar, Greenar, and alfalfa – general overall stand is predominately wheatgrasses and orchardgrass. Providing excellent wildlife nesting and escape cover. **Next evaluation 2009.**

ID04002 Dave Wattenburger Field Planting. Delar small burnet ordered August 19, 2003. Planting seeded fall 2004. No evaluation FY05 - FY07. **Next evaluation 2009.**

ID06007 Idaho Fish and Game – Field planting for wildlife winter nesting habitat. Blackwell switchgrass and 905439 switchgrass seed ordered March 9, 2006. Site characteristics: Farnhampton silt loam soil, 0-2 percent slopes, south aspect, elevation 1760 feet, 24 inch precipitation, non-irrigated, T65N R2W Sections 23 and 25. FY06 Idaho Fish and

Game field planting of native grasses is slow establishing. The field was mowed in 2006 for wild oats weed control. FY07- FY08 no evaluations. **Next evaluation 2009.**

ID06008 Bernie Heinemann – Riparian Field Planting. Coyote willow (50); 9067541 Peachleaf willow (20); 9067546 Peachleaf willow (20); 9067549 Peachleaf willow (20); 9067375 Peachleaf willow (20); 9067376 Peachleaf willow (20); and 9067560 Peachleaf willow (20) cuttings ordered February 2006. Site characteristics: Porthill silt loam soil, 5 percent slopes, 2000 feet elevation, 24 inch precipitation, non-irrigated, T65N R1W, Section 10. FY06- FY08 no evaluation. **Next evaluation 2009.**

FIELD OFFICE: COUER D'ALENE
None

FIELD OFFICE: PLUMMER
None

FIELD OFFICE: SANDPOINT
None

IDAHO DIVISION II
PLANT MATERIALS PLANTINGS

FIELD OFFICE: GRANGEVILLE

ID02002 Teresa Seloske Forest Field Planting. Lind Douglas fir (30 plants) and Yakima Douglas fir (13 plants) ordered July 16, 2001. Plants delivered to FO April 3, 2002 by WAPMC. FY02 Planting completed April 6, 2002. Lind Douglas fir 10 percent survival with poor vigor. Yakima Douglas fir 15 percent survival with fair vigor. Survival effected by extremely dry conditions. FY03 very hot dry summer resulted in failure of this planting. File was cancelled at end of 2003. FY06 field determination indicated the Yakima ecotype failed to establish, but the Lind ecotype is still alive. Lind ecotype has not grown much, but there is good survival of this ecotype during field evaluation in July 2006. FY08 this planting initially suffered from very hot dry summers and plant did not appear to be doing well. Following a number of years of root system establishment, this planting is doing somewhat better. The Lind ecotype is doing much better than the Yakima ecotype. The Lind ecotype could probably be recommended on sites where we would normally only recommend ponderosa pine. **Next evaluation 2011.**

ID04009 Carl Skyrman demonstration planting. Anatone bluebunch wheatgrass and Secar Snake River wheatgrass. Seed ordered March 8, 2004. Site characteristics: Chard sandy loam soil, northwest aspect, 1820 feet elevation, 16-22 inch precipitation, non-irrigated, T26N R1E NW1/4 Section 13. FY04 – Secar and Anatone were planted side by side in the spring of 2004. Good stands for each with > 5 plants per square foot establishing and it is hard to differentiate between plantings. Anatone plants were a bit more robust than Secar plants during evaluation 7/22/04. FY05 no evaluation. FY06 (4/25/06) good established stand, Carl will spray with Sencore for cheatgrass and ventenata control. FY08 pictures of planting indicate good establishment of most seeded species – a complete evaluation will be completed in 2009.

ID05003 Steve Hunter – starthistle control project. Rush intermediate wheatgrass, Tegmar intermediate wheatgrass and Newhy hybrid wheatgrass were ordered February 4, 2005. Site characteristics: 3 acres, MLRA B9, Bluesprin skeletal loam soil, 20 percent slopes, southwest aspect, elevation 2700 feet, 18 inch precipitation zone, non-irrigated, T30, R3, NW ¼ section 36. FY05 not planted. FY06 planted May 22, 2006 into poorly prepared seedbed. Fair stand establishing with about 0.25 plants/ft2 and fair vigor. FY08 Rush poor stand with 15 percent survival and fair vigor; Tegmar fair stand with 40 percent survival and fair vigor; Newhy poor stand with 25 survival and fair vigor. Plants on site are very stunted. Starthistle plants have been significantly reduced on the site. However, there has been an invasion of ventenata, annual fescue, medusahead and cheatgrass on the site and they are stressing the planted perennial grasses

ID05004 Tony Carson (combined with ID04004) – field planting. Anatone bluebunch wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass, High Plains Sandberg bluegrass, Rosana western wheatgrass, Sherman big bluegrass, Snake River Plains fourwing saltbush and Northern Cold Desert winterfat were ordered February 4, 2005. Site characteristics: 1 acre, Lickskillett – Tannahill silt loam soil complex, 45 percent slopes, south aspect, elevation 1960 feet, 16 inch precipitation, T28N, R1E, NE ¼ section 12. FY05 seeding was completed in early spring 2005. Half of the seeded area was treated with a straw pellet mulch. Above average spring rainfall resulted in very encouraging initial stand establishment with positively identified plants of Northern Cold Desert winterfat, Rosana western wheatgrass, Nezpar Indian ricegrass, Anatone bluebunch wheatgrass and many small seedlings present on July 13, 2005. FY06 April 25, 2006 excellent stand establishing, primarily seedlings, but also includes a few established grasses and fourwing saltbush. Good soil moisture during evaluation and cooperator will irrigate in 2-3 weeks if no additional rains occur. FY07 Snake River Plains fourwing saltbush fair stand with good vigor and about 35 inches tall. Northern Cold Desert winterfat fair stand with good vigor and about 6 inches tall. Nezpar Indian ricegrass, Sherman big bluegrass and Rosana western wheatgrass poor stands with fair vigor and about 3- 4 inches tall. Too soon to conduct a complete evaluation of stand. FY08 Anatone fair stand with fair vigor; Magnar poor stand with very poor vigor; Nezpar poor stand with poor vigor; High Plains very poor stand; Rosana good stand with good vigor; Sherman good stand with good vigor; Snake River Plains good stand with good vigor; Northern Cold Desert good stand with good vigor. Anatone and Rosana are the grasses doing the best on this very difficult eroded low fertility site. Both Snake River Plains fourwing saltbush and Northern Cold Desert winterfat are doing very well. **Next evaluation 2011.**

ID05006 Gary Crea (combined with ID04008) – Feedlot species adaptation trial. (1st planting P27 Siberian wheatgrass, Sodar streambank wheatgrass, Topar pubescent wheatgrass, Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, Rosana western wheatgrass, Durar hard fescue and Alkar tall wheatgrass) (2nd planting Newhy hybrid wheatgrass, Critana thickspike wheatgrass, and Rosana western wheatgrass) Seed was ordered on

February 4, 2005. Site characteristics: 0.5 acres, MLRA B9, Ferdinand-Flybow-Riggins soil complex, 2-8 percent slopes, west to southwest aspect, 20-24 inch precipitation, non-irrigated, T31N, R1E, SW of SW ¼ of section 27. FY04 overall the stand establishment is excellent due to good rainfall this year. Stand establishment exceeds 2 plants per square foot for all species except Alkar. The grasses are suppressing weeds in the feedlot. FY05 stand is spotty possibly due to excessive weed competition during establishment. FY06- FY08 no evaluations.

ID05007 Les Killgore – field planting. Covar sheep fescue, Durar hard fescue, Bannock thickspike wheatgrass and Rosana western wheatgrass seed was ordered on February 4, 2005. Site characteristics: 1.5 acres, MLRA E43a, loamy skeletal soil, 10 percent slopes, east aspect, elevation 2200 feet, 18 inch precipitation, non-irrigated, T28N, R1E NE ¼ section 33. FY05- FY06 not planted. FY07- FY08 no evaluations.

ID06005 Tony Carlson – Field planting of Rush intermediate wheatgrass, Bozoisky Russian wildrye, Magnar basin wildrye, Nezpar Indian ricegrass, and Sherman big bluegrass. Seed ordered February 21, 2006. Site characteristics: silt loam soil, 2 percent slopes, east aspect, 2100 feet elevation, 14-15 inch precipitation, non-irrigated, T28N R1E NE 1//4 Section 12. **FY06** seeded spring of 2006 (4/25/06) excellent stand establishing and seeding will be sprayed for broadleaf weed control. FY07- FY08 no evaluations.

ID07009 Daryl Mullinix Ventenata Study. Demonstration planting seed ordered February 14, 2007. Site was prepared for planting in fall of 2006 and spring of 2007. Site was planted on May 8, 2007. Layout-(south end) 1. Delar small burnet; 2. Pryor slender wheatgrass; 3. Secar Snake river wheatgrass; 4. Union Flat blue wildrye; 5. Regar meadow brome; 6. Covar sheep fescue; 7. Latar orchardgrass; 8. Bromar mountain brome; 9. Alkar tall wheatgrass; 10. Durar hard fescue; 11. Sherman big bluegrass; 12. Winchester Idaho fescue; 13. Foothills Canada bluegrass; 14. Bozoisky-Select Russian wildrye; 15. Rush intermediate wheatgrass; 16. Tuscany tall fescue; 17. Rosana western wheatgrass; 18. Sodar streambank wheatgrass; 19. Vavilov Siberian wheatgrass; 20. Lutana cicer milkvetch; 21. Syn-1 alfalfa (north end). FY07 Mark Stannard visited the plots on 7/27/07. The weeds were not bad but he mowed the plots to keep the weeds from going to seed. The grasses were doing fairly well. Vavilov was the best performing grass and alfalfa, cicer milkvetch, and small burnet were also doing very well. The ground was very hard and very dry. A lot of the plants were totally dormant. FY08 Mark spoke with Dr. Prather, Univ. of Idaho, and he indicated that he didn't have funding to do ventenata work. Mark prefers that plots not be sprayed. Sandlund talked with Daryl in early March and asked him not to spray the plots and to give them a 20-30 feet buffer strip around the plots not sprayed. The plots have a heavy infestation of ventenata and meadow foxtail. Rich Gribble and Bob Sandlund mowed the plot in late July. Species doing best include: Delar, Tuscanny II, Vavilov, Alkar, and Syn-1 alfalfa (getting hammered by deer). All other species are struggling. They recommend that plots be wick with Roundup in 2009 to control meadow foxtail. Spraying plots with sencor and diuron should also be considered.

ID07010 Debbie Hatter – Butcher Creek woody field planting. 15 cuttings each of coyote willow and Laurel willow were ordered March 1, 2007. Shipping is scheduled for April 2 for delivery on approximately April 6th. Site characteristics MLRA B9, DeMasters-Riggins silt loam soil, 10 percent slopes, north aspect, 3200 feet elevation, 24 inch precipitation, T30N R3E SW Quarter Section 15. FY07 cuttings shipped in early April. FY08 Laurel willow 67 percent survival with fair vigor; coyote willow 13 percent survival with fair vigor; First year leader growth is about 3- 4 inches.

ID08006 Debbie Hatter – riparian field planting. Laurel willow, coyote willow, peachleaf willow and black cottonwood cuttings were ordered March 10, 2008 for delivery in late March. FY08 Laurel willow 82 percent survival with excellent vigor; coyote willow 74 percent survival with fair vigor; Peachleaf willow 96 percent survival with fair vigor; black cottonwood 89 percent survival with fair vigor.

ID08008 Sydney Yuncevich Spirit sweetgrass adaptation planting. Sprigs were ordered on March 11, 2008 for shipping sometime in mid April. FY08 excellent stand with good vigor – sprigs were planted in pots, kept outside and watered occasionally. All survived and they will be planted out next spring.

ID08013A East of Grangeville Area demonstration plots. Packets of Anatone Germplasm bluebunch wheatgrass, Goldar bluebunch wheatgrass, 9076517 western wheatgrass, Bannock thickspike wheatgrass, P7 bluebunch wheatgrass, Bonilla big bluestem, Bison big bluestem, Forestburg switchgrass, Tomahawk Indiangrass, Critana thickspike wheatgrass, Rosana western wheatgrass, Foothills Germ. Canada bluegrass, 905439 switchgrass, Spirit sweetgrass (10 sprigs), PI-232247 California oatgrass, 9056244 California brome, Cave-In-Rock switchgrass, Salado

alkali sacaton, Blackwell switchgrass, Kanlow switchgrass and 9080250 blue wildrye were ordered 3/20/08. FY08 plantings completed in late spring.

ID08013B White Bird Area demonstration plots. Packets of Anatone Germplasm bluebunch wheatgrass, Goldar bluebunch wheatgrass, 9076517 western wheatgrass, Bannock thickspike wheatgrass, P7 bluebunch wheatgrass, Bonilla big bluestem, Bison big bluestem, Forestburg switchgrass, Tomahawk Indiangrass, Critana thickspike wheatgrass, Rosana western wheatgrass, Foothills Germ. Canada bluegrass, 905439 switchgrass, Spirit sweetgrass (10 sprigs), PI-232247 California oatgrass, 9056244 California brome, Cave-In-Rock switchgrass, Salado alkali sacaton, Blackwell switchgrass, Kanlow switchgrass and 9080250 blue wildrye were ordered 3/20/08. FY08 plantings completed in late spring.

FIELD OFFICE: LEWISTON

ID82001 Pat Richardson Starthistle control field planting. Covar sheep fescue planted in early 1980's. FY01 good to excellent stand with 2 plants per foot squared average, excellent vigor, fair spread for bunch grass. Plants are 10 inches tall with seedheads averaging 14 inches tall and 6-inch diameter plants. Overall Covar is providing good starthistle control. Starthistle is present in plot, but not reproducing seed. Where Covar has 4 plants per foot squared, starthistle is not present. Covar is moving slowly downslope into starthistle dominated area. FY04 excellent stand of Covar with excellent vigor, 7 inch height and light infestation of yellow starthistle. FY06 plots were heavily grazed by horses – some plants appear to be uprooted by hoof action. **FY07** good stand with fair vigor – stand is being very heavily grazed to ½ inch stubble height. Stand continues to exclude yellow starthistle with only 3- 4 plants observed within the plots. The edges of the plot are infested with Japanese brome, cheatgrass and medusahead. Plot was measured with GPS unit to determine actual size (203 ft x 80 ft = 0.37 acres). **Next evaluation will be in 2010.**

FIELD OFFICE: MOSCOW

ID06001A Lee and Roxanne Carrick riparian field planting. Cuttings ordered August 9, 2005. Cuttings to be shipped mid-late October 2005. Site characteristics: MLRA B9, Hampson silt loam soil, 0-3% slopes, NW aspect, 2600 feet elevation, 24 inch precipitation, non-irrigated, T41N R3W NW ¼ Section 3. 85 each of Rivar Mackenzie willow, Curlew Drummond willow, and Silvar coyote willow will be dormant fall planted 2005. FY06 planted November 4, 2006. FY08 Curlew Drummond willow 39 percent survival with good vigor and 24 inch height; Rivar Mackenzie willow 68 percent survival with good vigor and 36 inch height; Silvar coyote willow 22 percent survival with good vigor and 60 inch height.

ID06001B Lee and Roxanne Carrick riparian field planting. Plants to be shipped early-mid April 2006. Site characteristics: MLRA B9, Hampson silt loam soil, 0-3% slopes, NW aspect, 2600 feet elevation, 24 inch precipitation, non-irrigated, T41N R3W NW ¼ Section 3. 60 each of Blanchard blue elderberry, Okanogan snowberry, St Maries mockorange and 125 Cheney redosier dogwood will be spring planted in 2006. FY06 planted May 25, 2006. FY08 Cheney redosier dogwood 1 percent survival with poor vigor; St Maries Lewis Mockorange 2 percent survival with poor vigor; Okanogan snowberry 68 percent survival with good vigor and 6- 12 inch height; Blanchard blue elderberry 10 percent survival with fair vigor.

FIELD OFFICE: NEZPERCE

ID05009 William Stillman – Weed control project. Rush intermediate wheatgrass, Topar pubescent wheatgrass, Bannock thickspike wheatgrass, Paiute orchardgrass, Delar small burnet and Sherman big bluegrass seed was ordered on February 4, 2005. Site characteristics: 12 acres, MLRA B9, Jacket-Larkin silt loam soil, 20 percent slopes, south aspect, elevation 2900 feet, 23 inch precipitation, non-irrigated, T36N R1E SW ¼ section 19. FY06 plots were broadcast seeded March 12, 2005 and trampled by cattle and sprayed with Roundup. All plots contain intermediate wheatgrass from prior planting making identification of planted wheatgrass species difficult. Scattered patches Paiute were observed. Small burnet was observed across all plots. No Sherman was observed. There is heavy competition from weeds such as yellow starthistle, medusahead and ventenata. FY07 Delar small burnet fair stand with fair vigor; Topar pubescent wheatgrass and Paiute orchardgrass poor stand with poor vigor; Rush intermediate wheatgrass, Bannock thickspike wheatgrass and Sherman big bluegrass very poor stand with very poor vigor. Severe competition from weeds - medusahead, cheatgrass, yellow starthistle and ventenata. FY08 There are some problems with this project. The area had been planted previously to intermediate wheatgrass (by Bill) and to crested wheatgrass (by his father). When Bill sprayed the plots after seeding, he did not spray at a rate heavy enough to kill out the existing wheatgrasses. All plots have intermediate wheatgrass growing in them from the previous plantings. Site is dominated

by intermediate wheatgrass. Competition from these grasses definitely suppressed the seeded grasses. I recommend that we close out this field planting. **Cancel**

ID07015 David Mosman – Nezpar Indian ricegrass seed increase. Seed shipped March 1, 2007. FY07 due to drought conditions, this seed was not planted. FY08 no evaluation. FY08 seed transferred to another grower. **Cancel**

ID08011 David Mosman – Anatone bluebunch wheatgrass seed increase. Seed shipped August 31, 2006. FY07 due to drought conditions, this seed was not planted. Additional seed was shipped March 18, 2008. FY08 not seeded – plans to chemical fallow fields this year and will plant Anatone this fall.

ID08012 David Mosman – Vavilov II Siberian wheatgrass seed increase. Seed shipped March 18, 2008. FY08 not seeded – plans to chemical fallow fields this year and will plant Vavilov II this fall.

FIELD OFFICE: OROFINO

ID04011 Clearwater County Riparian Project. 9067541 peachleaf willow, 9067546 peachleaf willow, 9067 549 peachleaf willow, 9067568 black cottonwood, 9067569 black cottonwood, 9023 733 redosier dogwood, 9023739 redosier dogwood, 9023740 redosier dogwood and Okanogan snowberry. Cuttings ordered March 5, 2004. Site characteristics: Cobbly soil, flat aspect, 1100 feet elevation, 26 inch precipitation, non-irrigated. FY04 – FY06 no evaluations. **FY07** 9067541 peachleaf willow -30% survival with good vigor, 9067546 peachleaf willow -30% survival with good vigor, 9067549 peachleaf willow -20% survival with good vigor, 9067568 black cottonwood - failed, 9067569 black cottonwood - failed, 9023 733 redosier dogwood - failed, 9023739 redosier dogwood - failed, 9023740 redosier dogwood - failed and Okanogan snowberry - failed. FY08 no evaluation.

