USDA NRCS
Natural Resources Conservation Service

Aberdeen Plant Materials Center

2006 Annual Technical Report

United States
Department of
Agriculture

Natural Resources
Conservation Service

Aberdeen, Idaho

March 2007

Contents

Contents (continued)

Interagency Riparian Wetland Project

ON-CENTER ACTIVITIES

Foundation Seed Production at Aberdeen Plant Materials Center

A major responsibility of the Aberdeen Plant Materials Center is the production of Foundation quality seed of the plant releases from the Center. 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 District Seed Increase (DSI) programs.

The following table illustrates seed shipments from the Aberdeen Plant Materials Center for Fiscal Year 1998 through 2006:

Release Name	1998	1999	2000	2001	2002	2003	2004	2005	2006	TOTAL POUNDS
					POUNDS PLS					
Anatone Bluebunch wheatgrass	-	-	-	-	-	-	20	250	350	620
Appar Prairie Flax	950	115	320	300	470	65	0	848	955	4023
Bannock Thickspike wheatgrass	425	610	275	250	550	25	0	1110	900	4145
Delar small burnet	550	0	451	150	75	0	1250	945	490	3911
Ephraim crested wheatgrass	100	50	260	455	696	0	200	0	1300	3061
Goldar Bluebunch wheatgrass	200	370	175	100	375	250	200	200	170	2040
Magnar basin wildrye	180	901	517	1035	490	150	245	0	0	3518
Maple Grove Lewis Flax	-	-	-	-	-	-	240	280	70	590
Nezpar Indian ricegrass	350	100	900	150	75	340	0	300	500	2715
P-27 Siberian wheatgrass	200	25	150	200	500	0	0	0	0	1075
Penstemon "Clearwater Selection"	1	0	1	10	1	10	4	8	0	35
Penstemon "Richfield Selection"	6	5	5	1	7	6	3	11	25	69
Paiute orchardgrass	0	250	101	450	200	0	0	0	75	1076
Regar meadowbrome	305	800	670	1061	207	50	50	0	650	3793
Rush intermediate wheatgrass	1820	1000	215	525	0	0	0	800	300	4660
S.R.P. fourwing saltbush	-	-	-	-	25	5	2	16	0	48
Sodar streambank wheatgrass	250	100	860	500	500	200	0	625	775	3810
Tegmar dwarf intermed. wheatgrass	200	0	100	0	0	0	200	0	0	500
Northern Cold Desert Winterfat-	-	-	-	-	8	3	8	20	5	44
TOTAL POUNDS	5537	4326	5000	5187	4179	1104	2422	5413	6565	39733

June 9, 2006

Aberdeen Plant Materials Center

2006 FIELD ANNUAL PLAN OF OPERATION

HOME FARM

Field	Acres	Crop	Operation
1	1.7	Potatoes	U of I will plant potatoes.
2E	1.3	Potatoes	U of I will plant potatoes.
2W	1.0	Mountain Brome (Grand Teton NP - 2006)	Establish and manage for seed production.
3	1.8	Anatone Bluebunch (2005)	Manage for Certified seed production.
4	1.4	Constructed Wetland Ponds (1992)	Manage per constructed Wetland project plan.
5	2.4	Magnar (2000)	Manage for residue production.
6	2.4	Anatone Bluebunch (2004)	Manage for Certified seed production.
7	3.2	Delar (2006)	Establish and manage for Foundation seed production.
8	3.2	Fallow	Fallow as needed for weed control.
9	3.2	Maple Grove (2005)	Manage for Certified seed production.
10	3.2	Maple Grove (2006)	Establish and manage for Certified seed production.
11	1.1	Anatone Bluebunch (2002)	Manage for Certified seed production.
11	0.2	9076402 Mutton grass (2002)	Manage for increase and potential release.
12	1.4	USFS Forbs (2004) Great Basin Forbs (2005)	Evaluate for potential release. Evaluate for potential release.
13N	0.1	Penstemon (2003)	Manage for Certified seed production.
13S	0.25	Sandberg Bluegrass (Grand Teton NP - 2006)	Establish and manage for seed production.
14	1.2	Woody Display Nursery (1995)	Maintain display of woody conservation plants. Manage Durar/Covar cover crop.
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 project plan.

18-19	0.9	Fourwing and winterfat (1999)	Manage for Certified seed production.
20	1.5	Grass Display Nursery (2002)	Manage for display.

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2006 FIELD ANNUAL PLAN OF OPERATION

FISH AND GAME FARM

Field	Acres	Crop	Operation
21W	2.3	Alfalfa (2001)	Manage for hay production and wildlife benefits.
21E	1.4	Pipe yard (2004)	Maintain permanent yard for pipe storage.
21N	1.3	Bozoisky Cover crop	Maintain as needed for permanent cover.
22W	1.5	Wildlife Food Plot	Establish and maintain corn for wildlife use.
22E	2.6	Wildlife Food Plot	Establish and maintain corn for wildlife use.
22E	1.3	Willow IEP (1984)	Maintain as needed.
23W	2.4	Wildlife Food Plot	Establish and maintain corn for wildlife use.
23M	--	Windbreak	Maintain and irrigate as needed.
23E	2.2	Bannock (2005)	Manage for Foundation seed production.
24	1.1	Windbreaks	Maintain and irrigate as needed.
24W	2.2	Paiute (2001)	Manage for Foundation seed production.
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	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
27E	1.0	Slender Wheatgrass (Grand Teton NP - 2006)	Establish and manage for seed production.
28	5.3	Alfalfa (2004)	Establish and manage for hay production and wildlife benefits.
29W	1.3	Willows (1994)	Irrigate and control weeds according to Wetland Project plan.
29E	3.7	Wildlife Food Plot (2005)	Maintain winter wheat for wildlife use.

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2006 FIELD ANNUAL PLAN OF OPERATION (continued)

FISH AND GAME FARM

Field	Acres	Crop	Operation
30W	0.7	Windbreak/Guard Row	Maintain and irrigate as needed.
30W	2.5	Wildlife Food Plot USFS Grasses (2005) Mutton grass (2006)	Establish and maintain wheat for wildlife use. Evaluate for potential release. Establish advanced evaluation planting.
30E	2.3	USFS Grasses (2004)	Evaluate for potential release.
31	1.5	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
	3.75	DOD Western w.g. (2005)	Establish and 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)	Maintain for seed increase.
410E	2.0	DOD Slender w.g. (2005)	Maintain for seed increase.

PEARL FARM

Field	Acres	Crop	Operation
S1	5.0	Alfalfa (2006)	Establish and maintain for hay production and to improve soil quality.
S2	5.0	Alfalfa (2006)	Establish and maintain for hay production and to improve soil quality.
S3	5.0	Alfalfa (2006)	Establish and maintain for hay production and to improve soil quality.
S4	2.0	Fallow (2006)	Fallow as needed for weed control.
S5	5.0	Fallow (2006)	Fallow as needed for weed control.

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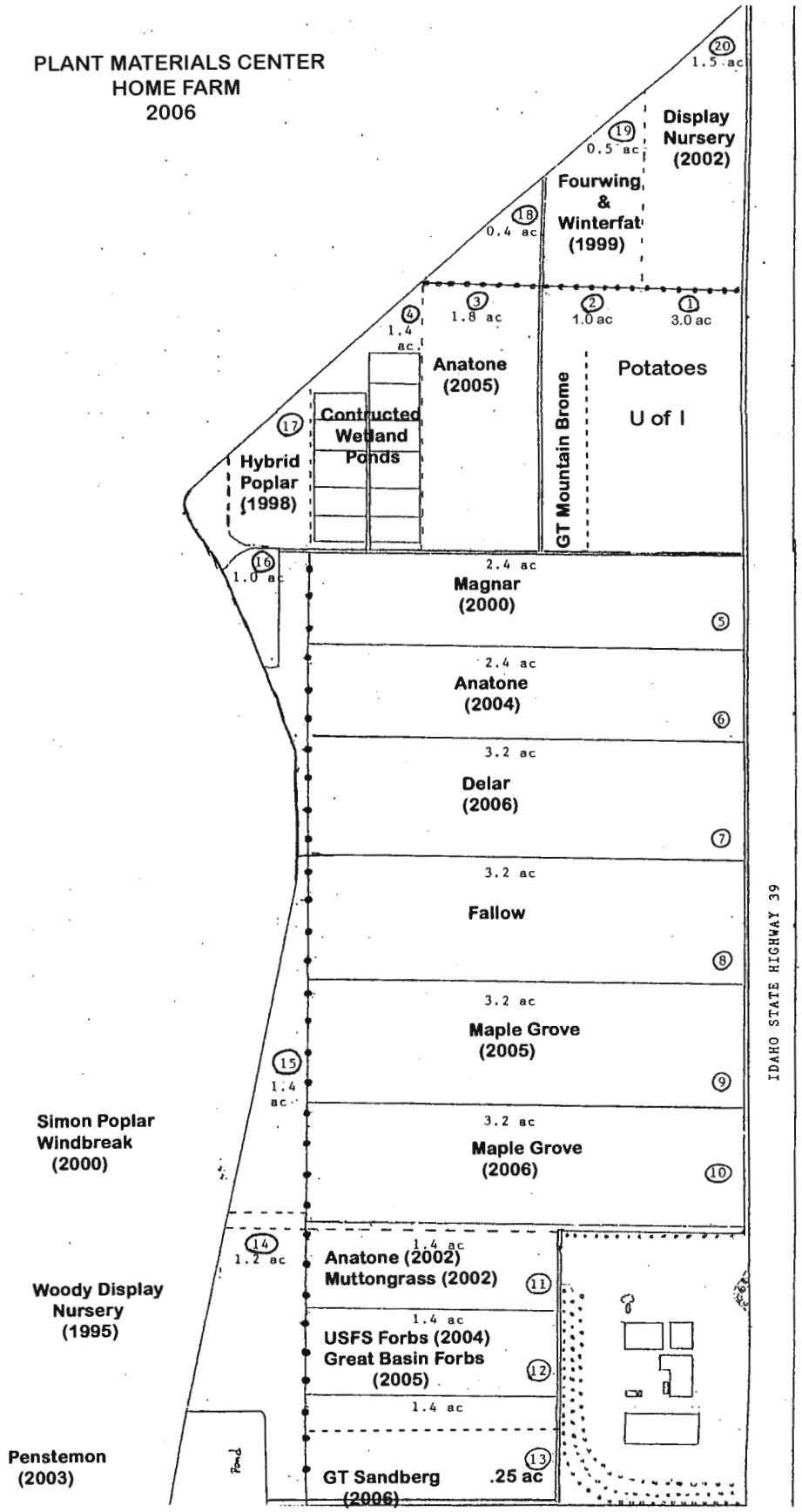
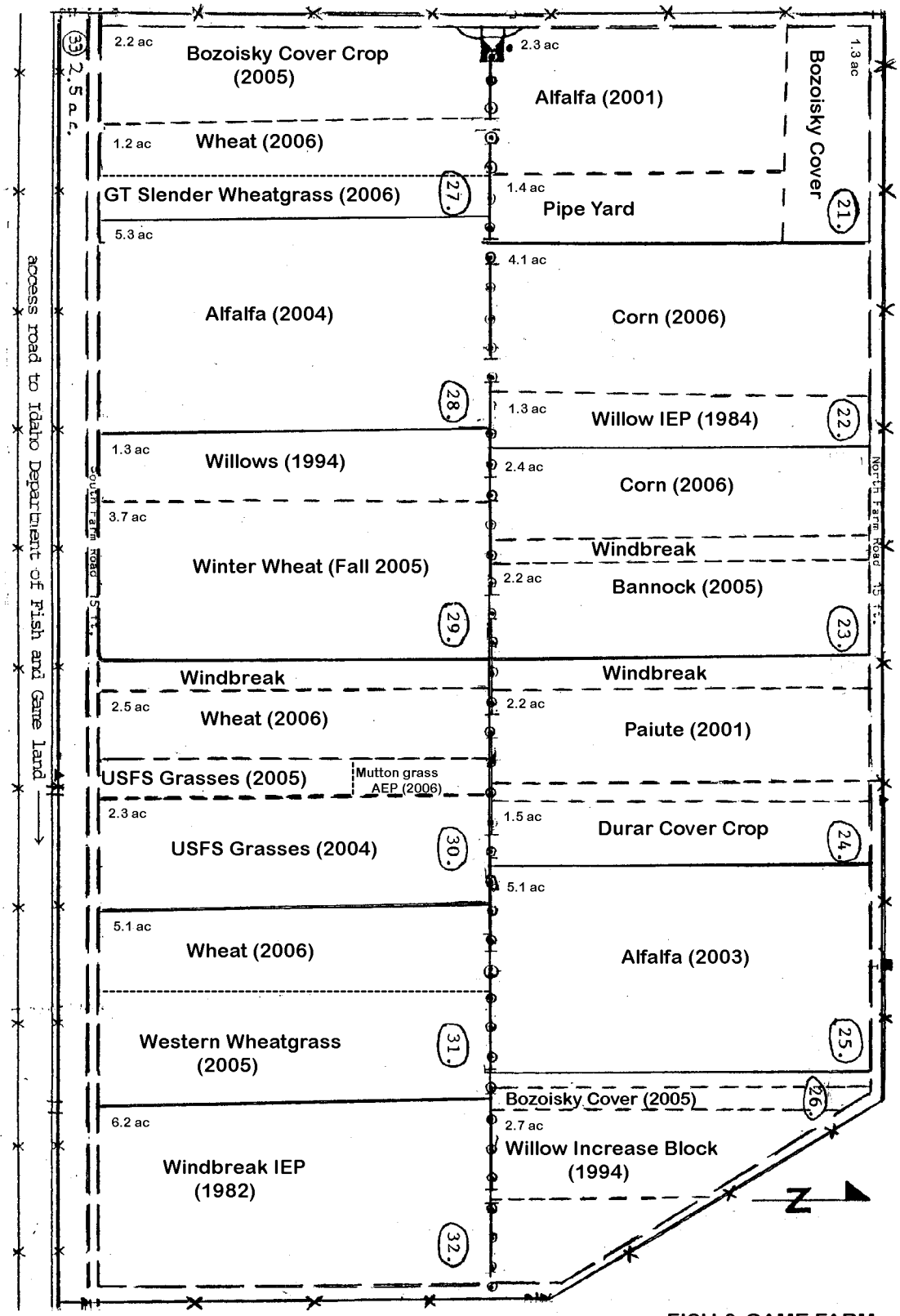
2006 FIELD ANNUAL PLAN OF OPERATION (continued)

PEARL FARM

Field	Acres	Crop	Operation
S6W	2.5	Magnar (2006)	Establish and manage for Foundation seed production.
S6E	2.5	Goldar (2006)	Establish and manage for Foundation seed production.
S7W	2.5	Blue Wildrye (Grand Teton NP - 2006)	Establish and manage for seed production.
S7E	2.5	Bannock (2006)	Establish and manage for Foundation seed production.
S8	2.2	Fallow	Fallow as needed for weed control.