IDAHO DIVISION III
PLANT MATERIALS PLANTINGS

FIELD OFFICE: CALDWELL

ID99006 Jacy Gibbs for demo plots. Site characteristics: very warm dry summers, Cencove fine sandy loam soil, 0-2 percent slopes, about 2200 feet elevation, 8-10 inch precipitation, T3N R5W NE1/4 Section 10. Seed ordered February 24, 1999. Aberdeen accessions: Bannock thickspike wheatgrass, Sodar streambank wheatgrass, Goldar bluebunch wheatgrass, Appar blue flax, Magnar basin wildrye, Nezpar Indian ricegrass, Richfield Selection firecracker penstemon, Clearwater Selection alpine penstemon, Snake River Plain fourwing saltbush. Bridger accessions: Trailhead basin wildrye, Rimrock Indian ricegrass, M1 Nevada bluegrass, PI434231 plains bluegrass, 9005460 alpine bluegrass, High Plains Sandberg bluegrass, Shoshone beardless wildrye, 9019219 bottlebrush squirreltail, Critana thickspike wheatgrass, Wytana fourwing saltbush. Meeker accessions: Summit Louisiana sagewort, Timp Utah sweetvetch, Bandera Rocky Mountain penstemon, 9040187-bottlebrush squirreltail, 9040189 bottlebrush squirreltail, 9043501 Salina wildrye, Maybell antelope bitterbrush. Pullman accessions Secar Snake River wheatgrass, Covar sheep fescue, Canbar Canby bluegrass, Sherman big bluegrass, Whitmar beardless wheatgrass, and Schwendimar thickspike wheatgrass. FY99 no evaluation. FY00 Nezpar has excellent seedling vigor, easy to transplant, remains green, and is an attractive landscape plant. Schwendimar is best thickspike wheatgrass, remains green longer, best regrowth, responds well after mowing, good dryland and limit irrigation. Goldar and Whitman stands are very poor due to cheatgrass competition. Basin wildrye, Sherman, Secar mix good weed competition. Basin wildrye, Sherman, Covar, Secar are all good landscape plants. Using Covar along one side of property for firebreak – it will be excellent. Penstemon species are very slow growing, remain green and will be good landscape plants. Appar can be a nuisance and is not very shade tolerant. Maybell is slow growing. Timp is a preferred species by rabbits resulting in difficulty establishing stand. Summary of best plants – Grasses: Secar Snake River wheatgrass, Magnar basin wildrye, Sherman big bluegrass, Nezpar Indian ricegrass, Covar sheep fescue, sand dropseed, Bannock thickspike wheatgrass, and Schwendimar thickspike wheatgrass. Forbs: western yarrow, Drummond phlox, white evening primrose, scarlet globemallow, silky lupine, Louisiana sagewort, Rocky Mountain iris, and Appar blue flax. Shrubs: native fourwing saltbush, native basin big sagebrush, Maybell bitterbrush, curlleaf mountain mahogany, Saskatoon serviceberry, Woods rose, almond, and Drummond willow. Trees: Idaho hybrid poplar, and Rocky Mountain juniper. FY01 - FY04 no evaluations. FY05 all plants are under some type of supplemental irrigation. Both the basin wildrye accessions are doing fine and are good landscape plants. The Secar bluebunch wheatgrass is doing well and is a good landscape plant. Covar sheep fescue has done well near the edges of walks and driveways where a little additional moisture is available and the soils are deep. It did poorly in an area that had topsoil removed and the soil may be somewhat compacted and is a good xeriscape plant. The accessions of Indian ricegrass that germinated and survived are doing well. There was poor germination and survival in general. They are good xeriscape plants. Appar Lewis flax is doing well with partial irrigation and is a good xeriscape plant. Scarlet globemallow seed was collected by cooperator and seeded. It did well for a couple of years, but died after 3-4 years. A good looking xeriscape plant. All accessions of penstemon, mostly Eaton or firecracker have done well under partial irrigation and are good xeriscape plants. The curlleaf mountain mahogany has done well and is a good landscaping plant. It receives some extra water. Serviceberry is doing well and is near full irrigation. Utah sweetvetch came up well, but received heavy use from rabbits and only one plant has survived. It is doing well. Golden current came into our yard through birds. Where it has volunteered, it is doing well and is a good xeriscape shrub. It needs to be pruned to make it denser since it is pretty leggy without pruning. It receives some additional water. I planted 3 or 4 silver buffaloberry shrubs and they have been slow in developing and are still quite small. They may do ok. The Maybell bitterbrush is doing fine. It receives some additional water and is a good xeriscape plant. Western yarrow was planted. It receives some additional run-on water where it was planted. It has spread readily to other areas with partial irrigation and some areas of full irrigation. In many ways this is a weed at my house. Rocky mountain iris has done fair in a place that I can fully irrigate and with no competition. Woods rose has done well and is a good landscaping plant. It is under full irrigation and should be pruned, similar to other roses to keep it under control. Western clematis started very slowly. This was from seed and not from Pullman PMC. Once it got going, after about 3 years, it has grown quite well and in fact needs to be controlled for spread. The almond we harvested near Brownlee reservoir has done very well under full irrigation. It has very good vigor, has good shape and in favorable springs has produced good seed crops. It is a medium sized tree, about 20 ft. high now. Herbaceous sagewort or Louisiana sage was planted from seed and receives partial irrigation. It does very well where it was planted and if the water was spread to a larger area, it would expand from rhizomes into that area. Mulberry trees volunteered through the help of birds to our yard. They do very well here and are good looking medium sized trees. They get partial to full irrigation and are not producing seed yet at 3 years old and 18 ft. tall. The ones down near the river do produce seed.
Next evaluation 2009 cooperator will complete evaluations.

ID05010 Jacy Gibbs – shrub test plots. Prospector common snowberry, Trapper western snowberry, St Marie's mockorange (plants) and Colfax mockorange (plants) were ordered February 4, 2005. Site characteristics: MLRA 11, silt loam to loam soil, 1 percent slope, elevation 2250 feet, 8 inch precipitation, irrigated. FY05 Mockorange received in April in good condition. The accessions were not marked. NOTE: this was indicated on receipt that was sent back to Pullman PMC. Wayne Crowder called shortly after this and no resolution on how to identify was made. No way to evaluate them separately. They were planted shortly after they arrived. Four mockorange received partial irrigation and had moderate competition from grass. Six mockorange received full irrigation and had little or no grass competition. Most of the partially irrigated plants died. The others have low vigor and have grown little for full irrigation. There should be better first year growth with full irrigation to be a good landscape plant. They are planted in partial shade and may come on in 2006. Seed of the snowberry accessions were received in April. Warm-cold stratification occurred per instructions. The seed was planted 1/03/06. FY06 snowberry failed. Mockorange was not sent with separate identification so accessions can not be determined. Mockorange is still alive, but growth rates are very slow. **Next evaluation 2009 cooperator will complete evaluations.**

ID06002 CB River Ranch WRP upland planting. Seeding mixture includes Bozoisky Russian wildrye, Pryor slender wheatgrass, Vavilov Siberian wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass and Snake River Plain fourwing saltbush. Seed was ordered September 26, 2005 and planting date is scheduled for May 2006. Site Characteristics: Feltham loamy fine sand soil, 3-12 percent slope, NE aspect, 11 inch precipitation and site will be irrigated for establishment. FY06 no evaluation. FY07 Previous seedings in this field have failed due to lack of moisture, sandy soils and weed competition. We discussed an irrigation system with handlines in order to get plants established, however it proved to be cost prohibitive, so operator will be trying a dryland seeding again. Manure has been added and disced in to increase organic matter and hopefully retain soil moisture. Seeding will occur around the 1st of November. FY08 manure was applied in April 2007. Manure and weeds were disced three times in April 2007 and again twice more in November 2007, with rubber tired roller behind to pack seedbed and prevent wind erosion. Grass seed drill was rented and field was drilled 11/28/07. The seeding was not very successful, as the field is over run with weeds. However this is the third attempt at this seeding, and I believe we need to manage for what we did get as there is evidence of plants from previous seedings. Unbelievably there are some large plants that escaped being disced 5 times and have rebounded from being mowed and are still surviving. Which leads me to believe maybe we need to be patient and see what comes up from the current seeding, because there are some plants that have established from the seeding, mainly Siberian WG. Need to stay on top of mowing and spraying. With no fourwing saltbush present, I would advise using broadleaf control chemicals. Another option would be to work with Andy Ogden, who has a strip seeder and drill into this field. But I would advise against any more discing. It is only bringing up more weeds and losing organic matter.

ID07001 Wayne Newbill (Ada County) field planting. Regar meadow brome and Cache meadow brome irrigated forages trial. Seed ordered August 10, 2006. Seed will be planted in late summer – early fall and surface irrigated (furrows) for establishment. Seed was delivered on 8/18/06. **FY06** weed control using 2 pints Roundup per acre was applied on 8/30/06 followed by discing, corrugating, pre-irrigation, harrowing, seeding with drill – 7 inch spacing on 9/9/06 and final corrugation. Regar is located in west field and Cache is located in east field. Fields were irrigated following planting. Initial evaluation in later fall 2006 indicated best stand establishment was Regar accession. **FY07** Regar - excellent stand, excellent vigor, 18 inch height and 3 plus plants per foot squared. Cache - excellent stand, excellent vigor, 12 inch height and 3 plus plants per foot squared. Cooperators rates Regar good to excellent and Cache good during establishment year. FY08 Both fields looked very good and had only mild weed issues. There was one cutting of hay and one period of grazing. Yield was reduced due to fact that it took Wayne awhile to find someone to hay the field and it should have been harvested 3 weeks prior to when it was cut and during that time it was not irrigated. Reduced available water did have an effect most notably on the Regar and patches of it did not recover from it as well as hoped. Appears to have gone dormant, I think it will come back in the spring.
West field- Regar: Excellent stand on South end, as you get further down to the end where Wayne land leveled the quality decreases and there are some patches of weeds and lowered yields. There are also a few areas where the grass has gone prematurely dormant, probably due to lack of water during first cutting of hay. Field was grazed for two weeks continuously with 6 young horses. Grazing was fairly short when finished, but plants have recovered nicely. 6 horses x 1.25 Au x .5 Mth = 3.75 AUM's 3.75/ 1.2 Ac = 3.1 AUM's/ac 1 AUM = 915 lbs 915 x 3.1 = 2,836/2000= 1.4 Tons 1.4 + 4.2 tons of hay = 5.6 Tons/ Ac Yield
East Field- Cache: Excellent stand throughout even down to North end where the soil is less than desirable, surprising because the soil in this field is very shallow and of poorer quality than the other field. The field seems to have suffered

no ill effects from the lack of moisture that affected the West field. It was grazed for one week continuously with 6 young horses. 6 horses x 1.25 Au x .25 Mth = 1.88 AUM's 1.88 / 1ac = 1.9 AUM's/Ac 915 x 1.9 = .9 Tons .9 + 4.2 = 5.1 tons/ Ac yield

ID07002 Doug Austin (Ada County) field planting. Regar meadow brome, orchardgrass and alfalfa field planting. Seed ordered August 28, 2006. Seed was planted in late summer – early fall and irrigated for establishment. Site characteristics: silt loam soil, 0-2 percent slope, 2800 feet elevation and irrigated. Seed was planted in early September 2006 and irrigated for establishment. FY07 stand 75% Potomac orchardgrass, 10% Regar meadow brome and 15% alfalfa – cooperator took 3 cuttings of hay (1st 0.6 ton/ac; 2nd 0.9 ton/ac and 3rd 1.5 ton/ac = 3 ton/ac for first year). FY08 Field had excellent utilization, no species being avoided. Some small 10 feet diameter spots with discolored foliage. Was unclear if this was a excess moisture issue as the soil was slightly muddy and trampled and had more weeds than surrounding areas. However, areas were minimal and overall had excellent weed control. Yielded 47 tons total on 12 acres and then began grazing. Yielded 17 AUM's on 12 acres. May yield some additional AUM"s as weather seems to be holding and grass is still up.

ID08014 Jim Classen WHIP field planting. Garrison creeping foxtail seed (18 pounds) ordered April 3, 2008.FY08 Garrison good stand with 4 plants per square foot and excellent vigor. Despite difficulties in planting late (see attached assistance notes from 6/6/08 through 9/3/08) and difficulties in watering due to water seeping into neighbors field the stand is emerging with a good density. Majority of plants are very small around 6 inches, but have developed some seed heads. There are some areas where plants achieved full height and are about 2 feet. The stand is somewhat patchy, but that is largely due to water regime. In areas that received too much water at bottom of pond. There is no Garrison Creeping Foxtail, however yellow nutsedge, barnyard grass and smartweed are growing, which although weeds are excellent duck and wildlife food. Other areas where it was too dry along the berm have a heavy weed infestation problem mainly Kochia. The bulk of the area is intermittent with mustard and cocklebur. However there is enough grass underneath that I believe next year will largely crowd out weeds. Field was flood irrigated several times over the season for several days. More irrigation was not possible due to flooding neighbor's alfalfa field. When last cutting of hay is removed the pond will be flooded for fall months. That will test the Creeping Foxtail and determine its suitability.

ID09003 Forest Clifton erosion control field planting. Vavilov and Vavilov II Siberian wheatgrass seed was ordered October 30, 2008. Site characteristics: 4 acres; purpose - soil erosion, conservation cover, fire reduction, weed control; soil - Lankbush sandy loam; slope- 30%; aspect - south; elevation – 2600 ft; precipitation - 10"; irrigation – no; T5N R2W Qrtr Section NW ¼ of SE Section 32. Seed will be broadcast planted in November and then rolled to press seed into seedbed.

FIELD OFFICE: EMMETT

ID04016 Richard Zamzow WRP upland field planting. Vavilov Siberian wheatgrass, Sodar streambank wheatgrass, Bannock thickspike wheatgrass and Magnar basin wildrye. Seed ordered July 2003. Site characteristics: fine sandy loam soil, 2100 feet elevation, 10-12 inch precipitation, aspect-flat. Planting planned for fall 2003. FY04 – FY05 no evaluations. FY04- FY08 no evaluations.

ID07007 V Dot Ranch – Jim Little field planting. Seed ordered 1/10/07. Seed mix 1: Anatone bluebunch wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Sherman big bluegrass, Snake River Plains fourwing saltbush; Seed mix 2: Goldar bluebunch wheatgrass, Bannock thickspike wheatgrass, Washoe basin wildrye, High plains Sandberg bluegrass, Wytana fourwing saltbush. Site characteristics: wildfire burn 2006, stony clay loam soil, 3000 feet elevation, 12-16 inch precipitation, ESD – Stony Loam 12-16 bluebunch wheatgrass, basin big sagebrush, bitterbrush, Sandberg bluegrass. Mixtures (one acre each) will be broadcast planted in mid to late winter and where possible using ATV dragged-raked to incorporate seed. FY07- FY08 no evaluations.

ID07008 _____ - _____ field planting. Peachleaf willow (accessions 9067541 and 9067546) and black cottonwood (accessions 9067537 and 9067569) extra long cuttings were delivered to Field Office on February 13, 2007. Planting to be completed using backhoe to dig holes to perennial water table – 2-3 cuttings will be placed in each hole. FY07- FY08 no evaluations.

ID08002 Randy Heffner field planting. Bozoisky Russian wildrye and Syn – A Russian wildrye fall and winter forage trial. Seed ordered October 12, 2007. Site Characteristics: Boise County, MLRA B10, 6 acres, dormant fall

planting, Brownlee sandy clay loam, 5-10 percent slope, south aspect, 2800 feet elevation, 14-16 inch rainfall, irrigated, T7N R2E NE1/4 Section 2. FY08 no evaluation.

FIELD OFFICE: MARSING/GRANDVIEW
None

FIELD OFFICE: MERIDIAN PLANTINGS MANAGED BY MERIDIAN CONSERVATIONIST
ID08009 City of Boise – Willow Lane bio-swale field planting. Durar hard fescue, Sherman big bluegrass, Appar blue flax and Richfield firecracker penstemon seed ordered March 17, 2008. Site: Notus loam soil, 0-2 percent slopes, 2500 feet elevation, 11- 12 inch rainfall zone, non-irrigated, T4N R2E NW ¼ Section 32. Planting planned for fall 2008. FY09 City decided to relocate this project. This seed was transferred to the Patterson project ID08010. **Cancel**

ID08010 Heidi Patterson – Dry Creek field planting. Durar hard fescue, Sherman big bluegrass, Bannock thickspike wheatgrass, Sodar streambank wheatgrass, Richfield firecracker penstemon and Appar blue flax seed ordered March 17, 2008. Site: Goose Creek loam soil, 0-2 percent slopes, 2800 feet elevation, 11- 12 inch rainfall zone, irrigated for establishment, T5N R1E NW ¼ Section 35. Planting planned for dormant fall 2008.

OTHER PLANTINGS MANAGED BY PLANT MATERIALS SPECIALIST
ID06003 Rebecca Laramie Field Planting. Roadcrest crested wheatgrass and Ephraim crested wheatgrass low moisture lawn trial. Seed shipped March 2005. Seedbed preparation included roto-tilling and hand raking. Lawn was seeded on September 1, 2005. Seed was broadcast at about 600 seeds per square foot, lightly raked and the entire area was mulched with dry grass clippings and then watered. Irrigation the first month was 3 times per week. On September 7, 2005 seedlings could be seen coming through the mulch. On September 25, 2005, no noticeable difference could be seen between Roadcrest and Ephraim establishment. **FY06** - the grass seeding is looking good, did spot seeding in a few spots where stand wasn't too thick.

FIELD OFFICE: MOUNTAIN HOME
None

FIELD OFFICE: PAYETTE
University of Idaho low maintenance turf plot(s) studies. Seed ordered March 1, 2007. Species include: Vavilov Siberian wheatgrass, Sodar streambank wheatgrass, Hycrest crested wheatgrass, Ephraim crested wheatgrass, Roadcrest crested wheatgrass, Rosana western wheatgrass, Covar sheep fescue and Manchar smooth brome. Plots will be established at 4 locations:

ID07016 Lower Payette Ditch Plots - Site preparation and seeding: Seeded 3/22/07. Plots were cultivated with a front tine garden cultivator, raked, hand seeded, light raked, and rolled with a water-filled drum (estimate 30-40 pounds pressure) immediately after seedi Some emergence, but plots essentially failed due to lack of soil moisture, extreme heat during summer and weeds (kochia and thistle). Reseeded: 11/8/07. Site prep included hand-raking before seeding (no cultivation), seeding, and rolling with water filled drum. FY08 S was terminated (1) because of lack of growth response even after reseeding; and (2) because plots were accidentally sprayed in the sprin 2008, about the time emergence would have been occurring. This planting failed - **Cancel**

ID07017 Clay Peak Landfill Plots - Site preparation and seeding: Seeded 3/22/07**.** Plots were prepared with a "groundhog" cultivat hand seeded, light raked, and rolled with a water-filled drum (estimate 30-40 pounds pressure) and immediately after seeding a tanker tr watered the plots. Some emergence, but essentially the plots failed due to lack of soil moisture and extreme heat. Reseeded: 11/9/07: h seeded and rolled with water-filled drum. FY08 Study was terminated due to lack of grow response Expectations were high after second seeding in November 2007 because of high winter precipitation after seeding, but still no success on this dryland site. This planting faile **Cancel**

ID07018 Oregon Trail Rest Area plots - three sets of plots. **Site preparation and seeding**: Seeded: 4/11/07. Plots were pre-sprayed with glyphosate 3/23/07 to kill existing weeds and grass; rototilled, hand raked, hand-seeded, light raked, rolled with water filled drum. These are irrigated plots. Two sets of plots were very successful, although infested with broad leaf weeds, saltgrass, and bristlegrass. The third set of plots was heavily infested with kochia, was not watered as frequently, and did not get cultivated as deeply due to malfunction of cultivator during site prep. Cooperator was treating successful plots with "Quicksilver," a broadleaf herbicide for new grass seedings. Plots were mowed in fall. FY08 All plots are well established. Covar sheep fescue, Roadcrest crested wheatgrass and Vavilov

Siberian wheatgrass are performing the best for ground cover and also weed control. FY08 Three sets of plots. One of three plots (on north exit of rest area) was abandoned because of poor establishment and intense infestation of kochia weed. Still surprise result in these plots was clear establishment of 'Vavilov' Siberian wheatgrass, despite the relative lack of irrigation and competition with kochia and other weed species in 2008.
Plots on the eastern side of the rest area are establishing with the benefit of supplemental irrigation, but compaction from maintenance equipment is having a significant detrimental impact of these plots (see attached pictures.) NRCS did not rate these plots, but a very subjective evaluation shows "Parks" Kentucky bluegrass, followed by "Covar" sheep fescue were the most tolerant of growing conditions in these plots. "Rosana" western wheatgrass and "Roadcrest" crested wheatgrass were also among the top performers in this group of plots.
Plots at the south entrance of the rest area were clearly the most attractive and successfully established plots, all though the other two sets of plots have merit for future evaluation and consideration relative to the harshness of their growing conditions: (1) north exit= abandonment, high weed infestation, poor seed bed for establishment, minimal irrigation; and (2) east side beds= high compaction and pet traffic.
That said, an evaluation by Dan Ogle, NRCS Plant Materials Specialist in Boise, shows all of the grasses except "Parks" Kentucky bluegrass with high rates of establishment (80-100% compared to 50% for the bluegrass.) Weed exclusion appears to be most successful with the 'Cover' sheep fescue, 'Hycrest' crested wheatgrass, 'Roadcrest' crested wheatgrass, 'Manchar' smooth brome, and 'Vavilov' Siberian wheatgrass.
Aesthetic value is truly in the eye of the beholder. 'Covar' sheep fescue is a lush fine texture grass that was very appealing, but subjective evaluations by University of Idaho Extension students showed a lot of variability in choices related to color, texture, clumpiness, and overall establishment of plots. Most these evaluations were also done earlier in the growing season, so these could change over time.
Drought tolerance was not tested, or at least not quantified. This is planned for the final year of the evaluation study (2009.)

FIELD OFFICE: WEISER

ID94025 Eckhardt Ephraim crested wheatgrass, Magnar basin wildrye, Mankota Russian wildrye, Trailhead basin wildrye, P27 Siberian wheatgrass, Manska pubescent wheatgrass, Reliant intermediate wheatgrass, Bannock thickspike wheatgrass, Schwendimar thickspike wheatgrass, Greenar intermediate wheatgrass, Sherman big bluegrass, Secar Snake River wheatgrass, Goldar bluebunch wheatgrass, Bozoisky Russian wildrye, Hycrest crested wheatgrass, Rush intermediate wheatgrass demo plots. Site is clay loam soil, non-irrigated, 10-12 inch ppt, 3000 feet elevation, and 5% slopes on NE exposure. Seed ordered July 1994. FY94 and FY95 due to drought conditions, seeding planned for spring 96. FY96 planted April 9, 1996 by hand planting and raking plots to control bulbous bluegrass competition. June 19, 1996 evaluation for establishment: Mankota poor, Manska good, Sherman very poor, Greenar good, Trailhead fair, Reliant good, Bozoisky good, Bannock good. July 8, 1996 establishment: Mankota fair, Manska good, Sherman poor, Greenar good, Trailhead fair, Reliant good, Bozoisky good, Bannock good, Goldar good, Rush excellent, Secar fair. Rush has the best stand establishment to date with Goldar next. FY97 no evaluation. FY98 first set of plots; Reliant is out producing all other plots, Greenar is second in production, Sherman hand planted plot is third in production, Sherman broadcast plot failed, T6633-P is fourth in production. Second set of plots; Bozoisky performed the best with Mankota second, and trailhead the poorest. The wildryes, thickspike wheatgrasses and intermediate wheatgrasses have shown adaptation to this area and could play a roll in revegetating local rangelands. FY99 plots were grazed this spring and grazing preference was evaluated. Plots: Greenar and Reliant were grazed the heaviest, followed by Mankota and Bozoisky Russian wildrye. This was uniform for all replications. Thickspike wheatgrasses and all other varieties had slight utilization. Basin wildryes were not utilized. Grazing preference for the larger plantings: Bozoisky Russian wildrye was used the heaviest, followed by Goldar bluebunch wheatgrass, and Rush intermediate wheatgrass used the least. Cattle are grazing Fourwing saltbush. The producer is very happy with results from these plots and uses the information to make his planting decisions. Cattle in mid May grazed FY00 the small plot species. Grazing preference was for Goldar, Bozoisky, and the intermediate wheatgrasses. The intermediate wheatgrasses are spreading into adjacent plots. Moderate use was made on Magnar and Trailhead. Sherman was used only slightly. Fourwing saltbush was utilized and continues to get taller (20 inches tall). In the large acre sized plots adjacent to a Hycrest planting, grazing preference (mid May) in order are: 1) Goldar, 2) Bozoisky, 3) Rush, and 4) Secar. Use of Goldar was similar too slightly heavier than the Hycrest. FY01 all plots are grazed this year. Utilization was heaviest on Greenar intermediate wheatgrass and Reliant intermediate wheatgrass plots. The larger plantings showed grazing preference was highest for Bozoisky Russian wildrye, then Goldar bluebunch wheatgrass, followed by Rush intermediate wheatgrass. FY03 plots were grazed this fall at time of evaluation. FY04 – Cattle preference (cows were moved into filed 4 days prior to evaluation on 10/5/04). Most preferred species during this period was Bozoisky-Select Russian wildrye which was grazed very close. Second most preferred species was Goldar bluebunch wheatgrass which was

grazed to a uniform 2 inch stubble height. Secar Snake River wheatgrass and Rush intermediate wheatgrass were not utilized. FY05 no evaluation. FY06 – observations in late June, grazing preference was Goldar bluebunch as first choice, Bozoisky-Select Russian wildrye as second choice, Rush intermediate as third and Secar as least desirable. Continue with this evaluation in 2007. **FY07 no evaluation - keep this as a viable planting and evaluate in 2010.**

ID96024 Howard Sutton Rush intermediate wheatgrass, Luna pubescent wheatgrass, and Oahe intermediate wheatgrass field planting. Site is loam soil, non-irrigated, 15-17-inch ppt, 3320 feet elevation, 1-4% slope on south exposure. Seed ordered March 14, 1996. FY96 planted in May into good seedbed with good weed control. Good stand establishing with about 3 plants per foot squared, each species was planted with alfalfa in alternate rows and alternating sections. FY97 good stands with excellent vigor of each cultivar. The Oahe/alfalfa stand was cut for hay and produced 1.5 tons/acre. Because of topography the Rush/alfalfa and Luna/alfalfa were not cut for hay. The entire field was grazed; grazing was uniform across all trials so preferences could not be determined. Producer is very happy with all three from standpoint of production potential when seeded with alfalfa. FY98 good stands and vigor for each species with about 7 plants per square foot. Yield for all species was about 5000 pounds per acre or about 3 AUMs per acre. Cattle are selecting Luna as first choice, then go to Rush before Oahe. The Rush was more mature than Luna when steers were put in pasture which may account for selection choices. FY99 good stands and vigor of all three species. Entire 84 acre seeding provided 135 AUMs or 1.6 AUMs/ac. Due to later season of use; cattle prefer Luna and Oahe to Rush. Rush initiates growth earlier and is more mature when cattle are turned into pasture, which probably accounts for this preference. FY00 similar report to last year. FY01 good stands and vigor for all species. Grazing preference continues to be for Oahe, followed by Luna, and the Rush. Production is about the same for all species although reduced this year due to two years of extreme drought. FY02 good stand, and vigor with greatly reduced production this drought year for all accessions. Produced 0.5-0.7 AUM/Acre for each accession, less than 50% of the normal precipitation year. Grazing is slowing spread of these species. FY04 – good stands with good vigor for all species. Production was approximately 0.7 AUMs per acre. FY05 - **FY07 no evaluation - keep this as a viable planting and evaluate in 2010.**

ID02010 Hugh Pangman - New Meadows Riparian Planting. 9067541 Peachleaf willow - Baker source and Golden willow. 50 cuttings ordered February 11, 2002 for shipment in early May 2002. To be planted with waterjet stinger. FY02 willows were planted through cobbly site using a backhoe to watertable located at 5-6 feet depth. 95 survival of each species. Peachleaf willows are 18-20 inches tall and Golden willows are 24 inches tall. Golden willows are more vigorous with more stem growth. FY03 Peachleaf willow 95 percent survival with 36-48 inch height. Golden willow local cuttings also have 95 percent survival with 48 inch plus height. Producer is please with this planting. FY04 no evaluation. FY05 end of 4th growing season - peachleaf willow 90% survival with excellent vigor, 15 feet plant height, 10 feet crown width, 3 inch DBH. Golden willow 90% survival with very good vigor, 10 feet plant height, 6 feet crown width and 2 inch DBH. Peachleaf plants are more vigorous than golden willow, but in a slightly better site based on soil and moisture availability. Plants are protected from grazing by domestic livestock. FY06 evaluation – peachleaf willow 90 percent survival, excellent vigor, 22-25 feet tall, 15 feet crown width; golden willow 90 percent survival, good vigor, 11-12 feet tall, 8 feet crown widths. Evaluate again in 2007 to document a good record of the success of planting and growth rates. **FY07 no evaluation - keep this as a viable planting and evaluate in 2009.**

ID02011 Tom Vogel - Paddock Riparian Planting. 9067546 Peachleaf willow - Burns source and local coyote willow. 50 cuttings ordered February 11, 2002 for shipment in late March 2002. To be planted with waterjet stinger. FY02 willows were planted on April 3, 2002 using the waterjet stinger. Stream was dry for most of July and August. Peachleaf willows have about 75 percent survival with some leader growth up to 36 inches. Coyote willow has about 60% survival. FY03 - FY05 - **FY07 - no evaluation - keep this as a viable planting and evaluate in 2009.**

IDAHO DIVISION IV
PLANT MATERIALS PLANTINGS

FIELD OFFICE: BURLEY

ID94003 Bronson Bozoisky Russian wildrye, Mankota Russian wildrye, Trailhead basin wildrye, Magnar basin wildrye, Goldar bluebunch wheatgrass (firebreaks and winter grazing). Site is sandy loam soil (weakly saline), 9-10" ppt, partially irrigated, 4800 feet elevation, 0-2% slopes. Species seeded in fall of 1994 with good seedbed. FY95 good stands of Mankota, Magnar and Trailhead; fair stands of Bozoisky and Goldar. All seedings are establishing well except in weedy areas. No seed production during establishment year. FY96 good stand of Goldar, fair stand of Mankota and Magnar, and very poor stand of Trailhead and Bozoisky. All plants that are present look good and are producing seed. There are weeds present including cheatgrass, tumble mustard, Russian thistle, broom snakeweed and sagebrush. FY97 Goldar full stand, Trailhead has improved and is spreading, Magnar is very thin, and both Russian wildryes are adapted with thin stands. FY98 good stands of Bozoisky and Goldar and fair stands of Mankota, Trailhead and Magnar. Stands are grazed in winter. FY99 Good stand and vigor of all species. All species are in same pasture and the Bozoisky is grazed closer than the other species. FY00 fair to good stand of all species. Cooperator is very pleased with all species and prefers them over crested wheatgrass varieties. Site was grazed in spring. Cooperator states that livestock make good use of Bozoisky and Mankota in spring, Trailhead in winter, and Magnar in fall and winter. Magnar stays greener than Trailhead. FY01 this site is suffering from two years of drought. Mankota Russian wildrye has 36-inch height, fair to good stand and good vigor. Bozoisky has 20-inch height, fair stand with fair vigor. Magnar has 30-inch height and Trailhead has 20-inch height and both have fair to poor stands with fair to good vigor. Goldar has 24-inch height, fair to poor stand with good vigor. FY02 Survival/Plant Height - Mankota 75%/26 inch, Magnar 80%/40 inch, Trailhead 80%/36 inch, Bozoisky 75%/30 inch, Goldar 30%/26 inch. Magnar and Trailhead are only lightly grazed and are showing very little effect from grazing. Bozoisky and Mankota stands are heavily grazed and stand are beginning to decline. Goldar stand is also heavily grazed and stand has declined significantly. Producer comments indicate that Goldar is always the first species to be grazed in this pasture followed by the Russian wildrye. FY03 - FY04 no evaluation. FY05 Mankota good stand and vigor with 24 inch plant height; Bozoisky good stand and vigor with 36 inch plant height; Goldar good stand and vigor with 26 inch plant height; Magnar poor stand with good vigor and 60 inch plant heights; Trailhead poor stand with good vigor and 60 inch plant heights. Cooperator states that Goldar is the first plant grazed each season and then Bozoisky and Mankota are utilized. Magnar and Trailhead are the last grasses utilized each season, but calves do utilized the basin wildrye stands for thermal cover. Both basin wildrye accessions are spreading into other plots. **Next evaluation 2009.**

ID96012 Poulton Garrison field planting for plug nursery. Seed ordered 12/8/96. FY96 no evaluations. FY97 field has full stand with 2 plus plants/ft2. Plants have height of 36 inches and no weeds. Stand is gravity irrigated and was fertilized with 80 pounds of N in early June. FY98 excellent stand that has improved significantly in the last year. The stand was hayed this year. FY99 good to excellent stand. The stand was 36 inches tall when swathed for hay and had 6 inches of regrowth in early September. Cooperator is very pleased with this grass. Elk are utilizing planting. FY00 planting was cut for hay and elk are utilizing it heavily due to drought conditions. FY01 due to drought conditions, this planting was hayed earlier than normal and has been heavily grazed. Production was below normal. Stand is solid with no bare spots or invading species. FY02 same comments as last year. FY03 - FY04 no evaluation. FY05 cooperator indicated that yields are up over previous years due to better rainfall this spring with 24-30 inch vegetative heights and seedheads up to 48 inches in height. The wetter areas of the field are primarily Garrison even in areas where it was not originally planted. The original planting was irrigated, but is no longer irrigated today and Garrison is going out of this area. Cooperator like Garrison as a forage species and would like to have in more of his pastures. Note: Garrison creeping foxtail requires full moisture either through irrigation and/or sub moisture conditions. It is very productive and a very high quality forage species if fully irrigated and if fertilized. You might consider recommending a fertility program to Mike if he wants to increase production. This planting is providing good information and should be maintained. **Next evaluation 2009.**

ID97006 Gary Jones Field planting of Garrison creeping foxtail. Site is silt loam soil, irrigated, 5000 feet elevation, and 0-3% slope on south exposure. Seed ordered 10/17/96. FY97 new seeding and very difficult to determine establishment. FY98 poor stand establishing with .5 plants per foot2. FY99 good stand with about 4 plants per square foot and 4000 pounds per acre production. Fertilizer would benefit stand and reduce weeds. FY00 good stand with excellent vigor. Planting was hayed this year. FY01 this is a good planting. It was cut earlier than usual for hay due to shortage of irrigation water. Yield was down this year, but cooperator was satisfied with yield given the droughty conditions. FY02 landowner is enthused about Garrison production/performance and plans to plant additional field to

this species. FY03 - FY04 no evaluation. FY05 Garrison is probably about 50% of the stand throughout field. Cooperator likes Garrison and said it is an excellent hay and grazable forage. Note: Garrison creeping foxtail requires full moisture either through irrigation and/or sub moisture conditions. It is very productive and a very high quality forage species if fully irrigated and if fertilized. You might consider recommending a fertility program to Gary if he wants to increase production. This planting is providing good information and should be maintained. **Next evaluation 2009.**

FIELD OFFICE: GOODING/FAIRFIELD

ID01007 Spring Cove Ranch – Butler demonstration plantings of Magnar basin wildrye, Snake River Plain fourwing saltbush, and Northern Cold Desert winterfat. Seed ordered March 16, 2001. Site characteristics: Planting 1. Vertisol soil, 11-inch rainfall, irrigated, 3300 feet elevation, south of Pioneer Reservoir. Planting 2. Sodic soil, 12-inch rainfall, irrigated, 3500 feet elevation, near Clover Creek – Hill City Road – southern base of Bennett Mountain foothills. FY01 - FY04 seed not planted due to extreme drought. Cooperator plans to plant fall 2004. FY05 Planting Site 1: Seed again not planted. Dan said he still wants to drill the Magnar next spring (2006) in the planned site (Planting Site 1). Said site in 2005 was too dry. As of 1/10/06 site is under flood waters. Moisture should be good for spring 2006 planting. He said he will drill seed in spring 2006. FY07 Dan has not planted the Magnar yet on account of other farming activities, but still wants to keep the seed and says he will try to get it planted this fall (2007). FY08 Spring Cove Ranch, called Dan last week, he said he did get the Magnar in the ground (about 3 acres or something, small seeding) last fall (fall 2007). He said he disked the ground twice and broadcast the Magnar and left as is. He felt he had enough seed coverage due to the soil condition after working and did not harrow or follow up for seed coverage. He did not take a close look after this growing season but believed he needed another year before making a judgement as not much apparently came. I agreed we will take a look at it next year.