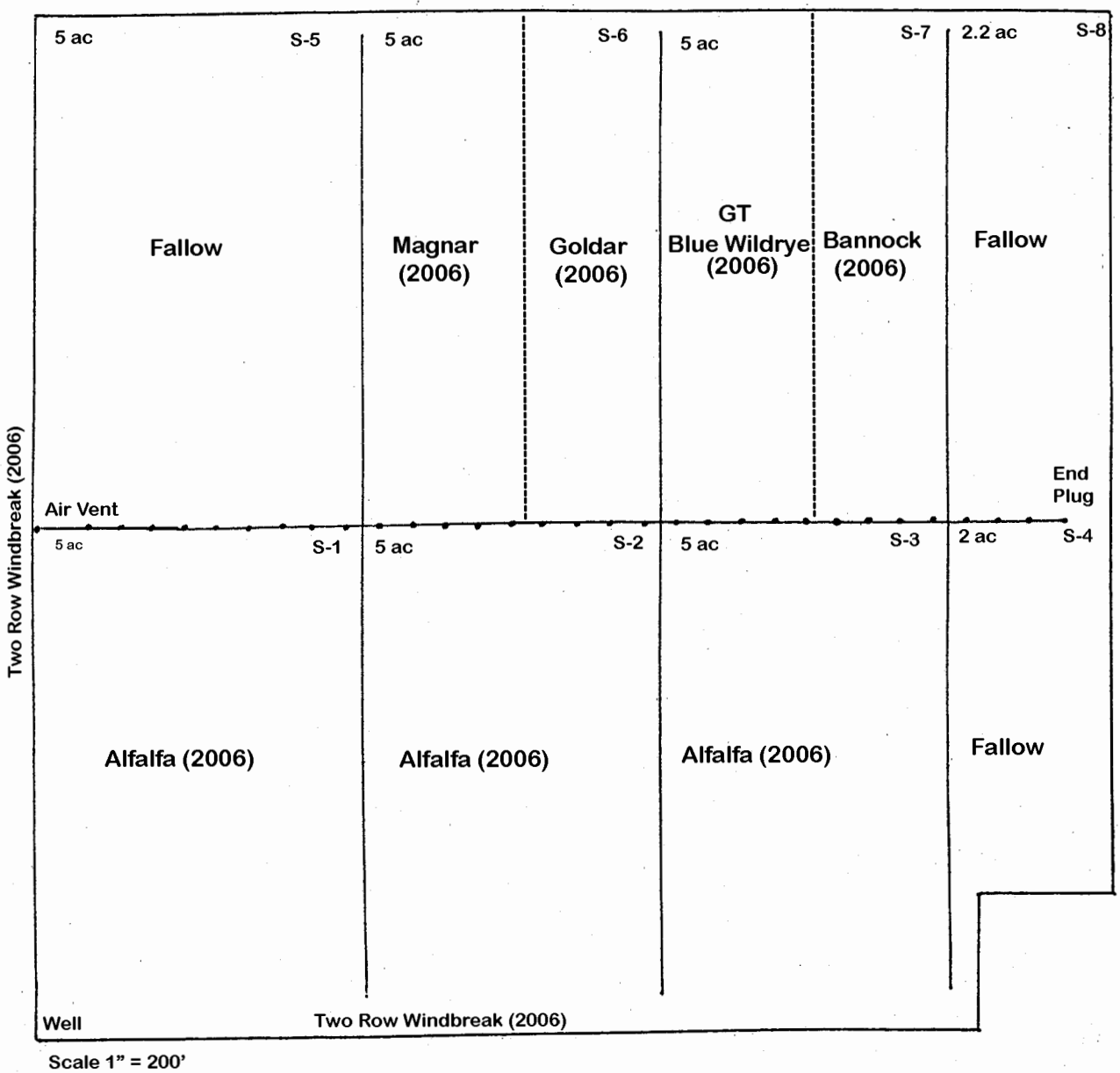
Two row windbreak (Rocky Mountain Juniper and Simon Poplar established on south and west farm borders. Gravel road to be constructed along west border and other roads to be grassed.


PLANT MATERIALS CENTER
HOME FARM
2006
20
1.5 ac
19
0.5 ac
Display Nursery (2002)
Fourwing & Winterfat (1999)
18
0.4 ac
4
1.4 ac
3
1.8 ac
2
1.0 ac
1
3.0 ac
Anatone (2005)
Potatoes
U of I
GT Mountain Brome
Contructed Wetland Ponds
17
Hybrid Poplar (1998)
16
1.0 ac
2.4 ac
Magnar (2000)
5
2.4 ac
Anatone (2004)
6
3.2 ac
Delar (2006)
7
3.2 ac
Fallow
8
3.2 ac
Maple Grove (2005)
9
15
1.4 ac
3.2 ac
Maple Grove (2006)
10
Simon Poplar Windbreak (2000)
14
1.2 ac
1.4 ac
Anatone (2002)
Muttongrass (2002)
11
1.4 ac
USFS Forbs (2004)
Great Basin Forbs (2005)
12
1.4 ac
Woody Display Nursery (1995)
Penstemon (2003)
Pond
13
GT Sandberg (2006)
.25 ac
IDAHO STATE HIGHWAY 39



FISH & GAME FARM
(2006)

PLANT MATERIALS CENTER
PEARL FARM
2006



Scale 1" = 200'

2006 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' 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, 2006 before buds began to break, 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 18, 2006 and the data is summarized in Table 1. An Abney Level was used to measure plant height. Accession no. 9076418 (OP-367) and 9076421 (52-225) continued to have the best survival. 9076418 (OP-367) was the tallest (mean plant height 17.1 m – 56.1 feet) and also had the largest D.B.H. (mean 31.2 cm – 12.3 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 continued to have the best survival and Siouxland had the tallest average height. Robust also had the largest mean D.B.H. (17.3 cm – 6.8 inches) of the plots that were re-planted in 1999. Imperial, (which had only one surviving plant at the evaluation in 2005), died from wind-throw during the 2006 growing season.

The planting will again be pruned early next year during dormancy to reduce side branching and will be evaluated next fall. The plots will be harvested in 2009 to evaluate wood production.

Table 1.
2006 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	14.6	17.1	19.8	31.2	1.4
9076419 (184-411)	1	11.1	--	--	10.4	6.9	5.0
9076420 (50-197)	0	0.0	--	--	--	--	9.0
9076421 (52-225)	6	66.7	8.5	8.7	16.8	13.7	6.8
9076422 (15-29)	3	33.3	6.4	5.2	12.2	7.1	6.2
Canam	2	22.2	6.7	8.9	11.0	11.9	6.0
Robust	3	33.3	12.8	13.9	14.6	22.3	3.0
Siouxland	5	55.5	11.6	14.2	15.5	21.5	3.0
Imperial	5	55.5	11.6	12.6	14.0	21.9	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	--	--	9.4	12.3	4.0
9076420 (50-197)	8	0	--	--	--	--	9.0
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	0	--	--	--	--	9.0
Canam	7	57	2.4	5.0	12.2	6.1	7.7
Robust	6	83	10.7	11.4	14.9	17.3	4.7
Siouxland	4	50	11.6	12.4	13.1	8.5	6.0
Imperial	4	0	--	--	0.0	0.0	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

Great Basin Native Plant Selection and Increase Project
2005 Annual Report

Project Title:

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

Project Location: NRCS Aberdeen, ID Plant Materials Center

Principal Investigators and Contact Information:

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Description of Project: Production of Certified Generation 1 (G1) seed of Maple Grove Germplasm Lewis flax, Anatone Germplasm bluebunch wheatgrass, 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.

Project Status:

Seed Production

Maple Grove Germplasm Lewis Flax – Original seed field established May 2002 was plowed out due to declining production and increasing weed competition. Established a new 3.2 acre field on May 23, 2005. Shipped 280 pounds of Certified seed to commercial growers in 2005.

Anatone Germplasm bluebunch wheatgrass – Established new 1.8 acre field on May 24, 2005. Currently 5.2 acres are in production. Estimated seed yield from 2005 seed

crop is 865 pounds. Shipped 250 pounds of Certified seed to commercial growers in 2005.

Snake River Plains Germplasm fourwing saltbush – Estimated seed yield from 2005 crop is 35 pounds. Shipped 16 pounds of Certified seed to commercial growers in 2005.

Northern Cold Desert Germplasm winterfat – Estimated seed yield from 2005 crop is 9 pounds. Shipped 20 pounds of Certified seed to commercial growers in 2005.

Propagation Studies

The project plan was to propagate 8,000 plants total of *Lomatium dissectum* (LODI), *Lomatium grayii* (LOGR), *Lomatium triternatum* (LOTR), *Eriogonum umbellatum* (ERUM), *Penstemon deustus* (PEDE), *Penstemon acuminatus* (PEAC) and *Penstemon speciousus* (PESP). 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 and direct dormant seeding of *Lomatium* and *Penstemon* accessions were completed at the PMC in November 2005.

On December 13, 2004 LODI, LOGR, LOTR, PEAC, PEDE and PESP seed was placed in cloth bags which were then placed in 1 gallon Ziploc bags filled with wet sand. Ziploc bags were placed in secure outdoor location for natural winter temperature stratification for 10 weeks. On February 24, 2005 seed was planted into 20 $in.^3$ conetainers and placed in PMC greenhouse. By March 2, ERUM and LOGR seedlings were beginning to emerge. By mid-March, there was little or no emergence of the *Penstemon* species and LOGR seedlings were dying from unknown causes. *Penstemon* seed leftover from the original planting in the greenhouse was treated with 500 ppm GA_3, planted into trays and as plants emerged, transplanted into conetainers.

On May 10, 2005 a plant count was taken in the greenhouse:

Species	No. Plants
ERUM	1500
PEDE	750
PESP	70

On June 22, 2005 eight hundred twenty four (824) ERUM plants were transplanted to field 12 at the PMC. Weed barrier fabric was installed and plants were transplanted into weed barrier fabric with 9 x 9 inch spacing. Approximately 675 ERUM plants were not well enough developed for transplanting.

On August 9, 2005 the remaining ERUM, PEDE PEAC and PESP plants in the greenhouse were transplanted to field 12 with weed barrier fabric and 9 x 9 inch spacing.

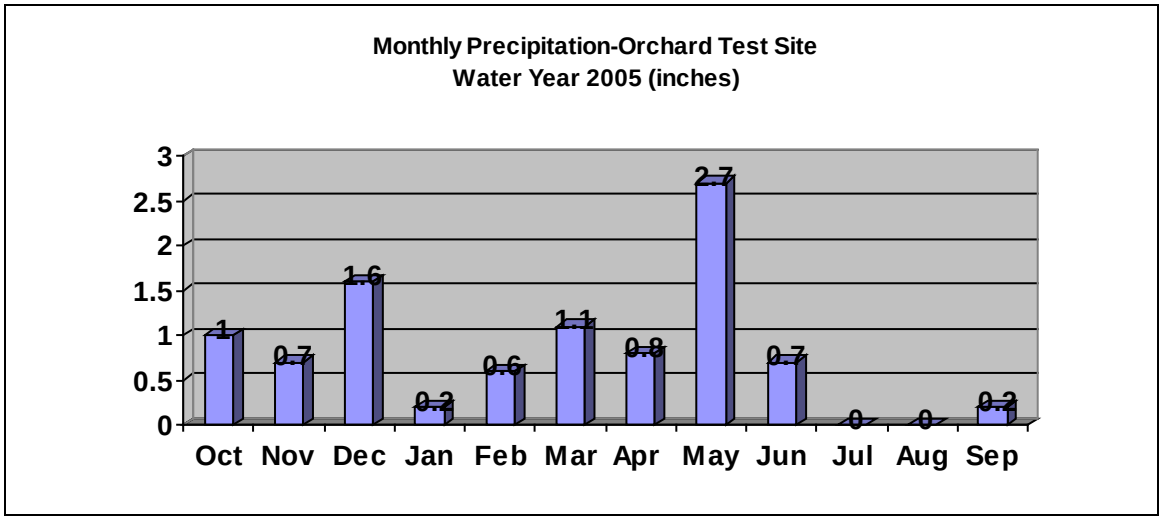
On October 7, 2005 transplants were evaluated:

Species	No. Planted	Percent survival	Canopy width (inches)
ERUM	992	89	1-8
PEDE	464	91	2-8
PEAC	392	96	1-6
PESP	68	87	1-6

In early November 2005, ERUM, Lomatium accessions and Penstemon accessions were direct seeded into weed barrier fabric in field 12 at the PMC.

Orchard Display Nursery
Establishment Year (2005) Evaluations

The Orchard Display Nursery was planted on November 16, 2004 in cooperation with the Great Basin Native Plant Selection and Increase Project. The nursery contains 82 accessions of 27 native and introduced grass, forb and shrub species planted in 7 X 60 foot plots. See Tilley et al (2005) for descriptions of the species and accessions used. 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 (USDA 2005).



The Bureau of Land Management (BLM) burned the site in the fall of 2002. The site was later sprayed by the PMC in May 2003 and May 2004 with a Roundup/2, 4-D 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. Plots were evaluated on April 27 and May 5, 2005. 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.

Materials and Methods

The first evaluation of the plots 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 thus the total number of cells containing at least one plant divided by four. The second evaluation occurred on May 25, 2005. The methods followed were the same as above, but the frame was evaluated five times for a total of 100 cells in $5m^2$. 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. Some actual densities, therefore, may be (and almost certainly are) 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.

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. Especially good stands were seen in the bluebunch and Snake River wheatgrass plots. 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" precipitation during that period and/or from a lack of pressure by black grass bugs (*Labops* sp.).

The best performing Indian ricegrass accession was White River, having a plant density of 0.56 plants/ft^2 at the first evaluation and 0.17 plants/ft^2 at the second evaluation. Rimrock had the best density at the second evaluation with 0.20 plants/ft^2. Fish Creek was the highest rated squirreltail accession with 0.97 plants/ft^2 in April and 0.54 plants/ft^2 in May. Bannock thickspike wheatgrass had a density of 1.04 plants/ft^2 and increased slightly to 1.07 plants/ft^2 at the second evaluation. Of the slender wheatgrass accessions, Revenue performed best with 1.00 plants/ft^2 recorded at the first evaluation and 0.93 plants/ft^2 at the second evaluation. Western wheatgrass accessions were all doing poorly during the first evaluation with the best performing accession being Rodan at 0.28

plants/ft^2. By the second evaluation plant density for Rodan had risen to 0.35 plants/ft^2. In April, bluebunch wheatgrass accession P-12 rated highest at 1.34 plants/ft^2 followed by Columbia (1.30) and Wahluke (0.97). At the second evaluation both P-12 and Wahluke had increased in density (1.59 and 1.26 plants/ft^2 respectively) while Columbia had decreased to 1.23 plants/ft^2. The best Snake River wheatgrass was Expedition with 1.27 plants/ft^2 which increased to 1.44 plants/ft^2 at the second evaluation. Trailhead was the highest rated basin wildrye accession at the first evaluation with 0.60 plants/ft^2; however, by the second evaluation it had decreased to 0.52 plants/ft^2 and was surpassed by U108-02 at 0.57 plants/ft^2. Accessions of sheep fescue did poorly with Initial Point and Covar being respectively rated at 0.04 and 0.00 plants/ft^2 at the second evaluation. The single accession of Thurber's needlegrass had zero germinants recorded at both evaluations. Sandberg bluegrass accessions had zero emergence with the exception of High Plains which had 0.25 plants/ft^2 in April. At the second evaluation no bluegrass accession germinants were recorded.