ID07006 Hugh Koonce field planting. Sodar streambank wheatgrass was ordered November 13, 2006 for critical area planting seeding. Seed will be dormant broadcast planted between November and January and harrowed to incorporate seed. Site characteristics: clay loam to silt loam soil, 5,000 feet elevation 2-6 percent slopes, 12 – 16 inch precipitation. FY07 no evaluation. FY08 **Cancel**

Little Wood River Farm: 1) beaver select Bur-oak trees even when other food trees are present; We lost 5 in one area to beaver, the trees were getting in the 9-10 foot height arena and really starting to grow. All oak trees are now chicken wired; 2) I removed all sea buckthorn (Hippophae rhamoides) plants from my shelterbelts last fall. My experiment with the species was completed. The plants flourished, and were starting to flourish a little too-well. I decided just knowing that they would grow so well was knowledge enough. Ecologically they provided no advantages/niches in my shelterbelts than what our farm-favorite silver buffaloberry are already providing. For snow management criterion in dry and cold environs, the sea buckthorn may shine brilliantly, provided the suckering habit is acceptable to the manager. Basically, I view sea buckthorn as a wide amplitude Russian olive; 3) Blooming box elder trees provide a strong draw for bees early in the spring, in case anybody is interested in stretching their colony's field season; 4) Firs (genus Abies) exhibit zero growth in the too-hot Gooding sun; 5) Siouxland poplars, on the other hand, are the all-time winners in growth on our farm, but still can't outrun beaver.....

FIELD OFFICE: JEROME
None

FIELD OFFICE: RUPERT
None

FIELD OFFICE: SHOSHONE/HAILEY
None

FIELD OFFICE: TWIN FALLS

ID02009 Shoshone Creek Riparian Planting – Rob Rogerson. 9067541 Peachleaf willow - Baker source, 9067549 Peachleaf willow - Prairie City source, and 9067560 Peachleaf willow - Deer Creek source. Cuttings ordered February 11, 2002 for shipment April 1, 2002. FY02 - 9067549 60 percent survival with good vigor - 9067541 76 percent survival with good to excellent vigor - 9067560 50 percent survival with fair vigor, native Planeleaf willow 100 percent survival with excellent vigor. Death loss can primarily be related to livestock damage when cattle were place in field for 5 days. FY03 no evaluation. FY04 9067549 peachleaf willow failed, 9067541 peachleaf willow 24 percent survival

with fair vigor, 9067560 peachleaf willow not evaluated, native willows 100 percent survival with good vigor. FY05 9067541 28% survival with good vigor and 18 inch height; 9067549 10% survival with good vigor and 24 inch height; 9067560 failed; native Planeleaf willow 100% survival with good vigor and 24 inch height. FY08 9067541 Peachleaf willow 20 percent survival with poor vigor; site is grazed annually and cuttings are not increasing in size. **Cancel**

ID04003 Steve Schuyler field planting – windbreak. Siouxland poplar, Carolina poplar, Golden willow and Laurel willow cuttings. Cuttings ordered January 12, 2004. Site characteristics: 0-1 percent slope, north aspect, 8-10 inch precipitation zone, irrigated-gravity, Portneuf silt loam soil. Planted April 10, 2004 – weed barrier fabric was installed – planting protected with snow fence along west edge. FY04 survival and height - 91 percent – 35 inches Laurel willow, 42 percent – 6 inches Carolina poplar, 82 percent – 42 inches Golden willow, 0 percent Siouxland poplar. FY05 replacements ordered February 22nd 10 golden willow, 25 Carolina poplar, and 5 Laurel willow. Evaluation August 11, 2005- Laurel willow 94% survival with excellent vigor, 8 feet height and 5 feet crown width; Carolina poplar 58% survival with excellent vigor, 9.3 feet height and 7.5 feet crown width; Golden willow 82% survival with excellent vigor, 9.5 feet height and 11 feet crown width.; Siouxland poplar failed. FY08 Laurel willow 89 percent survival with good vigor and 15.5 feet height; golden willow 82 percent survival with excellent vigor and 20 feet height; Carolina poplar 58 percent survival with excellent vigor and 28 feet height.

ID04006 Dickenson 319 riparian woody planting. Laurel willow, golden current, Wood's Rose, redosier dogwood, Siberian peashrub, coyote willow, golden willow, chokecherry, blue spruce, and Austrian pine. Plantings are protected from grazing and grass is mowed around pines, spruce, juniper and sumac.
FY04 planted in May 2004. Plantings are protected from grazing with a fence and arranged in clumps (copses) for natural appearance. Laurel willow 92 percent survival, excellent vigor, 24-36 inch height. Golden current 100 percent survival, excellent vigor, and 18-24 inch height. Wood's rose 100 percent survival, excellent vigor, and 18-24 inch height. Redosier dogwood 60 percent survival, fair vigor, and 18-24 inch height. Siberian peashrub 100 percent survival, excellent vigor, and 18-24 inch height. Coyote willow 80 percent survival, good vigor and 12-48 inch height. Golden willow 100 percent survival, excellent vigor and 72 inch height. Chokecherry 23 percent survival, poor vigor and 36 inch height. Blue spruce 73 percent survival, good vigor and 36 inch height. Austrian pine 100 percent survival, excellent vigor and 36 inch height. FY05 evaluation August 11, 2005- Laurel willow 100% survival, excellent vigor, 4-8 feet height and 2 feet crown width; Golden current 92% survival, excellent vigor, 4 feet height and 2.5 feet crown with; Wood's rose 100% survival, excellent vigor, 2.5 feet height and 3 feet crown width; Redosier dogwood 83% survival, excellent vigor, 4 feet height and 2 feet crown width; Siberian peashrub 12% survival, very poor vigor; Coyote willow 33% survival, good vigor, 5 feet height and 0.5 feet crown width; Golden willow 90% survival, excellent vigor, and 6 feet height; chokecherry 27% survival, fair vigor and 4.4 feet height; blue spruce 73% survival, fair vigor and 4.5 feet height; Austrian pine 100% survival, excellent vigor and 4.6 feet height; Rocky Mountain juniper 100% survival, excellent vigor and 14 inch height; Skunkbush sumac 80% survival, good vigor and 2 feet height. FY08 Laurel willow 100 percent survival with excellent vigor and 15 feet height; coyote willow failed; Peachleaf willow 80 percent survival with fair vigor and 15 feet height; Simom poplar failed; Carolina poplar failed; Firecracker penstemon failed.

ID05002 Perinne Coulee 319 Project riparian planting. Redosier dogwood (accessions 9023733, 9023739 and 9023740), Laurel willow and Peachleaf willow (accessions (9067375, 9067376, 9067541, 9067546, 9067549 and 9067560) cuttings were ordered February 4, 2005. Planted spring 2005. Survival and identification difficult in 2005. FY07 Peachleaf willow 50 percent survival with good vigor and 10 feet height; Laurel willow and red-osier dogwood failed. FY08 58 percent survival with good vigor and 11 feet height; Laurel 14 percent survival with poor vigor and 2.5 feet height (affected by saline soil conditions.

ID05011 Twin Falls County – Rock Creek Park critical area field planting. Regar meadow brome, Topar pubescent wheatgrass, Bannock thickspike wheatgrass, Snake River Plains fourwing saltbush, Rosana western wheatgrass, pryor slender wheatgrass and Garrison creeping foxtail were ordered March 14, 2005. Site characteristics: silt loam soil, 2 percent slopes, NW aspect, 3600 feet elevation, 12 in rainfall zone, non-irrigated (riparian – sub irrigated), T10S R17E SW ¼ Section 8. Twin Falls county coordinator said only a small amount of seed was planted in 2005. FY06 and FY07 no evaluation. FY08 **Cancel**

ID06006 Twin Falls Co. Riparian Projects. Woody field planting. Simon poplar (30), Peachleaf willow – Caribou Source (20), Peachleaf willow – Pocatello Source (20), Coyote willow (120), Golden willow (20), Laurel willow (20),

White willow (20), Redosier dogwood – Harrington Source (50), Redosier Dogwood – Cheney Source (50) and Redosier dogwood – Wallowa Source (50). Cuttings ordered February 2, 2006. FY06- FY08 no evaluation. **Cancel**

ID07021 Twin Falls Centennial Park field planting. Regar meadow brome, Sodar streambank wheatgrass, Bannock thickspike wheatgrass, Garrison creeping foxtail, Jose tall wheatgrass and Largo tall wheatgrass seed was ordered April 20, 2007. April 23 was informed Jose is not available. FY06 and FY07 no evaluation. FY08 **Cancel**

ID08007 Twin Falls Canal Company riparian project. Laurel willow, peachleaf willow accessions 9067546 and 9067376 and black cottonwood accession 9067538 were ordered March 10, 2008 for delivery in late March. FY08 Peachleaf willow 55 percent survival with fair vigor and 2 feet height; Black cottonwood failed; Laurel willow 37 percent survival with fair vigor and 15 inch height.

Walt Coiner Field Planting ID03001 Purpose: Field Planting - windbreak interspace perennial cover/weed control study - irrigated-semi irrigated-dryland trials. Seed was ordered on September 17, 2002. Approximately 1 acre per species - broadcast seeding rates - Aberdeen PMC broadcast planters were used for seeding - dormant fall planting completed November 4 and 5, 2002. Irrigated species: Durar hard fescue; Sherman big bluegrass; Foothills Canada bluegrass, and Talon Canada bluegrass. Semi Irrigated species: Covar sheep fescue; Sodar streambank wheatgrass; Paiute orchardgrass; Ephraim crested wheatgrass; Sherman big bluegrass; Roadcrest crested wheatgrass; and Quatro sheep fescue. Dryland species: Vavilov Siberian wheatgrass; Rosana western wheatgrass and Bozoisky Russian wildrye. FY03 initial evaluation August 20, 2003. FY04 evaluation September 13, 2004. FY05evaluation August 11, 2005 following well above average spring moisture. FY08 **Irrigated** – Sherman fair stand with good vigor; Talon good stand with good vigor; Foothills good stand with good vigor; Durar fair stand with good vigor; **Semi-irrigated** – Covar good stand excellent vigor; Quatro good stand with good vigor; Newhy failed; Roadcrest poor stand with poor vigor; Ephraim good stand with good vigor; Sodar stand destroyed; Paiute stand destroyed; Nursery has expanded and irrigation is no longer available; **Dryland species** - Vavilov good stand with good vigor; Bozoisky good stand with good vigor; Sherman good stand with good vigor; Rosana excellent stand with good vigor. **Data will be maintained but evaluations will longer be collected for these plantings.**

	Stand					Vigor				
Species	2003	2004	2005	2006	2008	2003	2004	2005	2006	2008
Irrigated Perennial Cover										
Sherman big bluegrass	good	fair	fair	fair	fair	exc.	fair	exc.	exc.	good
Talon Canada bluegrass	good	exc.	exc.	exc.	good	exc.	exc.	exc.	exc.	good
Foothills C. bluegrass	exc.	exc.	exc.	exc.	good	exc.	exc.	exc.	exc.	good
Durar hard fescue	fair	exc.	fair	good	fair	exc.	exc.	fair	good	good
Semi-Irrigated Perennial Cover										
Covar sheep fescue	poor	fair	good	good	good	fair	good	exc.	exc.	exc.
Quatro sheep fescue	poor	good	exc.	good	good	fair	good	exc.	exc.	good
Newhy hybrid wheatgrass	poor	failed	fair	fair	failed	fair	v. poor	good	good	failed
Roadcrest c. wheatgrass	good	fair	poor	poor	poor	good	good	good	fair	poor
Ephraim c. wheatgrass	exc.	fair	exc.	exc.	good	good	fair.	exc.	exc.	good
Sodar s. wheatgrass	good	poor	poor	poor	destroyed	fair	poor	poor	poor	destroyed
Paiute orchardgrass	fair	fair	fair	fair	destroyed	fair	fair	fair	fair	destroyed
Dryland Perennial Cover										
Vavilov S. wheatgrass	good	exc.	exc.	good	good	good	exc.	exc.	good	good
Bozoisky R. wildrye	poor	v. poor	good	good	good	fair	poor	good	good	good
Sherman big bluegrass	v. poor	v. poor	good	good	good	poor	v. poor	good	good	good
Rosana w. wheatgrass	fair	good	exc.	exc.	exc.	good	good	exc.	exc.	good

Recommendations based on evaluation years

Irrigated – Talon Canada bluegrass and Foothills Canada bluegrass are best fully irrigated choices

Semi-irrigated – Ephraim crested wheatgrass and the good dryland species Vavilov, Rosana, or Bozoisky

Dryland – Vavilov Siberian wheatgrass mixed with Rosana western wheatgrass or Bozoisky Russian wildrye

Twin Falls SWCD/Twin Falls Highway District ID00007 Drought tolerant landscape-weed control demonstration plantings. Seed ordered March 1, 2000 for late March delivery. Planting 1: Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, and Ladak alfalfa. Planting 2: Hycrest crested wheatgrass, Bozoisky Russian wildrye, and Ladak alfalfa. Planting 3: Secar Snake River wheatgrass, Critana thickspike wheatgrass, Trailhead basin wildrye, Rimrock Indian ricegrass, and Wytana fourwing saltbush. Planting 4: Secar Snake River wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass, and Snake River Plain fourwing saltbush. Site characteristics: MLRA B11A, Portneuf silt loam soil, 0-2 percent slopes, north exposure, 3800 feet elevation, 10-12 inch precipitation, irrigated for establishment only, T11S R18E SW1/4 of SW1/4 of Section 13. FY00 due to very dry spring the planting was delayed until better planting conditions occur. FY01 site was planted in mid to late April and sprinkler irrigated in May to assist with plant establishment. Site was also mowed several times during growing season for weed control. Because of mowing, species identification was not possible – estimated initial stand establishment for all plantings are fair with good plant vigor. FY02 introduced plantings are well established - native plantings failed. Introduced seed of Vavilov Siberian wheatgrass (15 lb) and Bozoisky Russian wildrye (5 lb) was ordered on September 15, 2002 to replant failed portion. Planting completed for October 25, 2002 (dormant planting). FY03 field observation determined that little establishment has occurred this year due to drought conditions. FY04 stands were mowed in June and inadequate moisture was available for regrowth. Wytana fourwing saltbush and Snake River Plains fourwing saltbush are becoming more evident with scattered plants throughout plantings 3 and 4. Mowing is keeping the fourwing saltbush short, but does not appear to be killing the shrubs. FY05 this is the first year of above normal spring moist since plantings were installed. Planting 1: good stand of Vavilov (2-3 plants/ft^2), Bozoisky (2 plants/ft^2) and alfalfa (< 1 plant/ft^2) and good vigor for grasses and poor vigor for alfalfa. Planting 2: good stand of Hycrest (3 plants/ft^2) and thickspike (2 plants/ft^2). Wytana fourwing saltbush and Snake River Plains fourwing saltbush are becoming more evident and plants are larger than last year throughout the older plantings 3 and 4. FY08 Mowing operations have ceased and overall stands are improving. Planting 1: good stand of Vavilov, Bozoisky and alfalfa with good vigor for grasses and poor vigor for alfalfa. Planting 2: good stand of Hycrest and thickspike. Wytana fourwing saltbush and Snake River Plains fourwing saltbush are becoming more evident and plants are larger than earlier years. **Data will be maintained but evaluations will longer be collected for these plantings.**

IDAHO DIVISION V
PLANT MATERIALS PLANTINGS

FIELD OFFICE: AMERICAN FALLS/ABERDEEN
ID07022 Wynn Farms Magnar basin wildrye demonstration planting. Seed ordered April 12, 2007. Seed shipped April 13, 2007. FY07- FY08 no evaluations.

FIELD OFFICE: BLACKFOOT
ID02006 Paul Ricks Demonstration Planting. Seed ordered February 11, 2002 for shipment to Aberdeen PMC by March 4, 2002. FY02 Planting completed in May 2002. August 27, 2002 initial evaluation indicated at least some establishment of all seed plots. FY03 evaluated 12/9/03. FY04 evaluated and clipped 6/23/04. FY05 - FY08 no evaluations. See attached tables at end of this section.

FIELD OFFICE: FORT HALL
ID03002 Shoshone-Bannock Tribe Demonstration Planting. Nezpar Indian ricegrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Sodar streambank wheatgrass, High Plains Sandberg bluegrass, and Sherman big bluegrass seed was ordered September 30, 2002. Planting completed early November 2002. FY03 no evaluation. FY04 Nezpar Indian ricegrass excellent stand and vigor with 24 inch height. Goldar bluebunch wheatgrass excellent stand and vigor with 24 inch height. Magnar basin wildrye excellent stand with good vigor and 36 inch height. Sodar streambank wheatgrass excellent stand and vigor with 30 inch height. Sherman big bluegrass good stand with good vigor and 30 inch height. Very poor stand and vigor with 8 inch height (only 3 plants came up – seed may have been buried too deep). FY05 evaluation June 15, 2005. Magnar excellent stand, 98% survival, excellent vigor and 48 inch height; Nezpar good stand, 90% survival, good vigor and 36 inch height; Goldar good stand, 95% survival, good vigor and 42 inch height; Sodar excellent stand, 98% survival, excellent vigor and 42 inch height; Sherman excellent stand, 98% survival, excellent vigor and 38 inch height; High Plains failed and will be replanted next year and irrigated for establishment. FY06 excellent stands of Goldar bluebunch wheatgrass and Magnar basin wildrye, good stands of Sodar streambank wheatgrass, and Sherman big bluegrass, fair stand of Nezpar Indian ricegrass and High Plains Sandberg bluegrass failed. FY07 no evaluation. FY08 common camas excellent stand with 90 percent survival and excellent vigor. Demo plots – Magnar basin wildrye 98 percent survival with excellent vigor and 48 to 60 inch height; Nezpar Indian ricegrass very poor stand with 10 percent survival and poor vigor; Goldar bluebunch wheatgrass fair stand with 70 percent survival and good vigor; Sodar streambank wheatgrass excellent stand with 80 percent stand and good vigor; Sherman big bluegrass good stand with 60 percent stand and good vigor; High Plains Sandberg bluegrass failed.

ID06010 Shoshone Bannock Tribe – ShoBan High School common camas field planting. FY06 Tribal members collected bulbs from the Camas Prairie near Fairfield in Camas County. The bulbs were planted about 4 inches deep in the native garden behind the field office and also near the constructed wetland at the ShoBan Jr./Sr. High School. Plantings are being heavily watered. FO– 1 plant/ft2; School– 1 plant/hole approximately 10-15 feet apart. FY07 Planted 36 bulbs in the garden and all but 3 came up - 4 or 5 flowered and form seed pods. We are currently waiting for the seed to ripen so we can gather them and hopefully get some growing from seed. FY08 No camas plants found at the constructed wetland at ShoBan School. This planting appears to have failed., probably due to lack of water. The canal water that furnishes the water for the constructed wetland does not come in until May, which may be too late for camas. **Cancel**

FIELD OFFICE: MALAD
None

FIELD OFFICE: MONTPELIER
None

FIELD OFFICE: POCATELLO
None

FIELD OFFICE: PRESTON
None

FIELD OFFICE: SODA SPRINGS

ID05001 Michael Tingey – Irrigated forages Demonstration Plots. Latar orchardgrass, Regar meadow brome, Cache meadow brome, Paiute orchardgrass, Garrison creeping foxtail, Rush intermediate wheatgrass, Bozoisky Russian wildrye, 905439 switchgrass, Blackwell switchgrass and Lutana cicer milkvetch seed was ordered February 4, 2005. SCD/Cooperator Supplies the following: Paddock meadow brome, Forager alfalfa, Kemal festolium, Potomic orchardgrass, Rebound meadow brome, Fuego tall fescue, Tekapo orchardgrass, Mara perennial ryegrass, Barliza timothy, Pradel meadow fescue, Barloex tall fescue, Bariane tall, fescue, Barcell tall fescue, Baridana orchardgrass, Hakari Alaska brome, Birdsfoot trefoil, Sainfoin, Sorgam, Grazing corn, Lakota prairie brome and Alice white clover. Site characteristics: 0.8 acres, MLRA B13, Rexburg-Ririe silit loam soil complex, 1-4 percent slopes, north aspect, elevation 5140 feet, 12-14 inch precipitation, irrigated, T11S R41E SW ¼ section 19. Planted in late spring 2005 due to persistent rainfall that did not allow earlier final land preparation and planting. FY06- FY08 no evaluations.

Species	Percent Stand			Vigor			Height		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Kura Clover	0			0			0		
Forager alfalfa	exc.			good			24”		
Lutana cicer milkvetch	good			good			6”		
Alice white clover	poor			fair			4-6”		
Birdsfoot trefoil	fair			good			3”		
Eski sainfoin	good			good			12”		
Baridana orchardgrass	poor			good			16”		
Tekapo orchardgrass	fair			good			12”		
Paiute orchardgrass	poor			fair			12”		
Latar orchardgrass	poor			fair			12”		
Potomic orchardgrass	fair			good			12”		
Satin orchardgrass	poor			good			8”		
Renagade orchardgrass	fair			good			18”		
Rebound meadow brome	good			good			24”		
Cache meadow brome	fair			good			30”		
Regar meadow brome	fair			good			12”		
Lakota prairie brome	good			exc.			36”		
Hakari Alaska brome	85			exc.			12”		
Seine tall fescue	30			good			24”		
Johnstone tall fescue	20			good			18”		
Bronson tall fescue	50			good			24”		
Bariane tall fescue	35			good			12”		
Dovy tall fescue	50			good			18”		
Pradel tall fescue	50			good			12”		
Garrison creeping foxtail	10			fair			12”		
Rush intermediate whtgrs	40			fair			6”		
Bozoisky Russian wildrye	35			poor			4”		
Kemal festolium	90			exc.			24”		
Mara perennial ryegrass	85			good			8”		
Barliza timothy	5			poor			4”		
Outlaw timothy	5			poor			8”		
Blackwell switchgrass	15			fair			18”		
9005439(MT) switchgrass	5			fair			8”		
Garrison sorgum-sudan	90			good			54”		

ID05012 Don Ayers – herbaceous windbreak field planting. Magnar basin wildrye seed ordered March 15, 2005. Site Characteristics: Lantonia-Chinahat silt loam soil, 1-4 percent slopes, 5983 feet elevation, 14-16 inch precipitation, non-irrigated, T8S R41E NW ¼ Section 24. FY05 Two of the four rows had good emergence and two rows had very poor emergence. Ground preparation was much better in rows that the best emergence. Plants that emerged have grown well and look very healthy - fair stand with 4 plants/ft^2, good vigor and 4 inch height. Several more plants emerged in the fall. FY06 planting was accidentally tilled and destroyed – cooperator plans to replant. FY07- FY08 no evaluations.

ID09002 _____ - 9076517 western wheatgrass field planting. Seed shipped September 29, 2008.

IDAHO DIVISION VI
PLANT MATERIALS PLANTINGS

FIELD OFFICE: ARCO

ID03003 Hill-Freeman Snake River Plain fourwing saltbush field planting. Seed ordered October 18, 2002. FY03 one half pound of Snake River Plains fourwing saltbush was included in a five acre marginal pastureland seeding adjacent to Warm Springs Creek on Barton Flat (South Custer County). The entire seeding area of 13.3 acres included a three and a half acre stand of decadent crested wheatgrass. A seed mix of Vavilov Siberian wheatgrass (1.2 lbs/ac), Bannock thickspike wheatgrass (2.0 lbs/ac), Bozoisky Russian wildrye (1.2 lbs/ac), Rincon fourwing saltbush (0.25 lbs/ac), and Bighorn skunkbush sumac (0.25 lbs/ac) was broadcast over the seeding area. The area was then rolled to obtain seed to soil contact on a firm weed free seedbed. FY04- FY06 no evaluations. FY07 Vavilov Siberian wheatgrass good stand with good vigor - 2 plants per feet squared; Bannock thickspike wheatgrass good stand with good vigor - 2 plants per feet squared; Bozoisky Russian wildrye poor stand with fair vigor - trace plants per feet squared; Snake River Plains fourwing saltbush failed; Bighorn skunkbush sumac – failed. FY08 no evaluation.

FIELD OFFICE: DRIGGS

None

FIELD OFFICE: IDAHO FALLS

ID95046 Winterfeld Venus penstemon and Firecracker penstemon District Seed Increase. Seed sent 8/95. FY95 planted fall 1995. FY96 poor stand establishing for Alpine and no emergence for Firecracker, no seed production. FY97 Alpine slow establisher and susceptible to frost, no seed production. FY98 fair stand of both Firecracker and Alpine penstemon (1 plant per foot 2). Stands for both species are getting better each year. FY99 fair stands in unfavorable moisture year and no seed production. FY00 Firecracker penstemon died due to drought and short-lived character. Alpine penstemon has good stand with good vigor and stands 24 inches tall. Seed production was unknown at evaluation date. FY01 firecracker penstemon came back, excellent stands and vigor for both species. Seed production estimated at 600 pound per acre bulk. FY02 - Venus - fair stand with excellent vigor, 24 inch height, and 100 pounds per acre bulk production. Firecracker - fair stand with excellent vigor, but slower establishment, 24 inch height, and 100 pounds per acre bulk production. FY03 Firecracker penstemon stand is going out – no production. Venus penstemon produced 80 pounds of seed. FY04 – excellent stand and vigor for each accession. No seed production reported. FY05 Venus penstemon – good stand and good vigor – no seed production reported. Firecracker penstemon stand was plowed out. FY06 excellent stand and vigor. FY07 Richfield firecracker penstemon - fair stand with fair vigor – no seed production; Clearwater Venus penstemon – excellent stand with excellent vigor – 75 pounds per acre cleaned. FY08 Richfield firecracker penstemon – established plants have good vigor, but no seed production. This is probably an issue with lack of an appropriate pollinator. Clearwater Venus penstemon – seed production 80 pounds cleaned.

ID03007 Winterfeld Fuzzytongue penstemon - Demonstration planting. Seed ordered February 10, 2003. Seed shipped February 18, 2003. FY03 not planted. FY04 planted with poor stand establishing. FY05 replanted October 26, 2005. FY06 fair stand establishing with 2 plants/ft2. FY07 fair stand with fair vigor – still establishing with primarily rosettes this year - no seed production. FY08 fair stand with good survival and good vigor.

ID04015 Winterfeld Maple Grove Lewis flax for seed increase. Seed shipped April 19, 2004. FY04 excellent stand with excellent vigor establishing. Plants are about 5 inches tall. FY05 good stand, good vigor and plants are about 24 inches tall. Lighter in color than Appar and not as good a competitor with severe weed competition in stand. No seed production reported. FY06 good stand with good vigor – seed production was not reported. FY07 fair stand with fair vigor – little to no seed production. FY08 planting destroyed fall of 2007 due to poor seed production **Cancel**

ID05015 Winterfeld Pryor slender wheatgrass for seed increase. Seed shipped May 2, 2005. FY05 no evaluation. FY06 excellent stand with excellent vigor - seed production not reported. FY07 excellent stand with excellent vigor – 320 pounds per acre cleaned seed production. FY08 320 pounds of cleaned seed production per acre and 0.75 tons per acre hay.

ID07003 Winterfeld Appar blue flax for seed increase. Seed shipped September 26, 2006. FY07 excellent stand with excellent vigor – establishment year – no seed production – clipped weed 3 times this season. FY08 330 pounds of cleaned seed production per acre plus 0.75 tons per acre hay

ID07011 Winterfeld Bannock thickspike wheatgrass for seed increase. Seed shipped March 5, 2007. FY07 fair stand with fair vigor establishing – no seed this year. FY08 seeding failed due to drought **Cancel**

ID07012 Winterfeld Regar meadow brome for seed increase. Seed shipped March 1, 2007. FY07 excellent stand with excellent vigor – establishment year – no seed production. FY08 8 pounds per acre seed production due to poor moisture year.

ID07014 Winterfeld Goldar bluebunch wheatgrass for seed increase. Seed shipped March 1, 2007. FY07 did not plant. FY08 planted June 5, 2008.

ID08003 Winterfeld Bannock thickspike wheatgrass seed increase. Seed shipped February 28, 2008. FY08 planted June 5, 2008.

ID08004 Winterfeld Vavilov II Siberian wheatgrass seed increase. Seed shipped February 28, 2008. FY08 planted June 5, 2008.

ID09001 Winterfeld Richfield firecracker penstemon seed increase. Seed shipped September 24, 2008.

FIELD OFFICE: REXBURG

ID89015 Wagoner Luna pubescent wheatgrass, P-27 Siberian wheatgrass, Sodar streambank wheatgrass, Greenar intermediate wheatgrass, Delar small burnet, Trevois alfalfa field planting on rangeland. Site is gravelly loam soil with a pan at 5-6 inches, non-irrigated, 12-inch ppt, 6300 feet elevation, and 3% slopes on NE exposure. FY89 ripped rangeland in spring and seeded mix in fall of 1990. FY91 excellent stand establishing with production about 1400 lbs/ac. FY92 clipping data: No Treatment - 318 lbs/ac., chisel only treatment (native species) - 495 lbs/ac., chisel/disc/seed treatment - 1110 lbs/ac. Clipped 7/9/92. FY93 Clipped plots resulted in production of 1200-2000 lbs/ac. FY94 production of about 800 lbs/ac in extremely droughty year. Non treated rangeland producing about 100 lbs/ac this year. FY95 excellent stand Luna and Greenar, Good stand P-27, Sodar and Travois and Poor stand of Delar. Stand produced 1400+ lbs/acre this year. High antelope use of stand was noted. Stand was grazed 3 weeks in spring and 4 weeks in fall with good management. FY96 excellent stand of Trevois and good stands of Luna, P27, Sodar, and Greenar. Very poor stand of Delar. Considered 90% stand overall. Produced 1000 lbs/ac in very poor moisture year. Stand is doing great under good management. FY03 Disc-Seed treatment – near fence good stand of natives – primarily crested wheatgrass in seeding with 5-6 percent sagebrush and 600 pounds per acre production in very dry year. Ripped-Disc-No Seed treatment – sagebrush very heavy with forage producing about 200 pounds per acre and brush producing about 200 pounds per acre in very dry year. Ripped-Disc-Seed treatment – excellent stand of primarily Bozoisky wildrye, Nordan crested wheatgrass, P27 Siberian wheatgrass and some Trevois alfalfa. Very little intermediate wheatgrass left in stand. Production is about 1000 pounds per acre in very dry year. FY05 There is a good stand of native bluebunch wheatgrass, Sandberg bluegrass and Indian ricegrass near west fence-line producing about 750 pounds per acre. The disced and seeded stand near west fence has a good stand of crested wheatgrass with about 5 percent sagebrush invasion and producing about 1000 pounds per acre. The ripped, disced and seeded area has an excellent stand of primarily Nordan crested wheatgrass and Bozoisky Russian wildrye with 3-4 plants per square foot, excellent vigor and producing about 1300 pounds per acre this year. P27 Siberian wheatgrass, greenar intermediate wheatgrass and Trevois alfalfa are present, but in much lower amounts. **Next evaluation 2009.**

ID90025 Wagoner Rush intermediate wheatgrass field planting on rangeland. Site is gravelly loam soil with a pan at 5-6 inches, non-irrigated, 12-inch ppt, 6300 feet elevation, and 3% slopes on NE exposure. FY89 ripped rangeland. FY90 planted April 1990. FY91 excellent stand establishing with no weeds. Production is 1400 lbs/ac. FY92 stand excellent with 1200 lbs/ac production. FY93 excellent stand producing 2000+ lbs/ac. Grazing value - appears to be a highly preferred/selected species according to cooperator. FY94 excellent stand producing 800 lbs/ac in very droughty year. FY95 excellent stand producing 1800+ lbs/acre. Rush is the most productive species in all range trials. FY96 excellent stand with 5-10 plants/ft2 producing 1000-lbs/ac and good vigor in very low rainfall year. FY03 good to excellent stand with 3 plants per square foot and good to excellent vigor. Producing 700 pounds per acre in very dry

year – produces about 1400 pounds per acre in average to favorable years. Sagebrush invasion is about 1-5 percent of plant community. No weeds in stand. **Next evaluation 2009.**

ID90035 Wagoner Bozoisky Russian wildrye field planting on rangeland. Site is gravelly loam soil, non-irrigated, 12-inch ppt, 6200 feet elevation, and 2% slopes on NE exposure. FY90 planted April. FY91 good stand establishing. FY92 excellent stand producing 1100 lbs/ac. FY93 90% + stand and up to 4' tall, estimated production 1200-1400 lbs/ac. FY94 good stand producing about 600 lbs/ac in very droughty year and only 50% of plants produced seedheads this year. FY95 good stand producing 1200+ lbs/acre. This species is doing very well and is well adapted to site. FY96 good stand with 4-5 plants/ft2 and 1200-lbs/ac production in very low summer rainfall year. FY03 good stand of P27 Siberian wheatgrass and Bozoisky Russian wildrye with 3 plants per square foot and good to excellent vigor. Stand is producing about 800 pounds per acre in a very dry year. Estimate 1400-1600 pounds per acre in an average to favorable moisture year. FY05 the Bozoisky Russian wildrye stand is maintaining very well with approximately 3 plants per square foot, excellent vigor and production about 1200 pounds per acre. Cattle seek out this species year around according to cooperator. **Next evaluation 2009.**

ID92013 Webster Regar meadow brome, Bozoisky Russian wildrye, Luna pubescent wheatgrass, Critana thickspike wheatgrass field planting on rangeland. Site is gravelly silt loam soil, non-irrigated, 14-inch ppt, 6000 feet elevation, and 4% slopes on SE exposure. FY92 site sprayed for weed control, but too dry to seed. FY93 seeding not completed. FY94 very poor moisture conditions, planting not installed. FY95 good stand of all species establishing with good spring moisture. FY96 good stand of all species with 2-4 plants/ft2 and good vigor on all except Regar has fair vigor. Stand had low production and is still establishing. FY97 good stands for all species with 60% stands and good vigor - they have been slow to establish on this tough site. FY99 Bozoisky and Luna good stands, Regar and Critana fair stands. FY03 good to excellent stand of Bozoisky Russian wildrye and Regar meadow brome with 3 plants per square foot (70% Bozoisky – 30% Regar), good vigor and about 1500 pounds per acre production in a very dry year. Good to excellent stand of Bozoisky Russian wildrye and Trevois alfalfa with 3 plants per square foot (70% Bozoisky – 30% Trevois), good vigor and about 1500 pounds per acre production in a very dry year. Fair to good stand of Critana thickspike wheatgrass with 9 plants per square foot, poor vigor and about 400 pounds per acre production in a very dry year. Good to excellent stand of Luna pubescent wheatgrass with 5 plants per square foot, good vigor and about 1500 pounds per acre production in a very dry year. Bozoisky is heavily grazed (80-90 percent utilization) by cattle and elk and stands are maintaining very well. FY05 Plot 1: good stand with 2 plants per square foot - Bozoisky Russian wildrye 100% survival, Regar meadow brome failed, Trevois alfalfa 50% survival; stand producing about 1300 pounds per acre. Cattle and elk are utilizing the stand at about 60 percent utilization on Bozoisky and 30 percent utilization on alfalfa. Plot 2: excellent stand with 3 plants per square foot – Bozoisky 100 percent survival and Trevois 50 percent survival; stand is producing about 1700 pounds per acre; Cattle and elk are utilizing stand with about 85 percent utilization on Bozoisky and 30 percent utilization on alfalfa. Plot 3; fair stand of Critana thickspike wheatgrass with 9 plants per square foot and fair vigor; stand is producing about 700 pounds per acre. Cattle and elk are not utilizing this plot. Plot 4: good stand of Luna pubescent wheatgrass with good vigor and 5 plant per square foot; stand is producing about 1700 pounds per acre; Cattle and elk are not utilizing this stand. **Next evaluation 2009**.

FIELD OFFICE: RIGBY/TERRETON

ID98014 Calvin Moser Rush intermediate wheatgrass pasture trial. Seed ordered 2/9/98. Site is sandy loam soil, 0-2 % slope, west aspect, 4795 feet elevation, 10-12 inch ppt, irrigated, T4N R38E SEl/4 Section 29. FY98 two acres of Rush were seeded at the end of March with oats as a cover crop (15 lbs/acre oats). The oats were harvested in mid-September and the Rush is responding with average of one foot tall and 2 plants/ft2 at the end of October. FY99 Rush - excellent stand with excellent vigor, 9000 pounds per acre production, 4 to 6 feet height, and 3+ plants per square foot. Regar – not planted. FY00 good stand with fair vigor and 5400 pounds production. Production lower due to heat and severe drought conditions. FY01 good stand with 3 plants per square feet and good vigor. Stand produced about 4000 pounds per acre this year with two flood irrigation applications. Stand probably would have produced more if cooperator had fertilized planting. FY02 good stand with good vigor - planting produced about 2 tons per acre. **FY06** excellent stand of Rush with 4-5 plants/ft2 and excellent vigor. Plant height is 40- 60 inches and production is 2.5- 3.0 tons/acre. Stand is now 8 years old and is thick and healthy. **FY07** excellent stand, 6 plants per square feet, good vigor, 40-48 inch height, 3.15 tons/acre. **Next evaluation 2010.**

FIELD OFFICE: SALMON/CHALLIS

ID80100 IDL Bradbury Flat Multiple Adaptation Evaluation. Planted March 25, 1980. Evaluations 8/7/84, 8/6/86, 7/12/89, 7/7/92, 11/14/95, 9/99, 5/21/03 and 7/25/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY10**.