		4/27/05	**5/25/05**
Species	**Name or accession**	**Plants/ft²**	**Plants/ft²**
Indian ricegrass	Rimrock	0.37	0.20
	White river	0.56	0.17
	Nezpar	0.42	0.17
	Ribstone	0.14	0.09
	Paloma	0.05	0.00
Squirreltail	Fish creek	0.97	0.54
	Shaniko Plateau	0.81	0.52
	Sand hollow	0.37	0.20
	Toe jam creek	0.58	0.17
	9019219	0.02	0.02
Thickspike wheatgrass	Bannock	1.04	1.07
	Critana	0.90	0.56
	Schwendimar	0.69	0.52
	Sodar	0.37	0.30
Slender wheatgrass	Revenue	1.00	0.93
	San Luis	0.60	0.69
	Pryor	0.30	0.30
Western wheatgrass	Rodan	0.28	0.35
	Rosana	0.05	0.20
	Arriba	0.16	0.15
Bluebunch wheatgrass	P-12	1.34	1.59
	Wahluke	0.97	1.26
	Columbia	1.30	1.23
	P-7	0.93	1.15
	Anatone	0.81	1.15
	Jim Creek	0.83	1.02
	P-15	0.60	0.93
	P-5	0.42	0.61

	Goldar	0.51	0.37
Snake River wheatgrass	Expedition	1.27	1.44
	Secar	1.00	1.11
	SERDP	1.02	0.94
	E-26	0.21	0.23
Basin wildrye	U108-02	0.56	0.57
	Trailhead	0.60	0.52
	U100-01	0.53	0.41
	U70-01	0.30	0.22
	Magnar	0.28	0.22
	Washoe	0.21	0.09
Sheep fescue	Initial Point	0.21	0.04
	Covar	0.16	0.00
Thurber's needlegrass	Thurber's	0.00	0.00
Sandberg bluegrass	High Plains	0.25	0.00
	Sherman	0.00	0.00
	Mountain Home	0.00	0.00
	Toole County, MT	0.00	0.00
	Hanford Source	0.00	0.00

Introduced Grasses
Although many of the introduced grass accessions had a fair percentage of germination, we noted an outbreak of black grass bugs at the time of the first evaluation. 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.

The crested wheatgrass accessions Nordan and Roadcrest both had densities of 1.30 plants/ft^2 at the first evaluation; however, at the time of the second evaluation Nordan had maintained a high plant density of 1.19 plants/ft^2 while Roadcrest had reduced dramatically to 0.07 plants/ft^2. Vavilov was the best Siberian wheatgrass with 0.65 and 0.20 plants/ft^2 for the two evaluations. The pubescent wheatgrass accessions all performed similarly with all three having densities from 0.54 to 0.65 plants/ft^2 at the second evaluation. Prairieland Altai wildrye was the best performer in its category with 0.56 plants/ft^2 in April and 0.39 plants/ft^2 in May. The Russian wildrye accession, Bozoisky-Select, had the best rating at 0.72 plants/ft^2 and 0.54 plants/ft^2 for the two evaluations.

		4/27/05	**5/25/05**
Species	**Name or accession**	**Plants/ft²**	**Plants/ft²**
Crested wheatgrass	Nordan	1.30	1.19
	Ephraim	0.65	0.28
	Hycrest	0.39	0.24
	CD-II	0.56	0.24
	Roadcrest	1.30	0.07
	Douglas	0.28	0.04

Siberian wheatgrass	Vavilov	0.65	0.20
	P-27	0.09	0.02
Pubescent wheatgrass	Manska	0.69	0.65
	Greenleaf	0.60	0.59
	Luna	0.79	0.54
Intermediate wheatgrass	Rush	0.60	0.56
Altai wildrye	Prairieland	0.56	0.39
	Eejay	0.16	0.28
	Pearl	0.35	0.15
Russian wildrye	Bozoisky Select	0.72	0.54
	Mankota	0.46	0.28
	Tetracan	0.42	0.20
	Syn-A	0.21	0.13

Forbs

Most of the forbs did poorly in comparison to the grasses. One notable exception was Eagle western yarrow which maintained a density of 0.50 plants/ft^2. Appar blue flax also began well with a density of 0.90 plants/ft^2, but fell to 0.26 plants/ft^2 by the second evaluation.

		4/27/05	**5/25/05**
Species	**Name or accession**	**Plants/ft²**	**Plants/ft²**
Western yarrow	Eagle	0.51	0.50
	Great Northern	0.19	0.09
Utah sweetvetch	Timp	0.14	0.02
Firecracker penstemon	Richfield Selection	0.02	0.02
Scarlet globemallow		0.00	0.00
Lewis flax	Maple Grove	0.42	0.15
Blue flax	Appar	0.90	0.26

Shrubs

Only two accessions of shrubs showed any germinants within the frames. Wyoming big sagebrush held a density of 0.02 plants/ft^2 while Hatch winterfat performed moderately better with ratings of 0.28 and 0.17 plants/ft^2.

		4/27/05	**5/25/05**
Species	**Name or accession**	**Plants/ft²**	**Plants/ft²**
Wyoming big sagebrush		0.02	0.02
Fourwing saltbush	Snake River Plains	0.00	0.00
	Wytana	0.00	0.00
	Rincon	0.00	0.00
Gardner's saltbush	9016134	0.00	0.00
Winterfat	Hatch	0.28	0.17

	Northern Cold Desert	0.00	0.00
	Open Range	0.00	0.00
Forage kochia	Immigrant	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, one on each side of the nursery, and five grids were used at the time of the second 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. The increase in density was presumably due to an increase in the two wheatgrasses.

Discussion

Despite large amounts of Russian thistle, native and introduced grasses had fair to good germination and plant density. Germination and emergence might have been increased with more precipitation during March and April, but germination was good with the rain that was received. Plants that made it through April received well over average May rainfall. Of major concern is the black grass bug outbreak. Plants subjected to black grass bug are normally affected by decreased seed yield and a reduction in palatability to cattle. 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 decrease in plant density recorded for Roadcrest crested wheatgrass may be an indication of this. Future evaluations will provide more information on plant establishment, persistence and longevity. The PMC 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) 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. The PMC modified a Truax Roughrider range drill, mixed the seed and rice hull mixtures and completed the seedings at the sites in Utah and Oregon.

On September 7, 2005 a new Truax Roughrider range drill and transport trailer were delivered to the PMC. PMC Technicians Boyd Simonson and Brent Cornforth made modifications to the drill to improve seed flow and placement. They improved the design and function of the drop tubes, reconfigured the chain and sprocket assembly to improve calibration of seed delivery, made major adjustments to the drill openers and realigned the packer wheels. While seeding both in Utah and Oregon the PMC technicians met with Jim Truax (drill manufacturer) to demonstrate the modifications to the drill under field conditions. Many of the modifications that the PMC Technicians made are being incorporated into new drills by the manufacturer.

The seed and rice hulls for this project were purchased by the cooperators and delivered to the PMC in early October. Preliminary testing of seed and rice hull mixtures were conducted to determine flowability of the mixtures. Based on the preliminary tests, seed and rice hulls were mixed for the actual seedings. The 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. The following table shows the seed and rice hull mixtures:

Utah Broadcast Mix

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.20	0.94
Rubber rabbitbrush	0.25	0.75
Eagle yarrow	0.20	0.24
“OR” sandberg bluegrass	0.75	0.95
Rice Hulls		7.41

Utah Drill Mix

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Fourwing saltbush	1.00	3.48
Appar blue flax	0.75	0.83
Munro globemallow	0.50	0.84
Anatone bluebunch wheatgrass	3.00	3.16
Sanpete bottlebrush squirreltail	2.00	2.82
Nezpar Indian ricegrass	2.00	2.13
Rice Hulls		4.58

Oregon Broadcast Mix

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.20	0.91
Rubber rabbitbrush	0.25	2.06
Eagle yarrow	0.20	0.26
Mtn. Home sandberg bluegrass	0.75	1.18
Rice Hulls		4.90

Oregon Drill Mix

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Fourwing saltbush	1.00	2.28
Appar blue flax	0.75	1.00
Munro globemallow	0.50	0.61
Anatone bluebunch wheatgrass	3.00	3.52
Toe Jam bottlebrush squirreltail	2.00	2.17
Nezpar Indian ricegrass	2.00	2.08
Rice Hulls		4.74

The Utah sites (Skull Valley and Lookout Pass) were seeded the week of October 17 and the Oregon site (Burns) was seeded the week of October 31, 2005. 12.5 acres were seeded at each site. The experiment will be conducted again in the fall of 2006 at these same locations. A new site near Elko, NV is also tentatively planned for seeding next fall.

CARIBOU-TARGHEE AND BRIDGER-TETON NATIONAL FOREST
NATIVE GRASS INITIAL EVALUATION
2006 PROGRESS REPORT

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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) and 2006 (first seed harvest year).

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 is being conducted at the Aberdeen Plant Materials Center, 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. Ground 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 in 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.

In 2006 (first seed harvest year) plots were evaluated when the seeds within a plot were judged to be ready for harvest, between July 20 and 28. All plots were evaluated for above ground biomass, 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 biomass 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.

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). 2006 means 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 varieties; '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 of 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). 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.).

In the 2006 evaluation, biomass 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.

It should be mentioned here that the Canadian release AEC Hillcrest, became visibly different from all other collections as the 2006 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.

Slender wheatgrass. Photo taken July 2006

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	Forage 2006	Seed 2006	Height (in) 2006
9076493	95	90.25	54.4 c[4/]	6.8 d-f	4.0 b-d	71.0 f	3.1 e-g	3326 d	308 e-f	40.3 d-f
9076494	95	90.25	70.2 a-b	13.0 a-c	4.0 b-d	86.0 a-e	3.6 c-e	5165 b-d	493 d-f	44.0 a-d
9076495	90	85.5	77.2 a-b	13.4 a-c	3.0 d-f	86.8 a-d	3.6 c-e	4093 d	401 e-f	43.8 a-d
9076496	90	85.5	25.4 d	2.3 f	6.7 a	56.3 g	2.8 g	2496 d	209 f	37.0 e-f
9076497	95	90.25	64.0 b-c	7.8 c-f	3.3 d-f	77.0 d-f	3.2 d-g	3939 d	435 e-f	39.7 d-f
9076498	95	90.25	75.4 a-b	15.3 a-b	3.7 c-e	84.8a-e	3.1 e-g	5133 b-d	550 d-f	41.7 c-e
9076499	85	80.75	71.1 a-b	14.5 a-b	3.0 d-f	86 a-e	3.1 e-g	3786 d	376 e-f	35.5 e-f
9076500	95	90.25	51.8 c	4.8 e-f	4.8 b-c	72.8 f	2.9 f-g	4766 c-d	702 c-e	42.1 b-e
9076501	95	90.25	73.7 a-b	10.8 b-e	2.8 d-f	79.8 b-f	3.0 f-g	4092 d	340 e-f	39.0 d-f
9076502	90	85.5	51.8 c	8.2 c-f	3.7 c-e	78.8 c-f	3.7 c-d	2713 d	200 f	37.8 d-f
9076503	85	80.75	52.7 c	8.0 c-f	5.0 b	74.5 e-f	2.8 f-g	4092 d	349 e-f	39.0 d-f
AEC Hillcrest	95	91.2	71.9 a-b	13.3 a-c	2.7 e-f	91.0 a-c	4.3 b	1823 d	303 e-f	34.1 f
Pryor	99.9	91.9	71.9 a-b	12.3 a-d	2.2 f-g	90.3 a-c	3.8 c	8384 a-b	544 d-f	49.5 a
Revenue	*	80.1	79.8 a-b	17.9 a	1.2 g	96.3 a	4.6 a-b	8997 a	1050 b-c	49.2 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	9304 a	1501 a	50.5 a
D.O.D.	98	90.2	79.8 a-b	16.6 a-b	1.3 g	90.2 a-c	3.8 c	7464 a-c	846 b-d	47.8 a-c
Adanac	98	84.3	85.1 a	18.1 a	1.5 g	95.5 a	4.8 a	9457 a	1226 a-b	47.3 a-c

[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

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, 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 biomass or seed yields. Biomass yield means 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. Greatest heights were achieved by Garnet and Bromar, both with means of 45.3 in. The top CTNF and BTNF accessions were 9076506, 9076507, and 9076508, all with heights of 42.3 in.

Mountain brome. Photo taken July 2006

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.

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	Forage (lb/ac) 2006	Seed (lb/ac) 2006	Height (in) 2006	Smut 2006
9076504	85	80.75	72.8 a-c	10.9 b	3.8 a	93.0[1/]	4.9 c-e	5300[1/]	1600[1/]	42.0 a-b	2.2 c-e [2/]
9076505	85	80.75	66.7 a-c	11.3 b	3.3 a-b	83.3	5.0 b-e	4900	1300	39.2 b	5.3 a
9076506	90	85.5	66.7 a-c	8.7 b	2.7 a-b	85.7	4.4 d-e	5500	1700	42.3 a-b	3.5 a-d
9076507	90	85.5	70.2 a-c	9.8 b	3.8 a	92.0	5.4 b-c	5200	1500	42.3 a-b	2.7 b-e
9076508	85	80.75	74.6 a-c	12.8 b	2.8 a-b	93.2	5.0 b-e	5600	1300	42.3 a-b	3.7 a-d
9076509	95	90.25	73.7 a-c	12.6 b	3.2 a-b	91.0	4.2 e	5900	1000	36.7 b	5.7 a
9076510	95	90.25	74.6 a-c	12.8 b	2.8 a-b	93.7	5.3 b-d	5200	800	40.5 a-b	4.3 a-c
9076511	90	85.5	59.7 b-c	10.8 b	3.2 a-b	82.5	4.8 c-e	5300	1300	40.5 a-b	4.8 a-b
9076512	90	85.5	59.7 b-c	11.9 b	2.3 a-c	88.3	5.1 b-e	4100	500	41.0 a-b	4.2 a-d
9076513	90	85.5	54.4 c	10.1 b	2.2 b-c	78.0	5.2 b-d	6600	700	41.8 a-b	1.8 d-e
Garnet	55	53.35	81.6 a	22.3 a	2.0 b-c	96.7	5.9 b	5600	1400	45.3 a	2.2 c-e
Bromar	97	96.0	78.1 a-b	14.1 b	1.0 c	94.7	6.8 a	4700	700	45.3 a	1.0 e

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

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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

Geographic illustration of CTNF and BTNF collection locations

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.

USDA FOREST SERVICE, REGION 1
NATIVE GRASS AND FORB INITIAL EVALUATION
PROGRESS REPORT
JANUARY 2007

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LOREN ST. JOHN, TEAM LEADER ABERDEEN PLANT MATERIALS CENTER

INTRODUCTION

The purpose of this study is to evaluate native perennial grass and forb accessions for potential use in revegetation, stabilization and beautification projects in the Rocky Mountain and sagebrush steppe ecosystems of Montana and northern Idaho. Large areas of national forest are in unsatisfactory ecological condition. Many areas are infested with invasive weeds such as cheatgrass, knapweed species, yellow starthistle and leafy spurge. These weeds cause many problems and detract from the health and beauty of the ecosystem. When dry, the weeds provide flash fuels for fires which create the potential for soil erosion and degradation of water quality and watershed values. Weeds also decrease plant community diversity, reduce habitat for wildlife and compete with threatened and endangered species. The goal of this study is to identify accessions of native grasses and forbs under evaluation that have potential to be released as germplasm for commercial seed production and use in revegetation projects in the Rocky Mountain and sagebrush steppe ecosystems of Montana and northern Idaho.

In 2003, The USDA-Forest Service, Region 1, (FS R1) collected seed of five native perennial grass species from 41 locations and three native forb species from eleven locations. The collections were sent to the USDA-Natural Resources Conservation Service-Plant Materials Center (PMC) at Aberdeen, Idaho for evaluation. From the total collections received at the PMC, 37 grass and ten forb collections were chosen for testing based on seed quality and/or quantity. Total usable collections included: twelve bluebunch wheatgrass (*Pseudoroegneria spicata*), seven blue wildrye (*Elymus glaucus*), thirteen Idaho fescue (*Festuca idahoensis*), one Sandberg bluegrass (*Poa secunda*), three tufted hairgrass (*Deschampsia caespitosa*), eight western yarrow (*Achillea millefolium*), one lupine (*Lupinus* sp.) and one pearly everlasting (*Anaphalis margaritacea*). Appendix 1 lists the accessions collected, collection locations and the size of each seed collection. This report summarizes the evaluations conducted for the seasons 2004, 2005 and 2006.