Accession	Stand	Plants/ft2	Vigor	Comments
B1574 crested wheatgrass	70%	1.0	good-exc.	
P27 Siberian wheatgrass	65%	0.5	good	
Sodar streambank wheatgrass	65%	1.5	good	
AB447 crested wheatgrass	60%	0.5	good	
Secar Snake River wheatgrass	60%	0.25	fair-good	high residue problems
Hatch winterfat	50%	0.5	good-exc.	
AB764 winterfat	50%	0.5	good-exc.	
AB922 fourwing saltbush	1%	< 0.1	fair-good	
AB942 fourwing saltbush	1%	< 0.1	fair-good	

Nezpar Indian ricegrass, Luna pubescent wheatgrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Topar pubescent wheatgrass, Appar blue flax, NM1143 Firecracker penstemon, Bandera R.M. penstemon, Cedar Palmer penstemon, NM1123 Venus penstemon, AB555 aster, R885a black-eyed susan, Delar small burnet, Immigrant forage kochia, Ladac alfalfa, buckwheat species, and arrowleaf balsamroot failed.

ID80101 IDL Bradbury Flat Multiple Adaptation Evaluation. Planted November 7, 1981. Evaluations 8/7/84, 8/6/86, 7/12/89, 7/7/92, 11/14/95, 9/99, 5/21/03 and 7/25/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY10**.

Accession	Stand	Plants/ft2	Vigor	Comments
B1574 crested wheatgrass	50%	0.5	good	
P27 Siberian wheatgrass	60%	0.75	excellent	
Sodar streambank wheatgrass	80%	1.25	excellent	
AB447 crested wheatgrass	65%	0.5	good-exc.	
Secar Snake River wheatgrass	50%	0.25	good-exc.	High residue problems
AB764 winterfat	20%	0.15	poor	
AB585 winterfat	1%	<0.1	very poor	
AB922 fourwing saltbush	3%	0.1	very poor	
AB942 fourwing saltbush	2%	<0.1	very poor	
Immigrant forage kochia	3%	0.1	fair-good	
Bozoisky Russian wildrye	70%	0.5	excellent	
Vinall Russian wildrye	70%	0.7	excellent	

Nezpar Indian ricegrass, Luna pubescent wheatgrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Topar pubescent wheatgrass, Appar blue flax, NM1143 firecracker penstemon, Bandera R.M. penstemon, Cedar Palmer penstemon, NM1123 Venus penstemon, Delar small burnet, Lodorm green needlegrass, Blair smooth brome, and Paiute orchardgrass failed

ID82102 BLM Centennial Multiple Adaptation Evaluation. Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 6/26/92, 6/20/95. FY99 not evaluated. Evaluated 5/21/03. Evaluated 7/24/07 by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY10**.

Accession	Stand	Plants/ft2	Vigor	Comments
GP52 alfalfa	10%	0.1	fair-good	
BC79 alfalfa	3%	0.05	fair	
RS1 wheatgrass cross	25%	0.5	good	
RS2 wheatgrass cross	15%	0.25	fair	
Newhy hybrid wheatgrass	75%	1.0	good	
Scarlet globemallow	1%	<0.1	fair-good	
Ephraim crested wheatgrass	85%	1.25	fair-good	
Barton western wheatgrass	5%	0.25	poor-fair	
Topar pubescent wheatgrass	1%	<0.1	very poor	
Whitmar beardless wheatgrass	25%	0.25	fair-good	
Goldar bluebunch wheatgrass	25%	0.5	fair-good	
Secar Snake River wheatgrass	50%	0.75	fair-good	

Vinall Russian wildrye	60%	0.75	good-exc.
Bozoisky Russian wildrye	45%	0.25	excellent
U7881 alfalfa	1%	<0.1	very poor
Nordan crested wheatgrass	70%	0.75	good

Lutana cicer milkvetch, Canbar Canby bluegrass, Immigrant forage kochia, Bandera R.M. penstemon, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, P27 Siberian wheatgrass, Nezpar Indian ricegrass, Magnar basin wildrye, and yellow sweetclover failed

ID82103 BLM Spud Alluvial Multiple Adaptation Evaluation. Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 6/25/92, 11/14/95, 9/99, 5/20/03 and 7/25/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY10**.

Accession	Stand	Plants/ft2	Vigor	Comments
RS1 wheatgrass cross	85%	1.5	fair	
RS2 wheatgrass cross	85%	1.5	fair	
Fairway crested wheatgrass	85%	1.5	fair	
Immigrant forage kochia	50%	2.0	excellent	many young plants
Ephraim crested wheatgrass	75%	1.0	good	
Barton western wheatgrass	<5%	0.1	poor	
Whitmar beardless wheatgrass	70%	1.0	fair	
P27 Siberian wheatgrass	90%	1.5	good	
Goldar bluebunch wheatgrass	30%	0.3	poor	
Secar Snake River wheatgrass	80%	0.75	fair-good	
Vinall Russian wildrye	70%	1.0	good-exc.	
Bozoisky Russian wildrye	85%	0.75	excellent	

BC79 Synthetic alfalfa, GP52 Synthetic alfalfa, scarlet globemallow, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, Topar pubescent wheatgrass, Nezpar Indian ricegrass, Magnar basin wildrye, and yellow sweetclover failed.

ID82104 BLM Jeff's Flat Multiple Adaptation Evaluation. Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 6/26/92, 9/99 5/19/03 and 7/24/07. FY07 evaluated by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY10**.

Accession	Stand	Plants/ft2	Vigor	Comments
GP52 Synthetic alfalfa	1-5%	<0.25	fair	
BC79 Synthetic alfalfa	1-5%	<0.25	fair	
Manchar smooth brome	50%	4	good	
Baylor smooth brome	50%	4	good	
Durar hard fescue	75%	3	good-exc.	
Covar sheep fescue	45%	2	good	
Nordan crested wheatgrass	25%	0.5	fair-good	
P27 Siberian wheatgrass	40%	0.75	good	
Greenar intermediate wheatgrass	65%	4	excellent	
Magnar basin wildrye	5%	0.1	fair	
Vinall Russian wildrye	3%	0.1	poor	
Bozoisky Russian wildrye	5%	0.1	fair	

RS1 wheatgrass cross, RS2 wheatgrass cross, Hycrest crested wheatgrass, Delar small burnet, Lutana cicer milkvetch, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, Sherman big bluegrass, yellow sweetclover failed.

ID82105 BLM Round Valley Multiple Adaptation Evaluation. Planted late October 1982. Evaluations 8/7/84, 8/6/86, 7/12/89, 6/25/92, 11/13/95, 9/99, 5/19/03 and 7/23/07. FY07 evaluated by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY10**.

Accession	Stand	Plants/ft2	Vigor	Comments
RS1 wheatgrass cross	1%	<0.1	fair	
RS2 wheatgrass cross	1%	<0.1	fair	
Immigrant forage kochia	2%	<0.1	fair-good	
Scarlet globemallow	1%	<0.1	fair	
Nordan crested wheatgrass	70%	1.0	good	

P27 Siberian wheatgrass	70%	1.0	good-exc.
Vinall Russian wildrye	30%	0.5	good
Bozoisky Russian wildrye	75%	1.5	excellent
Nordan crested wheatgrass	60%	1.0	fair-good

GP52 synthetic alfalfa, BC79 synthetic alfalfa, Critana thickspike wheatgrass, Bandera R.M. penstemon, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, Goldar bluebunch wheatgrass, Secar Snake River wheatgrass, Barton western wheatgrass, Topar pubescent wheatgrass, Whitmar beardless wildrye, Nezpar Indian ricegrass, Magnar basin wildrye, yellow sweetclover failed.

ID82106 BLM Gooseberry/Sheep Creek Multiple Adaptation Evaluation. Evaluated 7/7/92, 5/19/03 and 7/23/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY10**.

Accession	Stand	Plants/ft2	Vigor	Comments
Nordan crested wheatgrass	5%	0.1	fair-good	
Bozoisky Russian wildrye	10%	0.2	poor-fair	
Vinall Russian wildrye	10%	0.3	fair	
Sherman big bluegrass	95%	1.5	fair-good	
Greenar intermediate wheatgrass	2%	<0.1	very poor	
P27 Siberian wheatgrass	1%	<0.1	very poor	
Ephraim crested wheatgrass	3%	<0.1	poor	
Durar hard fescue	85%	2	good	
Covar sheep fescue	80%	2	fair-good	
Manchar smooth brome	50%	0.5	fair	
Baylor smooth brome	20%	0.25	fair	
Fairway crested wheatgrass	5%	0.1	fair	

Magnar basin wildrye, Appar blue flax, Paiute orchardgrass, Cedar Palmer penstemon, Bandera R.M. penstemon, Lutana cicer milkvetch, Delar small burnet, RS2 wheatgrass cross, RS1 wheatgrass cross, BC79 synthetic alfalfa, and GP52 synthetic alfalfa failed.

ID08001 Shiner Ranch Field Planting. Vavilov II Siberian wheatgrass seed ordered 9/27/07 and shipped 10/4/07 for November dormant planting.
Seed mixture 1 (5 ac): Vavilov II Siberian wheatgrass, Bozoisky Russian wildrye, falcata alfalfa;
Seed mixture 2 (75 ac): Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, falcata alfalfa
Site Characteristics: Leadore gravelly loam soil, 2-6 % slope. South aspect, 5,600 feet elevation, 8-12 inch rainfall, non-irrigated, T17N R24E NE1/4 Section 2. FY07 - a four acre field planting that contained Vavilov II Siberian wheatgrass, Bozoisky Russian wildrye and falcata (yellow blossom) alfalfa was planted in November 2007. The rest of the planting area was planted to Vavilov Siberian wheatgrass, Bozoisky Russian wildrye and falcata (yellow blossom) alfalfa in November 2007. The Vavilov II and Bozoisky Russian wildrye seed was furnished by the PMC and the falcata alfalfa was purchased by the cooperator. We wanted to evaluate the Vavilov II release with Vavilov, the standard currently available on the market and also evaluate the falcata alfalfa as a potential dryland forage type alfalfa that may do well in this area. A ½ pound of alfalfa was planted per acre. There is some information available on the internet describing this alfalfa.

FIELD OFFICE: ST. ANTHONY

ID06009 John Taft – Henrys Lake WRP. Field planting of 100 Engelmann spruce and 100 quaking aspen. Planting completed June 20 and 21, 2006 at 7 separate locations. One gallon potted plants; Engelmann spruce - 3 feet tall and quaking aspen 4- 5 feet tall; were planted using a skid steer with mounted 10 inch auger to dig holes. Each tree was planted by hand, pressed in by foot pressure and watered with bucket following planting. Hydrology – soil moisture varied from saturated locations near ponds at south end of project to field capacity at ponds at north end of project. FY08 no evaluation.

> **FY07 Spruce** – survival is poor with approximately 20% survival overall. Top growth die back is common with approximately half of the surviving plants green near base, but dead above. These are expected to die. Approximately 15 plants throughout entire WRP site show fair to good bud growth. Winter was open and plants were exposed most of winter – this may have resulted in top growth injury. Spring moisture since March has been very poor resulting in drought injury. Spruce is doing best in sites with saturated conditions. On sites that are drier and better drained, spruce is struggling.

FY07 Aspen – survival is good with approximately 50% survival overall. Top growth die back is common with approximately half of the surviving plants leafing along stem and about half sprouting from the base. Winter was open and plants were exposed most of winter – this may have resulted in top growth injury. Spring moisture since March has been very poor resulting in drought injury. Aspen is doing best in sites with very good soil moisture to saturated conditions. On site that are drier and better drained, aspen is struggling.
Site 1 birm near pond - was the only location where wildlife use was evident – probably moose.
Site 2 birm near pond
Site 3 wetland near road junction – aspen are in nearly standing water (water table within 6 inches of surface)
Site 4 upland just across bridge on right side of road
Site 5 upland to east of ponds on south end of property
Site 6 wetlands near ponds on south end of property

BLACKFOOT FIELD OFFICE
PAUL RICKS PLOTS - FIELD PLANTING – ID02006
(Evaluated by – Scott Engle/Cameron Williams/Karie Pappani/Dan Ogle – June 22-23, 2004)

IRRIGATED PLOTS
(Approximately 28 to 32 inches of combined precipitation and irrigation)

Common Name	Cultivar	FY02 12/9/03 Initial Est. 2nd Year	FY04 Stand	FY04 Vigor	FY04 Spread	FY04 Weeds	FY04 6/23/04 Growth Stage	FY04 6/23/04 Lbs/Ac
Alfalfa	Forager	good	fair	good	N/A	low	harvested	---
Ladino clover	Jumbo	fair	good	good	N/A	moderate	harvested	---
Alfalfa	Rampage	good	good	excellent	N/A	low	harvested	---
Alice clover	---	good	good	good	N/A	moderate	harvested	---
Alfalfa	Rowdy	excellent	good	good	N/A	low	harvested	---
Cicer milkvetch	Lutana	poor	fair	fair	N/A	high	harvested	---
Alfalfa	Ranger	fair	good	fair	N/A	low	harvested	---
Kura clover	Endura	poor	poor	good	N/A	high	harvested	---
Birdsfoot trefoil	Bull	fair	excellent	good	N/A	moderate	harvested	---
Perennial ryegrass	Mara	good	excellent	poor	N/A	none	pre bloom	1550
Tall fescue	Fawn	good	good	fair	N/A	low	bloom	1920
Orchardgrass	Latar	good	good	fair	N/A	none	bloom	3180
Tall fescue	Johnstone	good	good	fair	N/A	none	bloom	3480
Orchardgrass	Potomic	good	good	good	N/A	none	bloom	3420
Tall fescue	Teton	good	good	good	N/A	none	bloom	4620
Orchardgrass	Baridana	excellent	excellent	good	N/A	none	bloom	2580
Tall fescue	Dovey	excellent	good	fair	N/A	none	bloom	2100
Orchardgrass	Paiute	good	good	good	N/A	none	bloom	2760
Tall fescue	Barcel	good	good	fair	N/A	none	bloom	2460
Meadow brome	Regar	good	excellent	good	low	none	bloom	2880
Tall fescue	Barcarella	good	good	good	N/A	none	bloom	3660
Meadow brome	Rebound	excellent	excellent	good	none	none	bloom	3480
Tall fescue	TF33	good	good	good	N/A	low	bloom	2940
Meadow brome	Paddock	good	excellent	good	none	none	bloom	3360
Meadow fescue	Bartura	good	good	good	N/A	low	bloom	3060
Timothy	Climax	fair	fair	good	N/A	moderate	bloom	2760
Mountain brome	Hakari	excellent	excellent	good	N/A	none	bloom	3240
Timothy	Barliza	poor	fair	good	N/A	high	bloom	2400
Switchgrass	9005438	good	good	good	N/A	moderate	vegetative	1500
Switchgrass	Blackwell	good	good	good	N/A	moderate	vegetative	2650
Switchgrass	9005439	good	fair	good	N/A	high	vegetative	3500

Sunflower	Multimedia	fair	fair	good	N/A	high	vegetative	900
Russian wildrye	Bozoisky	good	excellent	excellent	N/A	none	bloom	6200

SEMI-IRRIGATED PLOTS
(Approximately 18 inches of combined precipitation and irrigation)

Common Name	Cultivar	FY02 12/9/03 Initial Est. 2nd Year	FY04 Stand	FY04 Vigor	FY04 Spread	FY04 Weeds	FY04 6/23/04 Growth Stage	FY04 6/23/04 Lbs/Ac
Alfalfa	Forager	good	good	good	N/A	low	harvested	---
Sainfoin	Eski	fair	good	good	N/A	moderate	harvested	---
Alfalfa	Rampage	good	fair	good	N/A	low	harvested	---
Sainfoin	Remont	fair	good	good	N/A	moderate	harvested	---
Alfalfa	Rowdy	good	excellent	excellent	N/A	low	harvested	---
Small burnet	Delar	fair	poor	fair	N/A	very high	harvested	---
Alfalfa	Trevois	good	good	good	N/A	moderate	harvested	---
Blue Flax	Appar	poor	fair	good	N/A	very high	harvested	---
Alfalfa	Ladak	good	good	good	N/A	low	harvested	---
Utah sweetvetch	Timp	poor	very poor	fair	N/A	very high	harvested	---
Western Yarrow	9057902	poor	poor	fair	N/A	very high	harvested	---
Ruby V. pointvetch	9063520	poor	failed	---	---	---	---	---
Western wheatgrass	Arriba	fair	good	good	excellent	low	bloom	4020
Western wheatgrass	Rosana	fair	excellent	fair	excellent	none	bloom	2880
Orchardgrass	Paiute	fair	good	good	N/A	low	bloom	4140
Mountain brome	Bromar	excellent	excellent	good	N/A	none	bloom	4900
Pubescent wheatgrass	Luna	good	good	good	fair	none	bloom	4410
Mountain brome	Garnet	good	good	fair	N/A	low	bloom	3080
Thickspike wheatgrass	Bannock	poor	poor	fair	none	high	bloom	1680
Crested wheatgrass	Douglas	very poor	poor	good	N/A	very high	bloom	3600
Thickspike wheatgrass	Critana	poor	fair	good	fair	moderate	bloom	3540
Smooth brome	Manchar	fair	good	excellent	fair	none	bloom	3780
Thickspike wheatgrass	Schwendimar	fair	fair	fair	poor	high	bloom	3420
Green needlegrass	Lodorm	fair	fair	good	N/A	high	bloom	2220
Intermediate wheatgrass	Reliant	excellent	good	good	poor	none	bloom	5160
Hybrid wheatgrass	Newhy	good	excellent	excellent	fair	none	bloom	4740
Intermediate wheatgrass	Rush	good	excellent	good	fair	none	bloom	5040
Big bluegrass	Sherman	poor	poor	good	N/A	moderate	bloom	4900
Intermediate wheatgrass	Greenar	good	good	good	fair	none	bloom	5340
Russian wildrye	Bozoisky	good	good	good	N/A	none	bloom	5250
Intermediate wheatgrass	Tegmar	good	good	fair	fair	none	bloom	3720
Canada bluegrass	Foothills	poor	poor	good	good	very high	bloom	2880

Hybrid wheatgrass	SL	fair	poor	poor	N/A	high	bloom	2280
Tall wheatgrass	Largo	good	excellent	poor	N/A	none	s. dough	3760
RS Hoffman wheatgrass	---	poor	fair	good	very poor	moderate	bloom	1740
Slender wheatgrass	San Luis	fair	good	fair	N/A	low	bloom	1800
Slender wheatgrass	Pryor	fair	good	good	N/A	low	bloom	1560
Tall wheatgrass	Alkar	fair	good	good	N/A	low	bloom	3120
Canada wildrye	Mandan	fair	fair	good	N/A	moderate	pre-bloom	950
Basin wildrye	Magnar	poor	poor	fair	N/A	very heavy	bloom	840
Idaho fescue	Joseph	poor	very poor	poor	N/A	very heavy	bloom	600
Basin wildrye	Trailhead	poor	fair	fair	N/A	very heavy	bloom	900
Russian wildrye	Mankota	fair	good	fair	N/A	low	bloom	4140
Bluebunch wheatgrass	Goldar	poor	very poor	fair	N/A	very high	bloom	---
Russian wildrye	Syn A	fair	good	good	N/A	low	bloom	3060