MATERIALS AND METHODS

Harvested seed collections were cleaned at the PMC seed cleaning facilities using a wide range of machines and settings. Each accession was treated separately due to differences in the quality of pre-cleaned materials and variation in seed size. Appendix 2 provides general information regarding machine calibration and settings used for each species. Minor adjustments were made to the seed cleaning equipment to achieve the best seed purity for each collection. Estimated viability was obtained using the kerosene heater "popping" method outlined in Ogle and Cornforth (2000). Some collections were also evaluated for viability using standard germination tests.

A seedling emergence trial was conducted in the PMC greenhouse from February to March, 2004 to determine if any accessions emerged more quickly or had better seedling vigor. No significant differences were detected (data not shown).

GRASSES

The native grass field evaluation trial is being conducted at the PMC, Fish and Game farm located approximately 5 miles northeast of Aberdeen, Idaho. Experimental design was designed as a randomized complete block with four replications. Individual plots were 20 feet long and contained one row; rows were planted on three foot centers. The experimental design also included 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 9.39 inches. The planting site was plowed in the fall of 2003 and then disked and roller packed in the spring of 2004 prior to planting.

Plots were seeded on May 10 and 11, 2004. Bluebunch wheatgrass and Idaho fescue accessions were planted using a Planet Jr. seeder. Blue wildrye, Sandberg bluegrass and tufted hairgrass accessions were planted using a belt seeder. Planting equipment was calibrated to plant approximately 25 Pure Live Seeds (PLS) per foot of row for large seeded species (bluebunch wheatgrass and blue wildrye) and 50 PLS per foot of row for small seeded species (Idaho fescue, Sandberg bluegrass and tufted hairgrass). Seeding depth ranged from ¼ inch for small seeded accessions to ½ inch for the larger seeded accessions. Each species block contained at least two released cultivars to use as standards for comparison. Border rows of 'Tegmar' intermediate wheatgrass (*Thinopyrum intermedium*) were planted on the outside of the blocks to reduce 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 in total annual precipitation. Weeds were controlled with herbicides and between row cultivation.

The first evaluation was conducted on June 14, 2004 when all grasses had reached the 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 number of plants per foot of row. Seedling vigor was measured on a subjective scale of one to nine (one being most healthy and nine being dead). Each plot was assessed and given a rating based on overall apparent vigor.

The second evaluation of 2004 was completed during the week of September 27. All accessions were rated for percent stand and plant volume. Plant volume was measured as plant height x width1 x width2 and recorded in cubic inches. Blue wildrye and bluebunch wheatgrass were also rated for percent of plants in flower per plot to provide some indication of potential seed production for the following year. Idaho fescue, Sandberg bluegrass and tufted hairgrass had not begun flowering by the time of the evaluation.

Seed yield data was not collected during the first year of establishment, because seed harvest during the first year of establishment is not generally recommended. All species except blue wildrye were evaluated for plant density as described above for the first evaluation. Plant density for the blue wildrye accessions was not collected during the second evaluation due to very tight and uniform stands that rendered data collection of plant density impossible.

The evaluations conducted during 2005 occurred between June 30 and July 27. Plots were evaluated when the seeds within a plot were judged to be ready for harvest. All plots were evaluated for forage yield, average plant height and seed yield. Sandberg bluegrass and Idaho fescue samples were collected from six feet of row, while blue wildrye, bluebunch wheatgrass and tufted hairgrass samples were collected from three feet of row. Each plot was divided in half lengthwise, and the northern adjacent three (or six) feet were harvested for seed production, while the southern three (or six) feet were sampled for forage yield. Seed samples from each species were cleaned as outlined in appendix 2 which resulted in a visually estimated 90% purity. Forage samples were collected in paper sacks and allowed to air dry for two weeks prior to weighing.

The 2006 evaluations took place from June 19 to July 31. All evaluations were performed as described above.

All data from 2004 and 2005, except plant vigor 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). 2006 analysis was completed using an ANOVA followed by a Tukey's multiple comparison test using Statistix 8 Analytical Software.

FORBS

The native forb evaluation trial was planted on May 19, 2004 at the PMC Home Farm approximately two miles north of Aberdeen. Site information, seedbed preparation and experimental design are identical to the grass trial. There are two industry standards included in the western yarrow plots, Eagle and Great Northern. There are no releases of lupine or pearly everlasting that would be comparable to the collections received for testing, so no standards of comparison were included for these two species. Yarrow plots were seeded with a target rate of 50 PLS per foot using a belt seeder. Lupine plots were seeded at 25 PLS per foot, and pearly everlasting plots were seeded at 50 PLS per foot using a Planet Jr. seeder. A border row of 'Appar' blue flax (*Linum perenne*) was planted on either side of the trial to reduce edge effect. The first evaluation was conducted on July 19, 2004. Plants ranged from the two to six leaf stage.

Forb plots were evaluated in the same manner as the grass plots. The first evaluation in 2004 included data collection for percent stand, plant density and seedling vigor. The second evaluation was conducted during the week of September 27, 2004 and data were collected on percent stand, plant density, plant volume and percent flower. Plots were evaluated in 2005 for seed yield in the same manner as described for grasses using three

feet of row for the sample collection. No data was collected for forage yield, because attempts to clip samples resulted in completely uprooting plants.

DISCUSSION

BLUE WILDRYE

2004 Evaluations

The blue wildrye trial contained three industry releases, Mariposa, Arlington and Elkton. Although all three releases were originally collected in western states, California, Washington and Oregon respectively, there are no releases from the Intermountain or Rocky Mountain regions (Dyer and O'Beck 2005). The first evaluation of blue wildrye showed no significant differences in percent stand between the accessions tested. Plant density showed low levels of significance. Accession 9076447 rated highest (39.0 plants/foot), and Elkton, a western Oregon accession, rated lowest at 16.4 plants/foot. Best vigor was recorded from accessions 9076446, 9076447 and Mariposa (1.8). Poorest vigor rated was 3.8 from Arlington, an accession from western Washington (see Table 1).

During the second evaluation of 2004 there was again no significant difference in percent stand for the blue wildrye accessions. All accessions had stands ranging from 90 to 100% except accession 9076448 which had an average stand of 76.4%. Mariposa, Elkton and accession 9076472 showed high percentages of flowering (93.4, 92.5 and 80.0% respectively). The other industry release, Arlington, had 55% flowering. The remainder of the accessions had little to no flower production ranging from 0.0 to 18.8%. Accessions showed a wide range of plant volumes from 117.3 in^3 (accession 9076439) to 768.0 in^3 (Mariposa) with Mariposa significantly larger than the rest of the plants in the trial.

2005 Evaluations

Plots were evaluated in 2005 for forage production, height and seed production. Analysis showed no significant difference between accessions for forage production. Extrapolated forage yields ranged from 4,441 lb/ac (accession 9076472) to as much as 5,663 lb/ac (accession 9076448). Plants ranged in height from 52 inches (accession 9076445) to 46 inches (Elkton). Mariposa seed yields were significantly greater than all other tested accessions (505 lb/ac). The next best seed producers were accession 9076439 and 9076448 with 348 and 323 lb/acre respectively. Overall, accession 9076448 was among the top three in all categories evaluated in 2005. Accession 9076445 had good forage yield but low seed production. Accession 9076439 is a shorter statured plant but scored in the top three in forage and seed production.

2006 Evaluations

Blue wildrye plots were harvested on July 13. In 2006 all of the characters evaluated for blue wildrye provided lower means than those of 2005 from the prospective accessions. In 2006 there were no significant differences detected between forage yields. Means ranged from 4400 lb/ac (Mariposa) down to 2400 lb/ac (Elkton). The top performing FS R1 accession was 9076445 which produced the second largest yield of 4055 lb/ac, followed closely by 9076439 and 9076446 which both yielded 3940 lb/ac. Plant height measurements were all between 41 and 45 in with the exception of Elkton which had a

mean height of 36 in. The greatest seed yield came from Mariposa (479 lb/ac) which differed significantly from all other accessions. The top performer for the FS R1 accessions was 9076439 which yielded 117 lb/ac seed.

Because there are currently no blue wildrye releases from the Rocky Mountain or Intermountain West regions, it may be desirable to consider one of the top performing blue wildrye collections for a selected class germplasm. All accessions showed excellent establishment characteristics and growth. Although seed yields have been lower from the FS R1 collections, forage yields have been comparable between the best of the collected accessions and Mariposa, clearly the top performer of the released materials. Accession 9076439 stands out as having consistently high forage and seed yields for both years evaluated. 9076439 originates from the Idaho panhandle and should be well adapted for use in northern Idaho and western Montana.

Blue wildrye

Table 1. Blue wildrye

Accession No.	% Est. viability	% PLS[3/]	% Stand 6/14/04	Density[1/] 6/14/04	Vigor[2/] 6/14/04	% Stand 9/29/04	% Flower 9/29/04	Plant vol. (in^3) 9/29/04	Forage (lb/ac) 2005	Plant height (in) 2005	Seed (lb/ac) 2005	Forage (lb/ac) 2006	Plant height (in) 2006	Seed (lb/ac) 2006
9076439	79	71.1	92.8[4/]	38.1 a-b[5/]	2.3[4/]	98.6[4/]	1.5 c	117.3 c	5445[4/]	49.25 a-c	348 b	3940[4/]	41.75 a	117.25 b
9076445	77	69.3	91.5	30.1 a-c	2.8	100.0	0.0 c	132.5 b-c	5566	52.00 a	254 b	4055	44.25 a	69.25 b
9076446	80	72.0	91.5	22.8 b-c	1.8	98.6	18.8 c	288.5 b-c	4683	48.75 a-c	282 b	3940	43.75 a	56.75 b
9076447	72	64.8	93.0	39.0 a	1.8	100.0	3.5 c	132.5 b-c	4889	49.50 a-b	256 b	3825	43.75 a	93.50 b
9076448	66	59.4	72.3	22.6 b-c	3.3	76.38	1.8 c	225.0 b-c	5663	51.25 a-b	323 b	3250	45.00 a	54.00 b
9076449	69	62.1	95.8	36.6 a-b	2.0	100.0	3.0 c	193.3 b-c	5167	50.75 a-b	236 b	3710	44.00 a	51.25 b
9076472	82	73.8	87.5	26.0 a-c	3.0	97.2	80.0 a	256.8 b-c	4441	48.50 b-c	218 b	3365	42.50 a	41.25 b
Mariposa	*	94.0	95.8	28.4 a-c	1.8	95.8	93.8 a	768.0 a	4489	49.75 a-b	505 a	4400	42.50 a	478.50 a
Arlington	*	93.0	91.5	31.5 a-c	3.8	100.0	55.0 b	353.5 b	5143	48.25 b-c	303 b	3250	42.00 a	73.00 b
Elkton	*	92.0	95.5	16.4 c	3.5	94.4	92.5 a	299.0 b-c	4646	46.00 c	266 b	2445	36.25 b	68.50 b
Critical Value (0.05)			22.1	13.7	1.8	NA	20.1	195.3	NA	2.95	124	NA	3.9	109.15

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] No significant difference detected between accessions
[5/] Means followed by the same letter are not significantly different
* Data not available from source

SANDBERG BLUEGRASS

2004 Evaluations

One collection of Sandberg bluegrass was compared against four industry releases. High Plains, Hanford Source and Mountain Home are all Sandberg bluegrass in the strict sense, while Sherman was originally released as big bluegrass (*Poa ampla*) [Ogle et al² 2003; Majerus et al 2007]. The first evaluation showed high levels of significance in all three categories solely due to the fact that accession 9076465 performed so poorly. Mountain Home Source had the best stand (95.5%) and greatest density (36.8 plants per foot), while 'Sherman' had the best vigor (2.5) at the first evaluation (Table 2).

At the second evaluation Sherman dwarfed all other Sandberg bluegrass accessions in the trial. Sherman plants had an average volume of 262.4 in^3, while the next largest, accession 9076465, measured a mere 8.8 in^3. Sherman also had the best stand (95.8%) and plant density (11.9) during the second evaluation. Accession 9076465 continued to perform poorly in percent stand and plant density (25.0 % and 0.75 plants per foot respectively).

2005 Evaluations

As in 2004, Sherman again received the best scores in all categories in the 2005 evaluations. Sherman however was first released as big bluegrass and should possibly for that reason be excluded from the analysis. If Sherman is excluded, accession 907645 scores well in plant height (21 inches), reasonably well in forage production (423 lb/ac) but poorly in seed production (2 lb/ac). It is recommended that FS R1 consider making additional Sandberg bluegrass collections for evaluation and potential release.

Sandberg bluegrass

2006 Evaluations

All of the true Sandberg bluegrass accessions were harvested on June 19, while Sherman big bluegrass was harvested on July 7. In 2006 forage yields compared well with those of 2005 with the exception of accession 9076465 which dropped from 423 lb/ac to 90 lb/ac. The largest forage yield came again from Sherman big bluegrass (4039 lb/ac). Of the true Sandberg bluegrass accessions, the best yield was provided by High Plains (935 lb/ac). 2006 plant heights ranged from 23.75 in (Sherman) down to 14.75 in (Hanford Source). FS R1 9076465 had a mean height of 16.75 in. Seed yields in 2006 were much higher than those of 2005. Sherman was the top seed producer with 857 lb/ac followed by High Plains (602 lb/ac) and Mountain Home (198 lb/ac). 9076465 and Hanford Source followed with 146 and 98 lb/ac seed respectively.

Table 2. Sandberg bluegrass

Accession No.	% Est. viability	% PLS[3/]	% stand 6/14/04	Density[1/] 6/14/04	Vigor[2/] 6/14/04	% Stand 9/29/04	Density 9/29/04	Plant vol. (in^3) 9/29/04	Forage (lb/ac) 2005	Plant height (in) 2005	Seed (lb/ac) 2005	Forage (lb/ac) 2006	Plant height (in) 2006	Seed (lb/ac) 2006
9076465	40	36.0	26.5 b[4/]	2.4 b	8.3	25.0 d	0.75 c	8.8 b	423 b-c	21.00 b	2 b	90.3 b	16.75 b-c	146 c
Sherman	*	75.8	84.8 a	29.1 a	2.5	95.8 a	11.88 a	262.4 a	4816 a	26.25 a	163 a	4039 a	23.75 a	857 a
High Plains	84	75.6	80.8 a	24.6 a	4.0	76.4 b	9.25 a-b	5.7 b	859 b	21.75 a-b	26 b	935 b	20.50 a-b	602 a-b
Hanford	*	85.0	91.5 a	27.5 a	6.0	47.2 c	6.13 b	0.9 b	206 c	15.50 c	10 b	155 b	14.75 c	98 c
Mtn. Home	*	74.3	95.5 a	36.8 a	5.0	65.3 b	8.75 a-b	4.5 b	605 b-c	17.50 b-c	36 b	787 b	17.50 b-c	198 b-c
Critical value (0.05)			16.8	12.3	1.2	17.4	4.41	42.2	563	4.64	45	849	varies	440

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] Means followed by the same letter are not significantly different
* Data not available from source

IDAHO FESCUE

2004 Evaluations

The Idaho fescue trial contained three industry releases. Joseph and Nezpurs are both synthetic cultivars comprised of collections made throughout the northwestern United States and Canada. Winchester Source Germplasm is a non-manipulated release from a collection made near Winchester, Idaho in the Idaho Panhandle (Ogle et al 2003a). The first evaluation of Idaho fescue indicated a wide range in stand establishment (Table 3). Accession 9076469 had the best stand averaging 80.5%. Accession 9076469 also ranked first in plant density with 12.0 plants/foot of row. Seedling vigor ratings showed industry release Winchester as the most vigorous with a rating of 2.8. Accession 9076444 had the poorest ratings of stand, density and plant vigor (16.8 % stand, 1.8 plants/foot and 7.8 vigor).