DRYLAND PLOTS (Irrigated Establishment Year – 10 to 12 inch rainfall zone)

Common Name	Cultivar	FY02 12/9/03 Initial Est. 2nd Year	FY04 Stand	FY04 Vigor	FY04 Spread	FY04 Weeds	FY04 6/23/04 Growth Stage	FY04 6/23/04 Lbs/Ac
Alfalfa	Forager	fair	fair	good	N/A	high	harvested	---
Beardless wheatgrass	Whitmar	very poor	very poor	poor	N/A	very high	harvested	---
Alfalfa	Rampage	good	good	good	N/A	moderate	harvested	---
Forage Kochia	Immigrant	poor	fair	good	N/A	high	harvested	---
Alfalfa	Rowdy	good	good	good	N/A	moderate	harvested	---
Indian ricegrass	Rimrock	poor	fair	fair	N/A	high	harvested	---
Alfalfa	Trevois	fair	excellent	good	N/A	moderate	harvested	---
Indian ricegrass	Nezpar	poor	fair	fair	N/A	high	harvested	---
Alfalfa	Ladak	fair	good	fair	N/A	moderate	harvested	---
Siberian wheatgrass	P-27	fair	fair	good	N/A	moderate	bloom	2580
Snake R. wheatgrass	Secar	poor	poor	fair	N/A	high	s. dough	900
Siberian wheatgrass	Vavilov	fair	excellent	excellent	N/A	very low	bloom	4500
Western wheatgrass	Arriba	fair	good	good	excellent	moderate	bloom	2640
Western wheatgrass	Rosana	fair	good +	good	excellent	low	bloom	3750
Crested wheatgrass	Nordan	poor	fair	good	N/A	high	bloom	3500
Streambank wheatgrass	Sodar	fair	good	good	good	moderate	bloom	2240
Pubescent wheatgrass	Luna	good	excellent	good	fair	very low	s. dough	3120
Crested wheatgrass	Ephraim	poor	fair	good	none	low	bloom	2380
Thickspike wheatgrass	Bannock	fair	good	good	good	moderate	bloom	3080
Crested wheatgrass	Hycrest	good	excellent	good	N/A	none	bloom	3640
Thickspike wheatgrass	Critana	good	good	good	fair	very low	bloom	2170
Crested wheatgrass	CD-II	good	excellent	excellent	N/A	none	bloom	3290

Thickspike wheatgrass	Schwendimar	fair	fair	good	fair	moderate	bloom	1575
Basin wildrye	Magnar	poor	poor	good	N/A	high	bloom	910
Sandberg bluegrass	High Plains	very poor	very poor	fair	N/A	very high	curing	975
Basin wildrye	Trailhead	poor	poor	good	N/A	high	bloom	1330
Bottlebrush Squirreltail	9019219	poor	poor	good	N/A	very high	s. dough	1170
Russian wildrye	Mankota	good	good	good	N/A	low	bloom	2240
Bluebunch wheatgrass	Goldar	poor	very poor	good	N/A	very high	bloom	350
Russian wildrye	Bozoisky	good	good	good	N/A	moderate	bloom	2380
Winterfat	Open Range	very poor	very poor	good	N/A	very high	bloom	---
Fourwing saltbush	S.R. Plains.	fair	fair	good	N/A	very high	vegetative	---
Winterfat	N. C. D.	very poor	fair	good	N/A	very high	bloom	---

PLANT MATERIALS

2008

UTAH EVALUATION SUMMARIES

FIELD, DSI and DEMONSTRATION PLANTINGS

UTAH AREA 1
PLANT MATERIALS PLANTINGS

UT01005 Scott Hansen – Tremonton FO field planting - tarweed control. P27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Ephraim crested wheatgrass, Goldar bluebunch wheatgrass, Nezpar Indian ricegrass, Rimrock Indian ricegrass, Arriba western wheatgrass, Bozoisky Russian wildrye, Mankota Russian wildrye, and Richfield Selection firecracker penstemon. Seed ordered April 16, 2001. FY01 not planted in 2001 or 2002 due to drought. FY03 planted in 4 plots in late March 2003. FY07 no evaluations.
* **Plot 1:** Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, and Goldar bluebunch wheatgrass – broadcast planted. FY03 initial evaluation during severe drought - Vavilov, P27 and Ephraim fair stands FY04 plantings generally look poor. FY05 no evaluation. FY06 Vavilov and Goldar failed. Rush poor stand with 0.3 plants/ft2 and fair vigor. Patch of smooth brome is also establishing in plot. FY08 Rush good stand and improving by rhizome spread; Goldar and Vavilov failed – **Cancel.**
* **Plot 2:** Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, and Goldar bluebunch wheatgrass – broadcast planted. FY03 initial evaluation during severe drought - Vavilov, P27 and Ephraim fair stands FY04 plantings generally look poor. FY05 no evaluation. FY06 Vavilov and Goldar failed. Rush poor stand with 0.3 plants/ft2 and fair vigor. FY08 Rush good stand and improving by rhizome spread; Goldar and Vavilov failed – **Cancel.**
* **Plot 3:** Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, and Goldar bluebunch wheatgrass – broadcast planted. FY03 initial evaluation during severe drought - Vavilov, P27 and Ephraim fair stands FY04 plantings generally look poor. FY05 no evaluation. FY06 Vavilov and Goldar failed. Rush fair stand with 2.0 plants/ft2 and good vigor. FY08 Rush good stand and improving by rhizome spread; Goldar and Vavilov failed – **Cancel.**
* **Plot 4:** Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, Goldar bluebunch wheatgrass, Nezpar Indian ricegrass, Arriba western wheatgrass, P27 Siberian wheatgrass, Ephraim crested wheatgrass, Bozoisky Russian wildrye, Rincon fourwing saltbush, Mankota Russian wildrye, and Rimrock Indian ricegrass – broadcast planted. FY03 initial evaluation during severe drought - Vavilov, P27 and Ephraim fair stands FY04 plantings generally look poor. FY05 no evaluation. FY06 All plots except Ephraim failed. Ephraim fair stand and 2.0 plants/ft2. FY08 Rush and P-27 and Ephraim fair stand. Rush improving by rhizome spread. Goldar, Vavilov, Nezpar, Arriba, Bozoisky, Rincon, Mankota and Rimrock failed – **Cancel.**

UT03005 Jon White – Logan FO field planting. Rush intermediate wheatgrass, Topar pubescent wheatgrass, and Tegmar dwarf intermediate wheatgrass were ordered April 18, 2003. Luna pubescent wheatgrass, Oahe intermediate wheatgrass and Regar meadow brome will be provided by cooperator. Purpose: Critical Area Planting - medusahead rye competition. Site Characteristics: Cache County, MLRA E47, 16 acres, Barfuss-Leatham silt loam soil complex, 35 percent slopes, northwest aspect, 5300 feet elevation, 14-17 inch precipitation, non-irrigated, SE1/4 Section 31 T10N R1E. Spring 2003 planting. Planting of 15 pounds per acre was completed on April 29, 2003 using a drill with 6 inch spacing into very good weed free seedbed. FY04 fair stands establishing for all species (Rush, Topar, Tegmar and Luna) with 40 percent survival, poor to fair vigor, approximately 20 inch heights for all except Rush with 24 inch height. FY06 Rush, Topar, Tegmar, Luna and Oahe all have fair to good stands with 3 plants/ft2 and fair vigor. FY08 Fair to good stand of Rush, Topar, Tegmar, Luna and Oahe intermediate wheatgrass accessions. Site has been inter-seeded with alfalfa and stands is about 50% grass and 50% alfalfa. Grazing management is severe and stand is suffering due to this management and becoming weedy. **Cancel**

UT05001 Brian Shaffer – Tremonton FO saline demonstration planting. Volga mammoth wildrye, Arriba western wheatgrass, Trailhead basin wildrye, Washoe basin wildrye, Bozoisky Russian wildrye, Rosana western wheatgrass, Magnar basin wildrye, P27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Sodar streambank wheatgrass, Syn A Russian wildrye and 9008027 silver buffaloberry (20 plants) were ordered on February 4, 2005. FY05 no evaluation. FY06 there is evidence that a number of species came up and made 2-3 leaves. Nothing appears to be surviving, but seeding will be evaluated in FY07 to be sure. FY08 all grasses and shrubs failed. **Cancel**

UT05002 John and Kyle Potter field plantings – 2 mixes. Mix 1: Anatone bluebunch wheatgrass, Nezpar Indian ricegrass, Maple Grove Lewis flax, Bandera Rocky Mountain penstemon, Magnar basin wildrye, Timp Utah sweetvetch, western yarrow and Maybell antelope bitterbrush; Mix 2: Goldar bluebunch wheatgrass, Rimrock Indian ricegrass, Appar blue flax, Bandera Rocky Mountain penstemon, Trailhead basin wildrye, Timp Utah sweetvetch, and Maybell antelope bitterbrush. Seed ordered February 4, 2005. FY05 not planted. FY06 planted October 19, 2005 – 2 mixes were planted on 0.5 acres each – each plantings was broadcast planted and then half of each planting was

harrowed (thus four plots total). FY06 Mix 1 – no evidence of Anatone, Nezpar, Magnar or Maybell; good stand of western yarrow with 2-3 plants/ft2 and good vigor; fair to poor stand of Maple Grove, Bandera and Timp with less than 1 plant/ft2 and fair to good vigor. Mix 2 – no evidence of Goldar, Rimrock, Trailhead or Maybell; poor to fair stand of Appar, Bandera and Timp with less than 1 plant/ft2 and fair to good vigor. No difference between broadcast and broadcast/harrow for either planting. FY08 Anatone, Nezpar, Magnar, Timp, Goldar, Rimrock, Trailhead and Maybell failed. Appar, Maple Grove, Bandera and Western Yarrow fair to good stands with good vigor. Yarrow and penstemon plants were found in areas that were harrowed. Appar and Maple Grove plants were found on both harrowed and non-harrowed locations.

UT05003 Swaner Nature Preserve riparian planting. Peachleaf willow (accessions 9067375, 9067376, 9067541, 9067546, 9067549 and 9067560), Redosier dogwood (accessions 9023733, 9023739 and 9023740) and Blanchard blue elderberry cuttings were ordered February 4, 2005. Site characteristics: East Canyon Creek, Summit County, MLRA E47, Echocreek-Kovich loam soil, 1-2 percent slope, NW aspect, 6350 feet elevation, 16 inch precipitation, non-irrigated, T1S R4E SE ¼ Section 18. FY05 peachleaf willow 9067375 85% survival, fair vigor, 12-24" height; peachleaf willow 9067376 100% survival, good vigor, 24-36" height; peachleaf willow 9067541 73% survival, fair vigor, 12-18" height; peachleaf willow 9067546 100% survival, good vigor, 24" height; peachleaf willow 9067549 88% survival, fair vigor, 24" height; peachleaf willow 9067560 85% survival, good vigor, 24-36" height. All peachleaf willows are performing well under severe reed canarygrass competition. Redosier dogwood 9023733 10% survival, very poor vigor, 3" of new growth; redosier dogwood 9023739 failed; redosier dogwood 9023740 100% survival, poor vigor, 6" of new growth; Blanchard blue elderberry failed. Elderberry stock was not in containers and plants were very difficult to handle. Recommend not sending elderberry plants without containers in the future.FY06 peachleaf willow 9067375 50% survival, fair vigor, 18-24" height; peachleaf willow 9067376 77% survival, fair vigor, 24-36" height; peachleaf willow 9067541 57% survival, fair vigor, 18-24" height; peachleaf willow 9067546 67% survival, fair vigor, 18-24" height; peachleaf willow 9067549 67% survival, fair vigor, 24-36" height; peachleaf willow 9067560 78% survival, fair vigor, 36-48" height. All peachleaf willows are performing well under severe reed canarygrass competition and high water this spring. Redosier dogwood 9023733 failed; redosier dogwood 9023739 failed; redosier dogwood 9023740 failed; Blanchard blue elderberry failed. FY08 all dogwood accessions and the elderberry failed. All Peachleaf willow accessions had some survival with accession 9067375 36% survival, 9067376 28% survival, 90673741 4% survival, 9067346 72% survival, 9067349 60% survival and 9067560 24% survival. Accessions range from 24 to 36 inches in height. Quackgrass and Reed canarygrass competition is severe so any Peachleaf survival is impressive.

UT07003 Bill Hopkin field planting Randolph Field Office. 9067549 and 9067560 Peachleaf willow accessions 9076375, 9076376,), black cottonwood (accessions 9067538, 9067562, 9067563, 9067568), Siouxland poplar, Carolina poplar and coyote willow cuttings to be shipped April 23, 2007. Cuttings shipped April 4. Site conditions – cobbly semi wet soil, 0-20 percent slopes, 6300 feet elevation and 12- 14 inch rainfall area. Cuttings were planted April 28, 2007. FY08 all accessions failed. **Cancel**

UT07004A Noel Bess Logan Field Office. 9076375 Peachleaf willow accession shipped April 4, 2007. FY08 planting site heavily infested with Reed canarygrass and failed. **Cancel**

UT07004B Roy Ropeleto Logan Field Office. 9076376 Peachleaf willow accessions shipped April 4, 2007. FY08 planting destroyed by beaver and failed. **Cancel**

UT07004C Zan Harris Logan Field Office. 9067549 and 9067560 Peachleaf willow accessions and coyote willow cuttings were shipped April 4, 2007. FY08 30 percent survival of 9067549 and 9067560 and 20% survival of coyote willow. Site is heavily infested with Reed canarygrass.

UT08006 _____ Tremonton Field Office adaptation trial. 10 plants of 9008027 silver buffaloberry were ordered March 10, 2008 for delivery in lat March. Planting not installed **Cancel**

UT08007 _____ Tooele Field Office adaptation trial. 10 plants of 9008027 silver buffaloberry were ordered March 10, 2008 for delivery in lat March. Planting not installed **Cancel**

UT08008 _____ Tremonton Field Office adaptation trial. 10 plants of 9008027 silver buffaloberry were ordered March 10, 2008 for delivery in lat March. Planting not installed **Cancel**

UTAH AREA 2
PLANT MATERIALS PLANTINGS

UT99001 Graymont Western (Lime plant) – Fillmore FO Vavilov Siberian wheatgrass critical area planting. 20 pounds of Vavilov seed was ordered November 19, 1998. The Vavilov will be planted in a mix, which will include Nordan crested wheatgrass, Sodar streambank wheatgrass, Critana thickspike wheatgrass, Nezpar Indian ricegrass, and forbs and shrubs. Site characteristics are a crushed gravelly – silty material lain over rock – cobble material; this material hardens to a near cemented pavement when packed and as moisture occurs; rainfall is about 8-10 inches; site is very windy. Site modifications recommended included 10 ton per acre composted straw, fertilizer based on soil tests, ripping prior to seeding resulting in a rough - rocky soil surface with about 50% of surface being exposed rock to provide micro-sites where seedlings would be protected from constant winds were recommended. FY99 no evaluation. FY00 Three site preparation treatments were installed in the fall/spring of 1998/1999 including 1. Planting directly into shallowly scarified site where soil surface was shattered and smooth; 2. Planting into moderately ripped site where soil surface was rough with approximately 25 percent of surface exposed angular rock; and 3. Planting into severely ripped site where soil surface was very rough with approximately 50 percent of surface exposed large angular rock. Company Manager indicated the past two years were dry winters with below normal rainfall season long. The mid growing season evaluation, on June 6, 2000, indicated Sodar streambank wheatgrass, Bannock or Critana thickspike wheatgrass, Vavilov Siberian wheatgrass, Nezpar Indian ricegrass, penstemon species, scarlet globemallow, winterfat, fourwing saltbush, and Wyoming big sagebrush were all planted and present to some degree on each treatment. Treatment 1 had a 5-10 percent stand present, plants were very small (stunted), and not reproducing (no seedheads present). Treatment 2 had a 30-40 percent stand present, plants were average sized, and a few were reproducing. Treatment 3 had a 70-90 percent stand, plants were tall for site (high vigor), and a high percentage of plants were reproducing. FY01 Graymont has produced a publication "Assessment of Revegetated Test Benches and Reference Transects at Cricket Mountain Plant" that describes the success of this trial. **FY06** May 16th – planting is excellent with approximately 75% Vavilov Siberian wheatgrass, 20% Nordan crested wheatgrass-Sodar streambank wheatgrass-Critana thickspike wheatgrass, 1% Nezpar Indian ricegrass, and 4% Richfield firecracker penstemon-Immigrant forage kochia-sweetclover-fourwing saltbush. The most severely disturbed site has an excellent stand and the moderately disturbed site has a good to excellent stand. The control with no ripping has a poor to failed stand. There are also plantings completed in years following the test plantings. The sites are typically moderately disturbed with good to excellent stands and species mixtures include additional species including Bozoisky Russian wildrye, rabbitbrush, Immigrant forage kochia and penstemon. On one west slope the seeding mixture included fourwing saltbush, shadscale in mixture with grasses and forbs. Due to droughty conditions, this planting only established shadscale approximately 60% of community and fourwing saltbush 10% of community. From these observations, the strongest species appear to be Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, Richfield firecracker penstemon, Immigrant forage kochia, shadscale and fourwing saltbush. **Next evaluation planned for 2010.**

UT03001 Merlin Webb – Cedar City FO. Seed shipped February 2003. Rimrock Indian ricegrass, Critana thickspike wheatgrass, Trailhead basin wildrye, Volga mammoth wildrye , Nezpar Indian ricegrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Vavilov Siberian wheatgrass, P-27 Siberian wheatgrass, Snake River Plains fourwing saltbush broadcast seeded into good seedbed on February 22, 2003 - rained soon after planting. FY03 no evaluation. FY04 stand/survival – Planting # 1 P27 fair/100%, Bannock fair/100%, Nezpar fair/100%, Mesa alfalfa fair/100% and Volga failed. Planting # 2 Vavilov fair/100%, Nezpar fair/100%, Bannock fair/100%, Magnar poor/25%, Volga failed, and Snake River Plains failed. FY05 Planting # 1 P27 fair stand with ½ plant/ft2 – Bannock fair stand with ¼ plant/ft2 – Nezpar poor stand with 1/10 plant/ft2 – alfalfa poor stand with 1/10 plant/ft2 – Volga failed. Mix has about 1 plant/ft2. Planting # 2 Vavilov good stand with 4 plants/ft2 - Nezpar poor stand with 1/10 plant/ft2 – Bannock fair stand with ½ plant/ft2 – Magnar and Volga failed – Snake River Plains fourwing saltbush fair stand with ¼ plant/ft2. Mix has 4.9 plants/ft2. Vavilov had the best survival of all plants in this trial and thus was able to respond to better moisture conditions that occurred this year. FY08 Plot 1 - Volga fair stand, Nezpar poor stand, P27, Bannock and alfalfa failed. Plot2 - SRP fourwing saltbush good stand, Magnar and Volga fair stand, Bannock and Vavilov poor stand and Nezpar very poor stand.