The second evaluation showed industry release Winchester having the best percent stand at 75.0% followed closely by accession 9076469 with 72.2%. Accession 9076444 again had the poorest stand with 16.7%. Accession 9076469 had the greatest plant density rating of 6.8 plants/foot but did not differ significantly from accessions 9076427, 9076438, 9076437 and Winchester (5.1, 5.0, 4.8 and 4.8 plants/foot respectively). Winchester had the largest volume (28.1 in^3) followed by accession number 9076427 with a volume of 22.3 in^3. The smallest plants were those from accession 9076432 at 1.5 in^3.

2005 Evaluations

Despite poor looking stands, accession 9076431 scored in the top two of all categories including best seed production in 2005. Winchester had the highest forage yield at 2287 lb/acre. In second, but not differing significantly, was accession 9076431 with 2154 lb/ac. Accessions 9076473 and 9076469 also had high forage yields (1622 and 1349 lb/ac respectively). High forage yields for accession 9076431 may be attributed (but not limited to) its high seed yield (231 lb/ac). Other high seed producers were Winchester (189 lb/ac) and accession 9076469 (186 lb/ac). On average, the tallest plants were those of Winchester (32.5 inches). Accession 9076431 came in second for plant height with 29.5 inches, followed by accession 9076469 (28.25 inches) and 9076473 (27.75 inches).

2006 Evaluations

All Idaho fescue plots were harvested on June 27. The majority of the Idaho fescue forage yields for 2006 were much greater than in 2005. The top yielding accession again was Winchester (3579 lb/ac) followed by FS R1 accessions 9076469 (2717 lb/ac) and 9076473 (2257 lb/ac). Mean heights ranged from near 18 in to as much as 28.75 in (Winchester). Seed yields for 2006 were dramatically higher than 2005 yields. The highest seed yield of 2006 came from FS R1 accession 9076469 with 744 lb/ac. Other high seed yields came from 9076473 and Joseph with 676 and 672 lb/ac respectively.

At this point in the trial FS R1 accession 9076469 shows the most promise for potential selected class release. 9076469 had better establishment in the establishment year. For 2005 and 2006 forage yields of 9076469 have been close, but somewhat lower than, those of Winchester. Seed yields however from 9076469 were nearly identical for 2005 for the

two accessions, 186 lb/ac (9076469) and 189 lb/ac (Winchester), and 9076469 had the greatest seed yield for 2006 (744 lb/ac) versus 584 lb/ac from Winchester.

Geographically, Winchester originated from a collection in the Idaho panhandle not far from Lewiston. 9076469 was collected in the Gallatin National Forest north of Bozeman, MT, over 300 miles to the east. Because of its performance and distance from the most comparable industry release, 9076469 should be considered for a selected class germplasm.

Idaho fescue

Table 3. Idaho fescue

Accession No.	% Est. viability	% PLS[3/]	% stand 6/14/04	Density[1/] 6/14/04	Vigor[2/] 6/14/04	% Stand 9/29/04	Density 9/29/04	Plant vol. (in^3) 9/29/04	Forage (lb/ac) 2005	Plant height (in) 2005	Seed (lb/ac) 2005	Forage (lb/ac) 2006	Seed (lb/ac) 2006	Plant ht (in) 2006
9076427	58	52.2	48.5 c-d[4/]	6.8 a-e	6.0	41.7 b-c	4.1 b-d	4.6 b-c	841 d-e	24.50 b-e	33 b	1190 b	578 a-c	22.75 a-b
9076431	61	54.9	39.0 d-e	3.0 d-e	6.3	55.6 a-b	2.4 c-e	11.8b	2154 a-b	29.50 a-b	231 a	1248 b	417 a-c	20.25 b
9076432	76	68.4	48.8 c-d	4.8 b-e	7.0	36.1 b-d	3.0 b-e	1.5 c	672 d-e	23.25 c-e	61 a-b	1740 a-b	371 a-c	21.75 a-b
9076437	61	54.9	71.0 a	8.8 a-c	4.5	57.0 a-b	4.8 a-b	5.1 b-c	986 c-e	24.25 b-e	60 a-b	1051 b	302 a-c	22.75 a-b
9076438	80	72.0	75.0 a	9.0 a-c	5.3	58.4 a-b	5.0 a-b	1.5 c	756 d-e	22.75 d-e	38 b	533 b	566 a-c	20.25 b
9076443	45	40.5	68.3 a-b	7.9 a-d	6.0	54.2 a-c	4.1 b-d	7.0 b-c	811 d-e	24.75 b-e	64 a-b	1510 a-b	458 a-c	19.50 b
9076444	13	11.7	16.8 f	1.8 e	7.8	16.7 d	1.3 e	2.6 b-c	351 e	21.00 e	24 b	590 b	182 b-c	20.75 b
9076453	50	45.0	66.8 a-c	7.9 a-d	5.0	51.4 a-c	4.4 b-c	10.0 b-c	799 d-e	25.75 b-e	69 a-b	1740 a-b	287 a-c	23.00 a-b
9076462	30	27.0	34.8 d-f	2.3 e	6.8	30.6 c-d	1.9 d-e	5.7 b-c	557 e	25.50 b-e	73 a-b	533 b	154 c	20.50 b
9076467	71	63.9	48.5 c-d	5.1 b-e	6.3	44.4 b-c	3.3 b-e	3.4 b-c	1004 c-e	24.00 c-e	115 a-b	1223 b	615 a-c	18.75 b
9076469	68	61.2	80.5 a	12.0 a	3.0	72.2 a	6.8 a	11.8 b	1349 c-d	28.25 a-c	186 a-b	2717 a-b	744 a	23.00 a-b
9076471	67	60.3	27.8 e-f	3.9 c-e	6.5	41.7 b-c	2.4 c-e	5.1 b-c	551 e	24.00 c-e	69 a-b	1453 a-b	458 a-c	22.00 a-b
9076473	45	40.5	69.5 a	11.3 a	3.0	59.7 a-b	5.1 a-b	22.3 a	1622 b-c	27.75 a-d	83 a-b	2257 a-b	676 a-b	22.25 a-b
Joseph	*	*	50.0 b-d	4.5 b-e	5.0	54.2 a-c	3.0 b-e	9.5 b-c	1337 c-d	25.50 b-e	129 a-b	2028 a-b	672 a-b	22.50 a-b
Winchester	*	*	73.8 a	9.9 a-b	2.8	75.0 a	4.8 a-b	28.1 a	2287 a	32.50 a	189 a-b	3579 a	584 a-c	28.75 a
Nezpurs	*	*	37.3 d-e	1.9 e	7.0	44.5 b-c	1.5 e	5.7 b-c	908 d-e	26.00 b-e	48 a-b	1305 b	526 a-c	22.50 a-b
Critical value (0.05)			17.8	4.7	0.5	20.8	2.0	8.1	631	1.58	155	2252	509	7.78

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] Means followed by the same letter are not significantly different
* Data not available from source

BLUEBUNCH WHEATGRASS

2004 Evaluations

Three industry releases were included in the bluebunch wheatgrass trial. Goldar and Anatone both come from collections from Asotin County, Washington while P-7 is a composite of 25 collections made in Idaho, Nevada, Oregon, Utah, Washington and British Columbia (Ogle et al 2003c). Bluebunch wheatgrass evaluations conducted in June 2004 showed numerous collections outperforming industry standards (Table 4). Accession 9076436 ranked highest for percent stand at 81.8%. Plant density and seedling vigor comparisons showed accession 9076433 as the best with 14.4 plants/foot of row and a 2.5 rating for vigor. Accession 9076463 ranked lowest in all three evaluations (27.8 % stand, 2.5 plants/foot and a vigor rating of 7.0).

Percent stand ranged from 83.3% (accession 9076466) to 33.3% (accession 9076463) at the second evaluation. Accession 9076433 had the best plant density at 5.8 plants/foot followed closely by accession 9076466 with 5.5 plants/foot. Lowest density was recorded by accession 9076463 (1.3 plants/foot). Density measurements may, however, be misleading, because a good stand of very small plants will show a much higher density than a good stand of robust plants (compare accession 9076433 with P-7). Plant volume measurements were dominated by the industry standards. P-7, Anatone and Goldar had the greatest volumes with 147.8, 125.0 and 109.8 in^3 respectively. The next largest plant volume came from accessions 9076426, 9076464 and 9076436 at 64.0 in^3. Accession 9076426, P-7 and Anatone all showed high first-year flower production (65.0, 58.8 and 48.8 %). There was also a large group of accessions that showed very little flower production: Goldar, 9076450, 9076466, 9076436, 9076441, 9076463, 9076442, 9076433 and 9076434 ranged from 22.5% to 2.5% flower production.

2005 Evaluations

The three industry releases obtained the best three scores in all categories in the 2005 evaluation. None of the FS R1 accessions stood out in any categories for 2005. Accession 9076426 had the fourth best average for forage yield (2432 lb/ac) but came in eighth for plant height (32.25 inches) and seed production (51 lb/ac). The fourth best seed yield came from accession 9076450 with 83 lb/ac, but this accession had the ninth best forage yield at 1682 lb/ac.

2006 Evaluations

Bluebunch wheatgrass plots were harvested between July 11 and July 14. In 2006 the industry releases again had the three top scores for forage and seed yield. In forage, P-7 had the greatest yield with over 5600 lb/ac, followed by Goldar (5089 lb/ac) and Anatone (4974 lb/ac). FS R1 accession 9076463 had the greatest forage yield for the collections with 4011 lb/ac. Plant heights ranged from 34 to 38 in. Seed yields were much greater in 2006 than in the previous year. P-7, Goldar and Anatone had the top three yields with 827, 678 and 518 lb seed/ac respectively. The next closest yield was obtained by accession 9076466 with a mean yield of 418 lb/ac. Currently no outstanding bluebunch wheatgrass collections have been identified with potential for future release.

Table 4. Bluebunch wheatgrass

Accession No.	% Est. viability	% PLS[3/]	% stand 6/14/04	Density[1/] 6/14/04	Vigor[2/] 6/14/04	% Stand 9/29/04	Density 9/29/04	Plant vol. (in^3) 9/29/04	% Flower 9/29/04	Forage (lb/ac) 2005	Plant height (in) 2005	Seed (lb/ac) 2005	Forage (lb/ac) 2006	Seed (lb/ac) 2006	Plant ht (in) 2006
9076426	76	68.4	70.8 a-c[4/]	9.9 a-b	3.0	75.0 a-c	4.5 a-c	64 c	65.0 a	2432 a-c	32.25 a	51 c-d	3825 a-c	269 c-e	38.00 a
9076428	56	50.4	49.8 c	5.8 b-c	5.0	54.2 b-d	3.3c	54.8 c-d	38.8 b-c	2045 c	31.50 a	44 c-d	2560 b-c	361 c-e	36.75 a-b
9076433	75	67.5	77.8 a-b	14.4 a	2.5	72.2 a-c	5.8 a	31.5 d-e	3.8 d	1658 c	30.00 a	69 c-d	1986 c	92 e	34.00 b
9076434	69	62.1	61.3 a-c	7.9 b-c	4.0	73.6 a-c	4.1 a-c	22.3 e	2.5 d	1670 c	28.00 a	50 c-d	2330 b-c	239 c-e	34.00 b
9076436	69	62.1	81.8 a	8.1 b-c	3.3	81.9 a	4.1 a-c	64.0 c	11.3 d	2348 b-c	30.25 a	48 c-d	3020 a-c	399 b-e	35.25 a-b
9076441	56	50.4	69.5 a-c	6.8 b-c	4.0	66.7 a-c	3.8 a-c	31.5 d-e	11.3 d	2081 c	32.75 a	49 c-d	2790 b-c	102 e	37.75 a-b
9076442	86	77.4	70.8 a-c	7.3 b-c	3.0	77.8 a-b	3.8 a-c	22.3 e	3.8 d	1428 c	32.00 a	46 c-d	3135 a-c	124 d-e	35.50 a-b
9076450	73	65.7	57.0 b-c	6.8 b-c	3.8	50.0 c-d	3.0 c-d	31.5 d-e	17.5 c-d	1682 c	33.50 a	83 c-d	2330 b-c	290 c-e	37.75 a-b
9076463	58	52.2	27.8 d	2.5 c	7.0	33.3 d	1.3 d	22.8 e	5.0 d	1525 c	18.00 b	13 d	4011 a-c	199 c-e	37.85 a-b
9076464	65	58.5	64.0 a-c	10.8 a-b	3.0	77.8 a-b	4.0 a-c	64.0 c	37.5 b-c	1670 c	32.50 a	69 c-d	3480 a-c	288 c-e	37.75 a-b
9076466	64	57.6	66.5 a-c	11.4 a-b	2.8	83.3 a	5.5 a-b	27.0 d-e	11.3 d	1972 c	32.50 a	66 c-d	3135 a-c	418 b-d	36.75 a-b
Goldar	*	81.5	66.8 a-c	8.0 b-c	2.5	72.2 a-c	3.9 a-c	109.8 b	22.5 c-d	2916 a-c	35.75 a	157 b	5089 a-b	677 a-b	37.75 a-b
Anatone	*	*	51.5 c	5.8 b-c	3.5	68.1 a-c	3.5 b-c	125.0 a-b	48.8 a-b	3630 a-b	33.75 a	102 b-c	4974 a-b	518 b-c	34.75 a-b
P-7	*	*	66.8 a-c	5.5 b-c	3.0	75.0 a-c	3.5 b-c	147.8 a	58.8 a-b	3812 a	36.25 a	227 a	5664 a	827 a	37.00 a-b
Critical value (0.05)			20.6	5.3	1.9	21.7	1.8	27.3	21.5	1277	8.45	62	varies	varies	varies

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] Means followed by the same letter are not significantly different
* Data not available from source

TUFTED HAIRGRASS

2004 Evaluations

The two industry releases used in the tufted hairgrass trial, Willamette and Tillamook, were originally collected in Oregon (Ogle et al 2003b). Percent stand of Willamette tufted hairgrass were significantly higher than all other accessions at the first evaluation (86.0%). Lowest percent stand was observed in accession 9076435 (53.0%). Accession 9076429 had the best seedling vigor rating of 4.8, while accession 9076435 showed the lowest vigor (7.8). Analysis of plant density showed no significant differences (Table 5).

At the second evaluation, Willamette, Tillamook and accession 9076429 had 93.1, 84.7 and 79.1 percent stand but did not differ significantly. Lowest percent stand came from accession 9076435 at 57.0%. Plant density measurements were tight among the tufted hairgrass plots. Densities ranged from 6.3 plants/foot (Willamette) to 4.1 plants/foot (accession 9076435). Plant volume showed a broad range of measurements (Willamette, 68.7 in^3 to accession 9076435, 16.6 in^3) and also did not differ significantly.

2005 Evaluations

Tillamook and Willamette scored significantly better than the FS R1 collections in all three categories. Tillamook and Willamette yielded 4187 and 3660 lb forage/ac respectively. The next best yield came from accession 9076429 which yielded 2323 lb/ac. Accession 9076429 also had the tallest average plants of the FS R1 collections (42.75 in). Tillamook and Willamette both had high seed yields (320 and 267 lb/ac respectively), while accession 9076430 had the best yield of the FS R1 collections (118 lb/ac). Despite being outperformed by the Oregon material, the FS R1 collections had dense, healthy stands and should still be considered for use in eastern-northern Idaho and western Montana.

2006 Evaluations

Tufted hairgrass plots were harvested on July 14. All forage yields for tufted hairgrass were lower in 2006 than in 2005. No significance was detected between forage means for 2006. The top forage producer was FS R1 accession 9076435 with 1851 lb/ac. Willamette came in second with 1595 lb/ac. Heights were all similar, ranging between 27 and 31 in, and did not differ significantly. Seed yields for 2006 were much lower than 2005. Tillamook, at 135 lb seed/ac had a significantly higher seed yield than the FS R1 collections which ranged from 42 lb/ac down to 18 lb/ac.

Although all FS R1 collections were outperformed by the Oregon material, the FS R1 collections had dense, healthy stands, and may still be worth considering for use in eastern-northern Idaho and western Montana.

Tufted hairgrass

Table 5. Tufted hairgrass

Accession No.	% Est. viability	% PLS[3/]	% stand 6/14/04	Density[1/] 6/14/04	Vigor[2/] 6/14/04	% Stand 9/29/04	Density 9/29/04	Plant vol. (in^3) 9/29/04	Forage (lb/ac) 2005	Plant ht (in) 2005	Seed (lb/ac) 2005	Forage (lb/ac) 2006	Plant ht (in) 2006	Seed (lb/ac) 2006
9076429	49	44.1	68.0 b[5/]	19.0[1/]	4.8	79.2 a-b	5.6a-b	31.0[4/]	2323 b	42.75 b	96 c	823[4/]	28.50[1/]	18 b
9076430	52	46.8	62.8 b-c	17.8	6.5	72.2 b-c	5.5 a-b	48.7	1894 b	40.75 b	118 c	1145	28.00	42 b
9076435	55	49.5	53.0 c	6.1	7.8	57.0 c	4.1 b	16.6	1912 b	34.25 c	36 d	1851	27.75	27 b
Willamette	*	81.0	86.0 a	23.0	5.3	93.1 a	6.3 a	68.7	3660 a	46.75 a	267 b	1595	31.50	68 a-b
Tillamook	*	81.0	69.8 b	21.8	5.5	84.7 a-b	5.4 a-b	60.2	4187 a	46.00 a	320 a	1051	30.00	135 a
Critical value (0.05)			11.6	11.6	1.5	16.4	1.8	NA	1076	3.16	51	NA	NA	89

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] No significant difference detected between accessions
[5/] Means followed by the same letter are not significantly different
* Data not available from source

WESTERN YARROW

2004 Evaluations

The yarrow collections were evaluated against two industry releases, Eagle and Great Northern. Eagle originally comes from southwestern Idaho in Ada County, while Great Northern was collected in northwestern Montana in Flathead County, just west of Glacier National Park. Yarrow plots failed to show significant differences in percent stand, plant density or seedling vigor in the first evaluation. Trends, however, showed accession 9076460 first in all but one category in 2004, seedling vigor, where it placed second. Lupine and pearly everlasting which were also included in the forb trial had essentially no germination (data not shown).

Accession 9076460 recorded the best percent stand at the second evaluation (73.6%), while accession 9076456 had the lowest stand at 29.15% (Table 6). No significant difference was detected for plant density. Means ranged from 3.0 plants/foot (accession 9076458) to 0.3 plants/foot (accession 9076457). Industry standards Great Northern and Eagle had the largest plant volumes (753.8 and 691.5 in^3 respectively). Great Northern also had the greatest percentage of flowering plants (38.8%).

2005 Evaluation

Evaluations were conducted only on seed production because forage yield clipping was uprooting plants. No significant differences were found in seed yields. The top three yields came from accession 9076459 (397 lb/ac) followed by Great Northern (396 lb/ac) and finally accession 9076458 (391 lb/ac).

Western Yarrow

2006 Evaluations

In 2006 height and seed yield were measured for western yarrow. The plots were harvested from July 17 to July 31 when seed production was optimum for each plot. Heights ranged from 27 in (Eagle) down to 14 in (9076457) but no significance was detected. Seed yields had a wide range, 332 lb/ac from 9076459 to 79 lb/ac from 9076457, but again no significance was detected. This is presumably due to the numerous plots from which no seed was found in the designated harvest plot. However, for the second year FS R1 accession 9076459 had the greatest seed yield.

Based on seed production data, accession 9076459 would be a potential candidate for future release as a selected class germplasm. However, its performance is comparable to that of Great Northern which comes from a collection in Flathead County, Mt, less than 200 miles from the collection site of 9076459. Also, 9076459 showed poor establishment characteristics during the first year of the trial.

Table 6. Western yarrow

Accession No.	% Est. viability	% PLS[3/]	% stand 7/16/04	Density[1/] 7/16/04	Vigor[2/] 7/16/04	% Stand 9/29/04	Density 9/29/04	Plant vol. (in^3) 9/29/04	% Flower 9/29/04	Seed (lb/ac) 2005	Plant height (in) 2006	Seed (lb/ac) 2006
9076454	84	75.6	37.5[4/]	2.4[4/]	4.8	48.6 a-b[5/]	2.4[4/]	441.0 a-b	22.5 a-c	160[4/]	21.50[4/]	269[4/]
9076456	73	65.7	32.0	1.5	6.0	29.1 b	1.9	342.0 b	16.3 a-c	248	24.75	240
9076457	86	77.4	32.0	0.3	5.5	31.9 a-b	0.3	679.0 a	22.5 a-c	150	14.25	79
9076458	80	72.0	59.7	2.8	3.8	63.9 a-b	3.0	595.8a-b	32.5 a-b	391	19.25	331
9076459	91	81.9	47.2	1.3	4.0	45.9 a-b	1.3	513.3 a-b	37.5 a	397	22.75	332
9076460	67	60.3	75.0	3.1	3.5	73.6 a	2.9	481.3 a-b	37.5 a	369	25.50	208
9076474	37	33.3	45.9	2.9	5.8	50.0 a-b	1.8	323.0 b	6.3 c	280	19.00	106
9076475	71	63.9	45.9	3.0	4.5	48.6 a-b	2.6	507.0 a-b	12.5 b-c	148	22.00	179
Great Northern	93	71.6	45.9	2.3	2.8	45.9 a-b	1.8	753.8 a	38.8 a	396	21.50	301
Eagle	*	*	33.3	0.5	5.5	37.5 a-b	0.5	691.5 a	15.0 a-c	339	27.25	327
Critical value (0.05)			NA	NA	NA	36.8	NA	283.6	21.4	NA	NA	NA

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] No significant difference detected between accessions
[5/] Means followed by the same letter are not significantly different
* Data not available from source

SUMMARY

After three years of evaluation we are seeing considerable variation for the evaluated traits comparing the collections against industry releases and against each other. Some accessions appear to be competing well and show promise as potential future selected class releases. These include accession 9076439 blue wildrye, 9076469 Idaho fescue, and possibly 9076459 western yarrow.

The Forest Service is interested in how the accessions will perform under stressful or drought conditions. In 2007 the plots will be irrigated early in the growing season to an equivalent of approximately 12- 14 inches of annual precipitation (irrigation + natural rainfall). In early June no additional irrigation will be provided in order to place stress on the plots. This will allow us to evaluate the effects of simulated drought to help identify accessions that may be more tolerant of drier conditions. Evaluations will be conducted in 2007 and a final report produced for FS R1 with results and recommendations.

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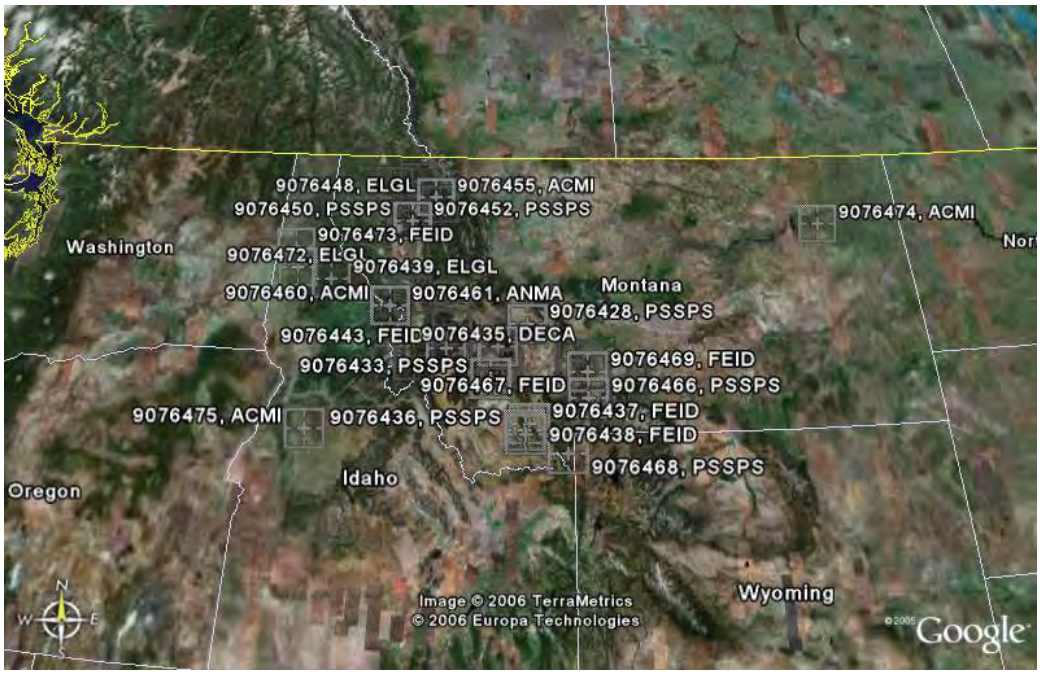
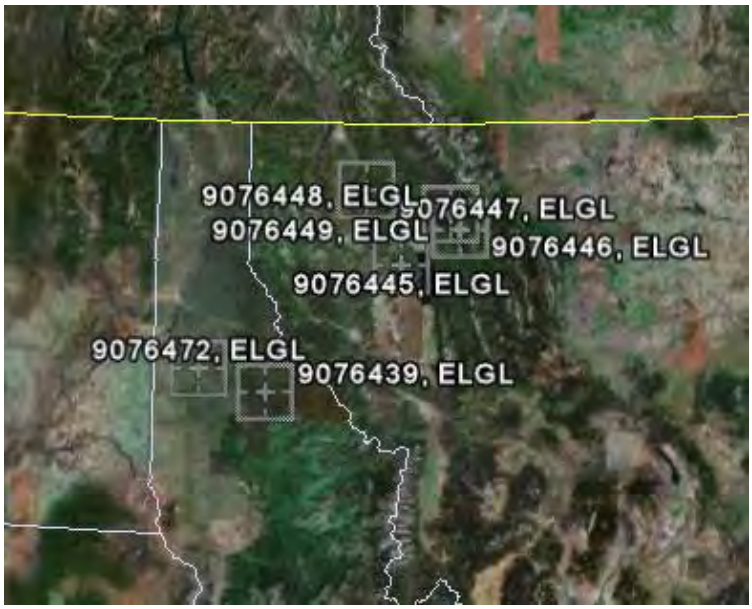
Appendix 1. Collection data and maps

Accession No.	Species	Date collected	Fresh wt. (lbs)	Cleaned wt. (lbs)	Forest	Location	Elevation (ft)
9076426	Bluebunch wheatgrass	7/17/2003	6	2.34	Lolo	N 46 51 38.6 W 114 10 18.4	4300
9076427	Idaho fescue	8/1/2003	1.5	0.22	Helena	N 46 28 20 W 111 54 42	5700
9076428	Bluebunch wheatgrass	8/1/2003	1.7	0.40	Helena	N 46 28 20 W 111 54 42	5700
9076429	Tufted hairgrass	8/6/2003	0.2	0.04	Lolo	N 46 42 31.3 W 114 35 31.6	4480
9076430	Tufted hairgrass	8/6/2003	0.6	0.12	Lolo	N 46 42 23.9 W 114 35 37.3	4480
9076431	Idaho fescue	7/22/2003	1.4	0.88	Beaver-Deer	N 45 51 15 W 112 22 08	7200
9076432	Idaho fescue	7/22/2003	1.3	1.02	Beaver-Deer	N45 51 27.3 W 112 28 48.2	6300
9076433	Bluebunch wheatgrass	8/6/2003	28	1.64	Beaver-Deer	N 45 42 47.7 W 112 35 10.3	7600
9076434	Bluebunch wheatgrass	8/12/2003	5.5	0.20	Beaver-Deer	N 45 42 47.7 W 112 35 10.3	7600
9076435	Tufted hairgrass	8/18/2003	4	0.60	Beaver-Deer	N 46 09 0.08 W 112 28 0.499	6400
9076436	Bluebunch wheatgrass	7/29/2003	7	1.00	Beaver-Deer	N45 2.247 46 W 111 56.904 08	6300
9076437	Idaho fescue	7/31/2003	9	2.40	Beaver-Deer	N45 7.332 36 W 111 51.832 43	8200
9076438	Idaho fescue	7/31/2003	3	0.94	Beaver-Deer	N 44 58.982 92 W 111 55.523 57	7500
9076439	Blue wildrye	8/20/2003	3.3	2.42	St. Joe Dist.	T43NR5E section 21	4600
9076440	Bluebunch wheatgrass	8/2/2003	0.8	0.12	Beaver-Deer	T7NR14W section 4 SW	5550
9076441	Bluebunch wheatgrass	7/25/2003	1.4	0.40	Beaver-Deer	T8NR14W section32-33 S	5850
9076442	Bluebunch wheatgrass	8/4/2003	1.1	0.44	Beaver-Deer	T5NR14W section 22 NW	6760
9076443	Idaho fescue	8/1/2003	1.3	0.40	Beaver-Deer	T4NR15W section 10	6460
9076444	Idaho fescue	7/29/2003	0.4	0.12	Beaver-Deer	T 7NR14W section 4	5890
9076445	Blue wildrye	8/21/2003	0.5	0.28	Flathead	T26NR22W section 26	5130
9076446	Blue wildrye	8/18/2003	2.1	0.78	Flathead	T29NR17W section 28,33,34	4500
9076447	Blue wildrye	8/19/2003	0.7	0.36	Flathead	T32NR25W section 22	5250
9076448	Blue wildrye	8/13/2003	1.4	0.46	Flathead	T30NR18W section 23	?
9076449	Blue wildrye	8/13/2003	1.9	0.95	Flathead	T29NR17W section 34	4600
9076450	Bluebunch wheatgrass	8/21/2003	0.4	0.22	Flathead	T26NR21W section 33	5000
9076451	Bluebunch wheatgrass	8/25/2003	0.1	0.03	Flathead	T26NR22W section 29	5700
9076452	Bluebunch wheatgrass	8/21/2003	0.3	0.08	Flathead	T26NR21W section 33	4980
9076453	Idaho fescue	8/25/2003	0.3	0.08	Flathead	T26NR22W section 29	5700
9076454	Common yarrow	8/21/2003	0.2	0.02	Flathead	T26NR22W section 15	4300
9076455	Common yarrow	8/13/2003	trace	trace	Flathead	T30NR18W section 23	3800
9076456	Common yarrow	8/21/2003	0.5	0.04	Flathead	T26NR21W section 33	4980
9076457	Common yarrow	9/4/2003	0.7	0.08	Flathead	T33NR21W section 26	4000