UT03004 Bob Bliss - Fillmore FO field planting - Durar hard fescue and western wheatgrass. Seed ordered March 20, 2003. FY03 - FY04 interseeding not planted. Poplar trees are struggling due to irrigation using dairy effluent. FY05- 08 no evaluation.

UT04001 Blake Walbeck project – Richfield FO demonstration plots. P27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Douglas crested wheatgrass and Ephraim crested wheatgrass. Seed packets ordered November 2003. FY04- FY08 no evaluations. **Cancel**

UT05006 Lars Rasmussen – Fillmore FO seed increase. Maple Grove Lewis flax seed was purchased and shipped March 9, 2005. FY06 planting planned for fall 2006. FY07 planted in late August 2007. Site was irrigated following planting, but no germination was evident in the fall of 2007. Seeded August 2007, site irrigated, seed did not germinate in fall, some seed germinated in the spring of 2008 but not enough for seed production. Planting destroyed. **Cancel**

UT05007 Lars Rasmussen – Fillmore FO Seed increase planting of sagebrush penstemon *Penstemon speciosis.* Planting installed in 2005 using weed barrier material and full irrigation. Weed barrier materials utilized was the cloth type materials which broke down in less than a year resulting in heavy weed competition. An excellent stand is established (5/17/06) and some seed production is expected this year. Weed control is difficult requiring extensive hand rouging. FY07 planting failed - **Cancel**

UT07002 Niels Hansen seed increase planting. Northern Cold Desert winterfat seed shipped February 8, 2007. Seed will be planted the spring of 2007. FY07 In the spring of 2007 6.5 acres of Northern Cold Desert Germplasm Winterfat was planted. The seeding rate was approximately 2 lbs per acre in rows five feet apart using a ten foot double disk grain drill with all but three of the drops taped shut. Row spacing was 5 feet. Soil had been prepared in the fall of 2006 with no tillage in the spring and soils were firm. On 3/20/07 seed was placed in a groove 1/4 to1/2 inch deep, but there was no packing wheel. The actual seeding rate was less due to adding too many rice hulls with the seed and occasional plugging. There were very harsh spring conditions for germination because there was no rain. It rained the second week in June and some winterfat germinated, but there was no rain again for four weeks. About 30 plants survived. They grew a foot tall by fall of 2007 and had heavy seed production. FY08 in fall of 2007 part of the winterfat field was replanted using left-over seed. The DWR cone seeder with 1/4 inch depth bands was used for this planting. In spring of 2008 the field was tilled for several reasons: no new seedlings were observed; the stand was too thin for production; and a significant encroachment of squarrose knapweed was observed. Landowner is holding back a half acre of this land where there were about 30 winterfat plants that grew where he spilled some seed cleaning the drill. These plants were hand-transplanted to a five foot spacing and will be sprinkle irrigated because he believes winterfat responds well to mid summer moisture. In fall of 2008 or spring of 2009 additional winterfat seed will be planted into weed barrier material. The other 6 acres have been spot sprayed with Milestone, sprayed with glyphosate first week of June, tilled twice in June, and sprayed with glyphosate and 2,4-D July 12. Some weed seed will persist next year, but weeds that have sprouted are gone.

UT07005 Niels Hansen seed increase planting Bozoisky II Russian wildrye. In the spring of 2007 cooperator planted 6 acres of Bozoisky II Russian wildrye after fall tillage and spring application of glyphosate. A ten foot grain drill with all but four drops taped closed was used for planting. There were no packer wheels and site was sprinkled. Row spacing was 35 inches. This was sprinkle irrigated every two weeks, with some being irrigated every four weeks. This was not adequate irrigation scheduling for sprouting seed, but was mandated by the irrigation company since it was a short water year. Weeds (prostrate knotweed) were sprayed once with 2,4-D in June and again with Weedmaster in July. The spring planted Russian wildrye established well, though with the cool soil temperatures at 6000 feet it didn't sprout significantly until the last of May. It was planted in March. Four ton/acre of turkey manure was applied to field in August 2007 and then 67 lbs/acre Urea was applied in May of 2008 after a soil test showed low N levels. Site was irrigated with subsurface drip on four of the 6 acres.

UT07006 Niels Hansen seed increase planting Gooseberry Leaf Globemallow. In April 2007 1/2 acre of Gooseberry Leaf Globemallow was planted in 30 rows using the DWR cone seeder at 1/4 inch depth. It was planted after 1 quart per acre application of glyphosate. No emergence occurred until late May. Due to early planting, weed pressure was too high; kochia and Russian thistle dominated the stand. A weed wick was used for weed control in June, mowed between rows and cooperator also did a lot of hand weeding. A significant number of plants survived. In the spring of 2008 landscape fabric was laid and plants were pulled through to control weeds and facilitate seed collection.

UT08001 Lee Madison (ARS) Demonstration Plots – Fillmore FO planting planned for late November 2007.

UT08009 Stuart Johnson – Richfield FO field planting. Rush intermediate wheatgrass and Regar meadow brome seed ordered May 27, 2008. Planting scheduled for July- August. Location is a mountain sage site, loamy soil, 2-3 percent slopes, north aspect, 7000+ feet elevation, 16 inch rainfall, T22S R3W NE ¼ Section 33. FY08 The seed was delivered to Stuart on June 30th. He plans to planted the seed by the end of July. 2009 will be the first growing season for evaluations.

UT09001 Niels Hansen seed increase planting Vavilov II Siberian wheatgrass. Cooperator intends to plant Vavilov II Siberian wheatgrass in a dormant fall planting in 2008 or spring of 2009 after treatment of glyphosate for weed control of knapweed.

UTAH AREA 3
PLANT MATERIALS PLANTINGS

UT86018 Smith – Roosevelt FO Hycrest crested wheatgrass, Ephraim crested wheatgrass, Appar blue flax, Arriba western wheatgrass, T28606 needle and thread, Magnar basin wildrye, and Nordan crested wheatgrass field planting. FY90 Hycrest, Ephraim, Appar, Magnar, Nordan all 80-100 % survival. Arriba and T28606 are less than 40% survival. FY91 and FY92 no evaluations. FY93 Hycrest, Ephraim, Appar, Nordan, and T28606 doing best. Magnar and Arriba poor stands. Sagebrush invading site, heavy use by elk, and Appar has many new seedlings. FY94 Hycrest, Appar, Arriba, and Nordan all have good stands. Ephraim, T28606 and Magnar have fair stands. All species are adapted to site and wildlife use is heavy. FY95 no change except vigor has improved due to excellent moisture year. FY96 Hycrest, Ephraim, Appar, T28606 and Nordan have good vigor. Fair vigor for Arriba and Magnar. FY97 Hycrest, Ephraim, Appar, Arriba and Nordan good stands. T28606 and Magnar fair stands. Many sagebrush seedlings within plots, particularly heavy in Arriba western wheatgrass and T28606 needle and thread. FY98 Hycrest, Ephraim, Appar, Arriba, Magnar, and Nordan all have excellent vigor. T28606 has good vigor. FY99 very heavy wildlife use in winter and spring. Poor regrowth due to dry spring/ summer and fair regrowth following late summer rains. Planting is being invaded by sagebrush. FY00 Heavy spring use by wildlife and a very dry spring and summer. Rains began in early September and plants began to green-up. Evaluation indicated good vigor for Ephraim, Appar, Arriba, T28606, Nordan and fair vigor for Hycrest and Magnar. FY01 fair to poor vigor for all species following two years of drought and heavy wildlife use. Sagebrush invasion is effective plant growth and vigor. FY03 good stands of Hycrest, Ephraim, Arriba and Nordan. Fair stands of T28606 needle and thread and Magnar. Appar failed. Area is experiencing heavy wildlife use. FY04 Stands are experiencing heavy wildlife use – no livestock use for the last two years. Good vigor and stands of Hycrest, Ephraim and Nordan. Fair vigor and stands of Arriba, T28606 and Magnar. Poor stand and vigor of Appar – most plants are along the edge of planting. FY05 Stands are experiencing heavy wildlife use – no livestock use for the last three years. Good to excellent vigor and stands of Hycrest, Ephraim, Nordan, Arriba and T28606. Fair vigor and stand of Magnar. Appar failed. **Next evaluation 2009.**

UT93005 Smith – Roosevelt FO Trailhead basin wildrye, Magnar basin wildrye field planting for erosion control. FY94 planted October 1993 and initial evaluation indicated Magnar with best seedling establishment and Trailhead doing best in run in areas. FY95 both Trailhead and Magnar rated good stands. Magnar is best adapted. FY96 good stands for both, good vigor for both, good drought tolerance for both, all seedheads of both species eaten by wildlife. FY97 excellent stands and plant vigor for both cultivars. Plant height about 50 inches for Magnar and 38 inches for Trailhead. Magnar has excellent seed production and Trailhead has fair seed production. FY98 excellent vigor and long seedheads for both cultivars. Magnar is a more robust and taller plant than Trailhead. FY99 no evaluation. Excellent stands of each with good vigor and approximately 50 inch height. Basal areas are getting larger, but no seed production this year due to spring/summer drought. FY00 due to very dry spring and summer with rains coming in early September resulting in green-up, both Trailhead and Magnar had fair vigor and only 36-40 inches of growth. FY01 both Magnar and Trailhead have poor vigor after very dry spring and summer (7.7 inches of precipitation this year). Each plant only has 2-3 reproductive stems, which probably did not produce seed this year. FY03 – Fair vigor for both Magnar (45 inch height – 0.5 AUM/ac) and Trailhead (38 inch height – 0.3 AUM/ac). Elk are using the fall green-up. FY04 due to lack of summer thunder storms there is only a fair stand with fair vigor for both Magnar and Trailhead. FY05 Magnar fair stand with good vigor, 50 inch height, 0.6 AUMs/ac – Trailhead fair stand with good vigor, 40 inch height and 0.4 AUMs/ac. **Next evaluation 2009.**

UT98005 Prevedel – Roosevelt FO Rush intermediate wheatgrass sprinkler irrigated field planting. Materials ordered 3/30/98. FY98 planted August 16, 1998 into excellent seedbed. FY99 excellent stand with excellent vigor and 20 plants per square foot. In early August plants went from very palatable to coarse. Fall rains softened it up making it more palatable to elk now utilizing field. FY00 stand produced approximately 3000 pound/acre under sprinkler irrigation. Elk graze stand until it gets rank, but will graze regrowth. Cooperator states Rush is an excellent grass for intensive grazing systems. FY01 excellent stand and vigor with 7 AUMs per acre. Cooperator is very satisfied with Rush intermediate wheatgrass performance. FY03 Rush is doing very well in the excessive heat of this summer and is becoming more dominant in the pasture mix of Rush, Regar meadow brome and Paiute orchardgrass. Still producing about 7 AUM/ac. FY04 good stand and vigor – Rush is out performing Regar meadow brome pastures. Both Rush and Regar stands are being invaded by quackgrass. FY05 good to excellent stand with excellent vigor and producing 13 AUMs/ac irrigated. FY06 good to excellent stand with excellent vigor and producing 13 AUMs/ac irrigated. Early warm up and severe summer heat limited production. FY07 Prevedel trial looked good. Brett tried to plant alfalfa with

the Rush but it has not done well. Furthermore with the alfalfa in it does not allow him to spray out weeds (knapweed) in the spring without affecting the alfalfa. He has decided he will end up spraying out the weeds and alfalfa and going back to a grass only pasture. He indicated that to increase the vigor of the pastures he needs/plans to fertilize. **Next evaluation 2010.**

UT00007 George Carter – Monticello FO. Tegmar intermediate wheatgrass - Topar pubescent wheatgrass – Paiute orchardgrass critical area planting. Seed ordered July 5, 2000. Site characteristics: Herm-Lles clay loam to stony loam, 8 percent slopes, west aspect, 8500 feet elevation, 14-16 inch rainfall zone, irrigated for establishment, T26S R23E Section 24. Planting planned for October 2000. FY01 no evaluation. FY02 planting was irrigated for establishment. Good stand of all three species establishing with good vigor. FY03-FY04 excellent stand of all three species with excellent vigor and production. Stand continues to be irrigated. FY05 Tegmar excellent stand with good vigor, and 24-36 inch height. Topar excellent stand with good vigor and 24-36 inch height. Paiute excellent stand with good vigor and 24-36 inch height. Entire stand produced 1500 pounds/acre. Stand has not been grazed. FY08 Excellent stands with good vigor of Tegmar, Topar and Paiute. Stands were grazed this growing season to reduce standing litter to maintain plant health. **Final evaluation 2010.**

UT02001 Pete Pickup – Roosevelt FO. Field planting Rush intermediate wheatgrass (3 acres) - Topar pubescent wheatgrass (5 acres) – Paiute orchardgrass (2 acres). Site information: MLRA D34, Turzo silt loam soil, 8 inch precipitation zone, irrigated, 4800 feet elevation, 2% slope, south exposure, T7S R2E Section 16. Seed ordered April 19, 2002. FY03 fair stand of Rush producing about 1 AUM/ac with fair vigor. Fair stand of Topar producing about .75 AUM/ac with fair vigor. Weeds are a problem in both stands of grass. FY04 good stands and vigor for both species. The plantings were hayed this year – Rush = 1.25 tons/acre and Topar = 1.0 ton/acre. Regrowth was grazed – estimate 0.25 AUMs/acre. FY05 - FY07 no evaluation.

UT05004 Mike Wilcox – Monticello FO field planting. This is a dormant spring or fall planting of Topar pubescent wheatgrass and Rush intermediate wheatgrass. Barnam loam soil, 3 percent slopes, south aspect, 6000 feet elevation, 14 inch precipitation, non-irrigated, T31N R26E Section 8. Seed ordered March 3, 2005. FY05 planted as a dormant fall planting. FY06 not planted – cooperator plans to plant in spring of 2007. FY07 planting was drill seeded in late September 2007.

UT05005 Bruce Adams – Monticello FO field planting. This is a dormant spring or fall planting of Topar pubescent wheatgrass, Appar blue flax, Maple Grove Lewis flax, Timp Utah sweetvetch, Richfield firecracker penstemon and western yarrow for habitat improvement for Gunnison sage grouse. Site characteristics: silty clay loam soil, 3-6 percent slopes, south aspect, 6300 feet elevation, 12-14 inch rainfall zone, non-irrigated, T32S R25E SW ¼ Section 33. Seed ordered March 3, 2005. FY05 not planted. FY06 drill planting completed August 19, 2006 – plants germinated and looked good on evaluation date. FY07 During the evaluation, it was difficult to find established plants from the seeding but we did find a few which was encouraging. It was discussed that the plants that were observed did appear to have grown enough to make it until next year. It was also noted that there had been some effects from prairie dogs and rabbits. The planting area had a lot of weeds which could be expected in new seeding. This site will continue to be monitored and evaluated. Cooperator is concerned about the viability of the seedlings because it was grazed so heavily. In addition cheatgrass came in very strong by late fall.

UT06001 Carol Vansteeter - Monticello FO field planting. Seed of Alma blue grama, Appar blue flax and Richfield Selection firecracker penstemon was ordered on May 23, 2006. FY06 broadcast and rake planting completed on November 15, 2006. Two days following seeding site was snow covered. FY07 did not notice any plant establishment. There was a bad rabbit problem and the planting could be limited by rabbit use. We will continue to evaluate the success in FY08.

UT06002 Cody Holyoak - Price FO (Green River) field planting. Seed of Blackwell switchgrass, Cave in Rock switchgrass, and 905430 switchgrass was ordered June 26, 2006. Seed will be planted in spring 2007 due to irrigation system delay. FY07 Cody was not available but we talked with his wife. She indicated that he was going to plant in the next couple of days. The field looked prepared for seeding. Follow up will be planned with him in 4-6 weeks to document progress. Seed was drilled in summer of 2007. Cave-in-Rock came-up and looked the best the first fall. FY08 stand planted August 12, 2007 with good germination and initial establishment, but low plant counts the spring of 2008. **Cancel**

UT07001 James Wheeler – Monticello FO field planting. Seed of P-7 bluebunch wheatgrass, Anatone bluebunch wheatgrass, Regar meadow brome, Cache meadow brome, Rush intermediate wheatgrass, Topar pubescent wheatgrass, Paiute orchardgrass, Bozoisky Russian wildrye, Vavilov Siberian wheatgrass and Sherman big bluegrass were ordered on August 28, 2006. A dormant fall planting is scheduled for late October to early November. Site characteristics include MLRA 36, silty clay loam soil, 0-2 percent slopes, NE aspect, 14-16 inch precipitation, T32S R26E NE ¼ Section 31. FY06 seed was drill planted into prepared seedbed on November 17, 2006. Soil moisture and fall rain was good prior to and after planting. It turned cold and snowy soon after planting. FY07 this area is suffering from the current drought conditions. Kyle explained that they did have some grass coming up from the planting in the spring but not much since. We walked around and looked and in fact did find some dormant grass plants that had become established. Dan indicated that it looks as if they got established enough for them to come up this next spring. We did see quite a few weeds in the planting but that is to be expected in the early stages of a new planting. Kyle and his Dad are optimistic and look forward to this coming spring to see how the grasses come back.

UT08002 Sam E. Jones (Reservation) Demonstration Plots. Nezpar Indian ricegrass, Vavilov Siberian wheatgrass, Vavilov II Siberian wheatgrass, 9076517 western wheatgrass, Rimrock Indian ricegrass, Rosana western wheatgrass, Paloma Indian ricegrass , Alma blue grama, Hachita blue grama, Grants cane bluestem and Westwater alkali muhly seed was ordered Jan. 14, 2008. Site Characteristics: sandy clay loam soil, 0-3% slope, 5000 feet elevation, 8-10" rainfall zone.

UT08003 Mike Roring field planting. Vavilov Siberian wheatgrass, Vavilov II Siberian wheatgrass, Bozoisky Russian wildrye, 9076517 western wheatgrass and Rosana western wheatgrass seed ordered Jan. 14, 2008. Site Characteristics: silty clay loam soil, 0-3% slope, 6800 feet elevation, 10-12" rainfall zone.

UT08004 Kyle Wheeler irrigated forages field planting. Rush intermediate wheatgrass, Tegmar intermediate wheatgrass, Regar meadow brome, Cache meadow brome and Paiute orchardgrass seed ordered Jan. 14, 2008. Site Characteristics: silty clay loam soil, 0-3% slope, 7000 feet elevation, 10-12" rainfall zone and irrigated.

UT08005 City of Monticello (Sewage Treatment Plant) – Chris Baird Erosion Control Planting. Rush intermediate wheatgrass, Tegmar intermediate wheatgrass, 9076517 western wheatgrass , Hycrest crested wheatgrass, Hycrest II (CD-II) crested wheatgrass, Douglas crested wheatgrass, Roadcrest crested wheatgrass and Ephraim crested wheatgrass seed ordered Jan. 14, 2008. Site Characteristics: loamy clay soil, 0-30% slope, 7000 feet elevation, 12-14" rainfall zone and irrigated.