9076458	Common yarrow	8/20/2003	1.4	0.20	Flathead	T26NR21W section 29	?
9076459	Common yarrow	9/4/2003	2.5	0.86	Bitterroot	T2NR20W section 2,10,11	5600
9076460	Common yarrow	9/22/2003	0.5	0.38	Lolo	N46 42 14.7 W114 35 56.8	4500
9076461	Pearly everlasting	9/23/2003	1.8	0.03	Lolo	N46 41 48.5 W114 36 10.5	4600
9076462	Idaho fescue	7/24/2003	0.4	0.20	Bitterroot	T2NR20W section 11	5600
9076463	Bluebunch wheatgrass	7/24/2003	1.8	0.54	Bitterroot	T2NR20W section 2	5700
9076464	Bluebunch wheatgrass	7/14/2003	17.5	1.86	Gallatin	N45 40 08.32279 W1100026.177	5500
9076465	Sandberg bluegrass	7/15/2003	7	1.58	Gallatin	N45 58 43.57899 W1110012.792	6700
9076466	Bluebunch wheatgrass	7/30/2003	17	1.88	Gallatin	N452733.66724 W1104630.334	7200
9076467	Idaho fescue	7/30/2003	19	5.25	Gallatin	N452743.68577 W1104630.334	7400
9076468	Bluebunch wheatgrass	7/31/2003	9.5	0.00	Gallatin	N444430. W1110954	6570
9076469	Idaho fescue	8/4/2003	12.5	3.92	Gallatin	N454842. W1104642.	7200
9076470	Lupine	8/4/2003	9.5	1.08	Gallatin	N454842. W1104642.	7600
9076471	Idaho fescue	7/16/2003	17.5	3.00	Gallatin	N45 58 06. W110 57 24.	6400
9076472	Blue wildrye	8/1/2003	4.5	3.08	ID Panhandle	T45NR2W sec. 26	2800
9076473	Idaho fescue	7/25/2003	1	0.46	ID Panhandle	T48NR3W section 12	2400
9076474	Common yarrow	7/15/2003	15	0.98	Custer	T25NR46E section 19	4000
9076475	Common yarrow	9/5/2003	2.1	0.12	ID Panhandle	T19N R4E section 15	5200



Composite map of all collections



Blue wildrye

Idaho fescue

Tufted hairgrass

Bluebunch wheatgrass

Western yarrow

Appendix 2. Seed cleaning calibrations

Blue Wildrye (*Elymus glaucus*)

1. Thrashing
    A. 3/8" screen followed by ¼" screen
2. Air screen cleaner
    A. screens
        1. top-4.350
        2. middle-3.550
        3. bottom-6 X 32
    B. valves
        1. 2.25
        2. 4.75
        3. 1.60
        4. intake-closed
    C. adjustments
        1. blower speed-4.4
        2. sieve boat-10
3. Debearder
    A. adjustments
        1. brush speed-10
        2. vacuum-on
4. Gravity table
    A. adjustments
        1. sieve boat-10
        2. blower speed-5
            i. valve-2.5
    B. table angle
        1. slope-1.0
        2. pitch-0.5

Bluebunch Wheatgrass (*Pseudoroegneria spicata*)

1. Thrashing
    A. #14 screen
    B. 3/8" screen top and ¼" screen bottom
2. Clipper
    A. screens
        1. 6-24
        2. #12
3. Air screen cleaner
    A. screens
        1. top-3.95 round
        2. middle-3.150 round
        3. bottom-6 X 24 slit
    B. valves
        1. 2.5
        2. 5.3
        3. 2.5
        4. intake-closed
    C. adjustments
        1. blower speed-6
        2. sieve boat-10
4. Indent cleaner
    A. spool-7.5
    B. adjustments
        1. catchpan-4.0
        2, sieve speed-10
5. Debearder
    A. adjustments
        1. brush speed-10
        2. gate-1.5
4. Gravity table
    A. adjustments
        1. sieve boat-10
        2. blower speed-8
            i. valve-3.0
    B. table angle
        1. slope-1.0
        2. pitch-0.5

Idaho Fescue (*Festuca idahoensis*)

1. Thrashing
    A. 3/8” screen
2. Clipper
    A. screens
        1. #12 top
3. Air screen cleaner
    A. screens
        1. top-3.750 round
        2. middle-2.350 round
        3. bottom-solid blank
    B. valves
        1. 2.1
        2. 5.25
        3. 2.5
        4. intake-closed
    C. adjustments
        1. blower speed-4.5
        2. sieve boat-10

Sandberg Bluegrass (*Poa secunda*) and Tufted Hairgrass (*Deschampsia caespitosa*)

1. Thrashing
    A. 3/8” screen
2. Air screen cleaner
    A. screens
        1. top-3.150 round
        2. middle-2.10
        3. bottom-6 X 32
    B. valves
        1. .25
        2. 2.5
        3. 3.5
        4. intake-closed
    C. adjustments
        1. blower speed-3.5
        2. sieve boat-10

CRATERS OF THE MOON NATIONAL MONUMENT
2005 Annual Report
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NATURAL RESOURCES CONSERVATION SERVICE
ABERDEEN, IDAHO PLANT MATERIALS CENTER

INTRODUCTION

In 2004, the Aberdeen Plant Materials Center (PMC) entered into an agreement with Craters of the Moon National Monument and Preserve (CRMO) to produce transplants and/or cleaned seed of thirteen native plant species for use in revegetation of disturbed areas following road construction. The National Park Service requires that restoration of native plants be accomplished using germplasm from populations as closely related genetically and ecologically as possible to park populations. Many of the proposed species are poorly understood or require special attention for adequate germination and survival. The PMC was chosen for its personnel, expertise and equipment to assist in seed collection, cleaning, development of establishment protocols and production of greenhouse propagated materials for transplanting at CRMO.

Two sites are to be revegetated at CRMO. The "Soil Base" site is approximately 28,380 sq. feet (0.65 acres) and is to be reseeded with a grass mix consisting of equal parts of Thurber's needlegrass (*Achnatherum thurberianum*), Indian ricegrass (*Achnatherum*

hymenoides) and Sandberg bluegrass (*Poa secunda*). The "Cinder Garden" site is approximately 18,780 sq. feet (0.43 acres) and will be seeded with a forb mix consisting of 30 % dwarf buckwheat (*Eriogonum ovalifolium* var. *depressum*), 30 % dusky maiden (*Chaenactis douglasii*), 30 % scorpion weed (*Phacelia hastata*) and 10 % dwarf monkey flower (*Mimulus nanus*). Table 1 lists the seed mixtures that will be broadcast planted. Greenhouse propagated materials will be transplanted into both sites as deemed suitable by the CRMO ecologist.

Table 1. Seed mixes

Site	Species	% mix	Full rate lb/ac (PLS)	Mix rate/0.66 ac. (PLS)	Broadcast rate (2x) PLS
Soil Base Site	Thurber's needlegrass	33	6	1.3	2.6
(28,380 ft^2)	Indian ricegrass	33	6	1.3	2.6
	Sandberg bluegrass	33	2	0.4	0.8
				Mix rate/0.43 ac. (PLS)	
Cinder Garden	Dusky maiden	30	3.18	0.42	0.84
Site (18,780 ft^2)	Dwarf buckwheat	30	0.38	0.05	0.10
	Scorpion weed	30	2.42	0.32	0.64
	Dwarf monkey flower	10	0.11	0.01	0.02

ACCOMPLISHMENTS

Based on the area to be revegetated and number of transplants desired of each species, the PMC estimated amounts of seed required (see Table 2). The PMC then advised CRMO personnel in seed collecting time periods, techniques and storage. During the summer of 2004, CRMO staff hand collected seed for each species at numerous sites throughout the monument with technical assistance from PMC personnel. Seed collections were dried and bagged at CRMO and delivered to the PMC in early fall. Collections were cleaned and processed by PMC staff during the winter of 2004-2005.

Figure 1. Antelope bitterbrush seedling.

CRMO technicians also made opportunistic collections of the following species: Nelson's needlegrass (*Achnatherum nelsonii*), cushion buckwheat (*Eriogonum ovalifolium* var. *ovalifolium*), western needlegrass (*Achnatherum occidentalis*) and fern bush (*Chamaebatiaria millefolium*). Table 3 provides a summary of collections made during 2004 with cleanout information as well as Tetrazolium (TZ) test results for collections sent to the Idaho State Department of Agriculture seed lab.

A portion of the seed was to be planted in 40 cubic inch conetainers at the PMC greenhouse during the winter of 2005; however, because of delays in road construction, transplant propagation was postponed until the winter of 2005-2006.

Figure 2. Limber pine seedling.

During the summer of 2005, technicians from CRMO made further seed collections of antelope bitterbrush, sulphurflower buckwheat, dwarf buckwheat, Indian ricegrass, Sandberg bluegrass, scorpion weed and needlegrass. These materials were then dried, bagged and transported to the PMC. Seed collections were cleaned at the PMC in November of 2005. The 2005 collection of needlegrass could not be identified to a single species and most likely represents a composite of more than one *Achnatherum* species. Table 4 shows collections made during 2005 with cleanout information. Table 5 depicts the optimum times for seed harvest for each species collected, and Table 6 shows actual collecting dates and provides hourly totals for time spent making collections.

As of fall 2005, CRMO had met all seed requirements with the exception of sagebrush and Thurber's needlegrass. Sagebrush has not been collected during either season and should not be collected until the season before planting due to storage difficulties with the species. Of the 3.8 lbs of required Thurber's needlegrass, a total of 0.5 lb has been collected. However if the other collections of western needlegrass, Nelson's needlegrass and the needlegrass mixture are combined with the Thurber's, then there is a total of 2.62 lb collected leaving 1.18 lb lacking.

In the fall of 2005, the PMC began propagation of limber pine and started stratification of dwarf buckwheat, bitterbrush, and hotrock penstemon. In late November, the PMC was notified that construction was delayed indefinitely. It was agreed at this point that the PMC would postpone further greenhouse propagation and maintain the limber pine seedlings in the PMC greenhouse until late summer 2006 when they would be delivered to CRMO. Some of the seed that had been under stratification when the decision to discontinue propagation was started in the greenhouse to evaluate propagation strategies for future reference.

Table 2. CRMO Seed Requirements and collection yields

Species	Accession #	Transplants	Broadcast Seed (lb PLS)	Total Required Cleaned Seed	Collected Seed (lb)		Total seed (lb)
					2004	2005	
Antelope bitterbrush	9076477	600	n/a	0.31	0.82	19.00	19.82
Rabbitbrush	9076478	300	n/a	0.03	0.22	0.00	0.22
Sagebrush	--	200	n/a	0.04	0.00	0.00	0.00
Limber Pine	9076480	75	n/a	0.68	1.58	0.00	1.58
Sulphurflower buckwheat	9076479/ 9076514	200	n/a	0.02	0.54/ 0.46	0.96	1.96
Hotrock penstemon	9076481	25	n/a	0.003	0.34	0.00	0.34
Dwarf buckwheat	9076482	150	0.2	0.21	0.12	0.03	0.15
Thurber's needlegrass	9076483	200	3.7	3.8	0.5	0.00	0.50
Indian ricegrass	9076484	200	3.7	3.8	1.4	2.60	4.00
Sandberg bluegrass	9076485	200	1.1	1.2	4.68	1.20	5.88
Dusky maiden	9076486	n/a	1.68	1.68	1.84	0.00	1.84
Scorpion weed	9076487	n/a	1.28	1.28	0.7	1.10	1.80
Dwarf monkey flower	9076488	n/a	0.04	0.04	0.11	0.00	0.11

Table 3. 2004 collections and seed cleanout percentages

Common Name	Species	Min. req. seed (lb)	Est. % cleanout	Est. min dry material (lb)	Collected fresh material (lb)	Collected dry material (lb)	% dry matter	Actual clean seed (lb)	Actual % cleanout (seed/dry)	% Viability (TZ test)
Antelope bitterbrush	*Purshia tridentata*	0.31	55	0.6	8.93	5.1	57	0.82	84	60
Rabbitbrush	*Ericameria nauseosa*	0.03	95	0.6	3.44	2.2	64	0.22	90	91
Sagebrush	*Artemisia tridentata* var. *vasseyana*	0.04	95	0.88	0	0	0	0	0	
Limber Pine	*Pinus flexilis*	0.68	--	2.7	23.12	13.2	57	1.58	88	73
Sulphurflower buckwheat	*Eriogonum umbellatum*	0.02	95	0.5	5.4	3.4	63	1.00	71	64
Hotrock penstemon	*Penstemon deustus* var. *deustus*	0.003	95	0.06	3.1	2.1	68	0.34	84	96
Dwarf buckwheat	*Eriogonum ovalifolium* var. *depressum*	0.21	95	4.14	1.73	0.51	29	0.12	76	68
Thurber's needlegrass	*Achnatherum thurberianum*	3.8	85	25.04	1.95	1.68	86	0.50	70	94
Indian ricegrass	*Achnatherum hymenoides*	3.8	85	25.04	29.85	25.1	84	1.40	94	38
Sandberg bluegrass	*Poa secunda*	1.2	85	8.03	8.9	8.0	90	4.68	42	78
Dusky maiden	*Chaenactis douglasii*	1.68	95	33.6	20.9	9.1	44	1.84	80	67
Scorpion weed	*Phacelia hastata*	1.28	95	25.6	25.2	12.1	48	0.70	94	97
Dwarf monkey flower	*Mimulus nanus*	0.04	95	0.8	4.93	1.60	32	0.11	93	93
Nelson's needlegrass	*Achnatherum nelsonii*	n/a	n/a	n/a	16.86	11.63	69	0.96	92	85
Cushion buckwheat	*Eriogonum ovalifolium* var. *ovalifolium*	n/a	n/a	n/a	4.91	3.27	67	0.36	89	91
Western needlegrass	*Achnatherum occidentale*	n/a	n/a	n/a	4.21	2.92	69	0.26	91	85
Fern bush	*Chamaebatiaria millefolium*	n/a	n/a	n/a	2.85	2.23	78	0.88	61	Not tested

Table 4. 2005 collections and seed cleanout percentages

Common Name	Species	Min. req. seed (lb)	Est. % cleanout	Est. min dry material (lb)	Collected dry material (lb)	Actual clean seed (lb)	Actual % cleanout (seed/dry)
Antelope bitterbrush	*Purshia tridentata*	0.31	55	0.6	41.11	19.00	46
Sulphurflower buckwheat	*Eriogonum umbellatum*	0.02	95	0.5	4.0	0.96	24
Dwarf buckwheat	*Eriogonum ovalifolium* var. *depressum*	0.21	95	4.14	0.4	0.03	8
Indian ricegrass	*Achnatherum hymenoides*	3.8	85	25.0	11.5	2.60	23
Sandberg bluegrass	*Poa secunda*	1.2	85	8.0	4.3	1.20	28
Scorpion weed	*Phacelia hastata*	1.28	95	25.6	11.5	1.11	10
Needlegrass mix	*Achnatherum* spp.	n/a	n/a	n/a	11.5	0.90	8

Table 5. Duration of seed harvests

		June			July			August			September			October		
Scientific Name	**Common Name**	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late
Achnatherum hymenoides	Indian Ricegrass															
Achnatherum nelsonii	Columbia Needlegrass															
Achnatherum occidentale	Western Needlegrass															
Achnatherum thurberianum	Thurber's Needlegrass															
Artemisia tridentata ssp. *vaseyana*	Mountain Big Sagebrush															
Chaenactis douglasii	Dusky Maiden															
Chamaebatiaria millefolium	Fern Bush															
Ericameria nauseosa	Rubber Rabbitbrush															
Eriogonum ovalifolium	Cushion Buckwheat															
Eriogonum ovalifolium var *depressum*	Dwarf Buckwheat															
Eriogonum umbellatum	Sulphurflower Buckwheat															
Mimulus nanus	Dwarf Monkeyflower															
Penstemon deustus var. *deustus*	Hotrock Penstemon															
Phacelia hastata	Scorpionweed															
Pinus flexilis	Limber Pine															
Poa secunda	Sandberg's Bluegrass															
Purshia tridentata	Antelope Bitterbrush															

Table 6. Seed collection dates and rates

	Collecting dates		Hours collecting		Total seed collected (lb)		Lb seed/hr	
Species	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**
Antelope bitterbrush	7/15-7/26	7/25-7/26	11.6	28.0	0.82	19.00	0.07	0.68
Rabbitbrush	8/10-8/30	--	1.92	0.0	0.22	0.00	0.11	--
Limber Pine	8/19-8/24	--	3.17		1.58	0.00	0.50	--
Sulphurflower buckwheat	7/21-8/2	7/18-7/30	12.92	5.0	1.00	0.96	0.08	0.19
Hotrock penstemon	7/21	--	6.00	0.0	0.34	0.00	0.06	--
Dwarf buckwheat	6/16-7/13	7/11-7/28	8.17	6.2	0.12	0.03	0.01	0.005
Thurber's needlegrass	7/1-7/28	--	17.0	0.0	0.50	0.00	0.03	--
Indian ricegrass	7/7-8/13	7/6-7/21	57.5	15.1	1.40	2.60	0.02	0.17
Sandberg bluegrass	6/15-7/1	6/30-7/13	29.6	5.6	4.68	1.20	0.16	0.21
Dusky maiden	6/30-7/20	--	27.7	0.0	1.84	0.00	0.07	--
Scorpion weed	6/22-8/11	7/6-7/30	16.8	9.1	0.70	1.10	0.04	0.12
Dwarf monkey flower	6/16-7/28	--	9.5	0.0	0.11	0.00	0.01	--
Nelson's needlegrass	7/16-7/23	--	19.7	0.0	0.96	0.00	0.05	--
Cushion buckwheat	7/23-8/4	--	7.4	0.0	0.36	0.00	0.05	--
Western needlegrass	7/19-7/28	--	6.0	0.0	0.26	0.00	0.04	--
Fern bush	8/11-8/18	--	2.0	0.0	0.88	0.00	0.4	--
Needlegrass mix	--	6/30-7/30	0.0	22.1	0.00	0.90	--	0.04

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INTRODUCTION

In 2004 the Aberdeen Plant Materials Center (PMC) entered into an agreement with Craters of the Moon National Monument (CNM) to produce seed and plants of thirteen native plant species for use in revegetation of disturbed areas following construction.

ACCOMPLISHMENTS

During the summer of 2005, technicians from CNM hand collected additional seed for those species with inadequate seed supplies from the prior year collections. These materials were dried, bagged and transported to the PMC. In November 2005, PMC technicians cleaned the seed using the small-lot-seed-cleaning facilities at Aberdeen. The 2005 collection of needlegrass could not be identified to a single species and most likely represents a composite of *Achnatherum* species. In the fall of 2005 the PMC began propagation of limber pine in the greenhouse. In late November, the PMC was notified that construction work and revegetation is delayed indefinitely. The PMC will continue to maintain the limber pine plants to the end of September and then make them available to CNM and hold all collected seed in cold storage until further notice.

Species	Scientific Name	Estimated minimum (lbs)	Collected 2004 (lbs)	Collected 2005 (lbs)	Total (lbs)
Antelope bitterbrush	*Purshia tridentata*	0.60	0.82	19.00	19.82
Rubber rabbitbrush	*Chrysothamnus nauseosus*	0.60	0.22	0.00	0.22
Mountain big sagebrush	*Artemisis tridentata* ssp. *vasseyana*	0.88	Not collected	0.00	0.00
Limber pine	*Pinus flexilis*	2.70 (cones)	1.58 (seed)	0.00	1.58
Sulphurflower buckwheat	*Eriogonum umbellatum*	0.50	1.00	0.96	1.96
Hotrock penstemon	*Penstemon deustus* var. *deustus*	0.06	0.34	0.00	0.34
Dwarf buckwheat	*Eriogonum ovalifolium* var. *depressum*	4.14	0.12	0.03	0.15
Thurber's needlegrass	*Achnatherum thurberianum*	25.04	0.50	0.00	0.50
Indian ricegrass	*Achnatherum hymenoides*	25.04	1.40	2.60	4.00
Sandberg bluegrass	*Poa secunda*	8.03	4.68	1.20	5.88
Dusty maiden	*Chaenactis douglassii*	33.60	1.84	0.00	1.84
Scorpion weed	*Phacelia hastata*	25.60	0.70	1.10	1.80
Dwarf monkey flower	*Mimulus nanus*	0.80	0.11	0.00	0.11
Needlegrass mix	*Achnatherum* spp.	n/a	0.00	0.90	0.90

TECHNOLOGY DEVELOPMENT

None.

BASIN WILDRYE ADVANCED EVALUATION
PROGRESS REPORT - JANUARY 9, 2007
DEREK J. TILLEY, RANGE CONSERVATIONIST (PLANTS)

INTRODUCTION

The purpose of this study is to evaluate the "Gund" collection of basin wildrye (*Leymus cinereus*) from Nevada for pre-varietal release potential. Basin wildrye is a perennial cool-season bunchgrass native to many of the northern cold-desert ecosystems of the Intermountain West and western Great Plains. Basin wildrye is commonly used in seed mixtures for rangeland erosion control, forage and cover seedings, wildlife habitat improvement, as well as in mine spoil and critical area stabilization projects. Currently there are three industry releases available, 'Magnar', 'Trailhead', and Washoe Germplasm. Magnar and Trailhead were both selected for drought tolerance, while Washoe Germplasm was selected for high tolerance to acidic conditions encountered in mine reclamation situations (Ogle et al, 2002).

MATERIALS AND METHODS

The trial is being conducted at the Aberdeen Plant Materials Center, Fish and Game farm located approximately 5 miles northeast of Aberdeen, Idaho. Experimental design was a randomized complete block with six replications. Individual plots were 20 feet long and contained one row with rows planted on three foot centers. Experimental design also contained plots of the three industry standards 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 test site was plowed in the fall of 2004 and subsequently disked and culti-packed in the spring 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. Seed was 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 in total annual precipitation. Weeds were controlled with herbicide treatments and between row cultivation.

The first evaluation was conducted on June 15, 2005 (27 days after planting) when most of the plants had reached the 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 are 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 occurred on September 15, 2005, prior to winter dormancy. Accessions were again evaluated for percent stand using the same method as discussed above. Additionally, it was planned at this point in the trial to evaluate treatments for plant height; however, due to weed pressure and weeds nearing the mature seed stage, the entire field was mowed to a height

of approximately four inches. For this reason, individual plants in each plot were selected and measured for average width (in inches) to provide additional plant measurement data.

The evaluations conducted during 2006 occurred between July 22 and 28. All plots were evaluated for above ground biomass, average plant height and seed yield. Plots were evaluated when the seeds within a plot were judged to be ready for harvest. 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 were cleaned to a visually estimated 90% purity. Forage samples were collected in paper sacks and allowed to air dry for two weeks prior to weighing.

All data from evaluations were subjected to an Analysis of Variance (ANOVA) and means were separated using a Tukey's multiple comparison test.

RESULTS

At the spring 2005 (establishment year) evaluation the highest percent stand was observed in the Trailhead plots (57.9 %) which did not differ significantly from the next highest rating of 52.6 % from Magnar (Table 1). The lowest stand came from Gund with 13.1 % which was significantly lower than the other three tested accessions. All three industry releases had significantly higher plant density than Gund (7.9, 7.6 and 5.8 plants/foot from Magnar, Trailhead and Washoe respectively versus 0.3 plants/foot from Gund). Gund also showed the poorest seedling vigor with a rating of 7.0 out of 9.0. The three other accessions differed significantly from Gund with vigor ratings from 2.7 to 1.3.

The fall evaluation similarly showed Gund performing significantly more poorly than the other three accessions being tested. Evaluation of percent stand showed the three industry releases rated highest to lowest as Washoe (65.0 %), Magnar (62.2 %) and Trailhead (57.8 %). Gund was rated at 16.7 %. Plant size, as measured in width, was greatest in the three releases. Average widths were 4.3, 4.2, and 4.0 inches for Washoe, Magnar and Trailhead respectively. Gund measured 2.3 inches.

The 2006 evaluation (first harvest year) included plant height, above ground biomass production and seed production. Magnar had the highest ratings in all three categories while Gund had the lowest. Due to poor stand establishment, Gund had zero seed produced in the harvested area, and very little forage production. Gund plants were significantly smaller than all other accessions tested.

DISCUSSION

At this point in the evaluation, the three known industry releases of basin wildrye have performed significantly better than the Gund collection in all aspects evaluated. Gund established poorly, and the established plants are smaller at maturity, produce less seed and biomass. These differences could be attributed to the industry releases being better adapted to the conditions found at the Aberdeen PMC farm. Provenance tests at other sites are advisable to determine if Gund displays superior traits under other conditions.

Table 1. Basin wildrye evaluation										
			% stand	Density[1/]	Vigor[2/]	% stand	Width (in)	Biomass (lb/ac)	Seed (lb/ac)	Height (in)
Accession		% PLS[3/]	6/15/05	6/15/05	6/15/05	9/16/05	9/16/05	2006	2006	2006
Gund		89.2	13.1 c[4/]	0.3 b	7.0 a	16.7 b	2.3 b	87 b	0 b	23 c
Magnar		87.5	52.6 ab	7.9 a	1.7 b	62.2 a	4.2 a	8231 a	150 a	62 a
Trailhead		89.6	57.9 a	7.6 a	1.3 b	57.8 a	4.0 a	4323 ab	39 ab	58 a
Washoe		72.0	40.4 b	5.8 a	2.7 b	65.0 a	4.3 a	3972 ab	125 ab	43 b

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

REFERENCES

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Comparison of methods for seeding Nebraska sedge (*Carex nebrascensis* Dewey [Cyperaceae]) and Baltic rush (*Juncus balticus* Willd. [Juncaceae])

Progress Report (January 23, 2006)
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INTRODUCTION

Restoration of wetlands is important but often difficult to accomplish. Vegetating wetlands with container grown greenhouse seedlings is expensive because of nursery production costs and the labor associated with outplanting in the field. A much simpler, more cost effective approach would be direct seeding by discing seedbeds on the project site, broadcasting seed, and packing or pressing seed into the soil. Unfortunately, direct seeding is usually not practiced because of unpredictable results and the lack of seed of the desired plant species.

Unpredictable results of direct seeding can often be traced to the three major requirements wetland species seed need to germinate: adequate heat, water, and light (Hoag 2000). Drilling or chaining, covers the seed with soil that blocks sunlight necessary for germination (Jones 1999; Hoag and others 2001). Further, broadcast seeding has yet to be proven successful because seed of most of the commonly used wetland species either float or can be easily displaced by water or wind (Hoag 2000). Often, these same species are perennial plants that spread primarily through vegetative reproduction and thus allocate less energy and effort into seed production. While proliferation of rhizomes is desirable for soil stabilization, these plants typically produce very little seed and the seed produced typically has low viability (Van der Valk and others 1999; Steed and DeWald 2003).

New technologies have been developed that may be adapted to the problems faced in direct seeding wetlands. Tackifiers commonly used for hydro-seeding are available to glue seed to the soil. Another product, Submerseed™ from Aquablok Industries (Toledo, Ohio), involves binding seed with clay or clay-sized material and organic polymers to a dense aggregate core (Figure 1). These aggregates absorb water and sink, preventing seeds from floating to the surface (Krauss 2004; Submerseed 2005). In preliminary testing using these products, our results showed excellent germination rates without seed loss due to washout (Figure 2).

Figure 1. Submerseed™ particles incorporated with alkali bulrush seeds.

In this study, we tested the effectiveness of 4 seeding methods when followed by a single simulated flooding event to determine which (if any) method provides greater establishment success. The 4 seeding methods included: 1) tackifier to simulate a hydro-seeding; 2) Submerseed™; 3) surface pressed to simulate broadcast seeding

followed by a lawn roller or seed imprinter; and 4) drilled to simulate use of a seed drill with packer wheels.

MATERIALS AND METHODS

Figure 2. Submerseed™ particle with *Juncus* seedlings (six days after planting).

The experiment was conducted at the USDA Natural Resources Conservation Service Plant Materials Center in Aberdeen, Idaho. Seed of Nebraska sedge (*Carex nebrascensis* Dewey [Cyperaceae]) and Baltic rush (*Juncus balticus* Willd. [Juncaceae] (Table 1) were planted on 20 April 2005 into 56 cm x 41 cm (22 in x 16 in) greenhouse trays filled with a 1:1:1 (v:v:v) mix of peat, perlite and sand. Rows were created using an imprinting jig designed to make eight, 31 cm (12 in) rows, 6 mm (0.25 in) wide and 6 mm (0.25 in) deep. Treatments were placed in a randomized complete block design with 8 replicates. For both the surface pressed and drilled treatments, seed was broadcast by hand at a rate of 0.10 g seeds per row for *Carex* and 0.05 g seeds per row for *Juncus* providing approximately 185 *Carex* and 770 *Juncus* seeds/row. Seed in the drilled and surface pressed rows were then pressed into the soil using the imprinting jig to provide good seed to soil contact. Drilled rows were then covered with approximately 6 mm (0.25 in) of soil mix that was lightly pressed into the rows by hand. Tackifier treatments were applied as a tackifier—seed slurry using 0.05 g Turbo Tack High Performance Tackifier (Turbo Turf 2004) in 125 ml water with 0.80 g *Carex* seed or 0.40 g *Juncus* seed. The slurry was well agitated in a beaker and poured into the rows by hand. When poured over the 8 replicates this provided approximately the same seeding rate as the drilled and surface pressed treatments. Submerseed pellets were planted by hand at 20 pellets per row. With approximately 2 *Carex* seeds or 5 *Juncus* seeds per pellet, this provided about 40 *Carex* or 100 *Juncus* seeds per row.

Table 1. Seed origin and characteristics.

Species	Common name	Collection location	Collection date	% Purity	% Viability	Estimated seeds/lb
Carex nebrascensis	Nebraska sedge	ID PMC wetland ponds	2000	99	88	840,000
Juncus balticus	Baltic rush	Sterling Wildlife Management Area, Bingham County, ID	2004	99	90	7,000,000

The greenhouse trays were placed in a 1.2 m x 2.4 m x 0.3 m (4 ft x 8 ft x 1 ft) tank that was used to simulate a natural wetland in the PMC greenhouse (Figure 3). Water was added slowly to the tank allowing the trays to saturate from the bottom up to remove any air pockets in the medium. Water was then allowed to slowly spill over the edges of the greenhouse trays and into the rows. The tank was flooded until the water line was about 1.3 cm (0.5 in) above the medium surface. We then agitated the water in the tank by hand to create a current which would displace any floating seeds. After about 1 h the tank was drained until the water was just deep enough to keep the medium saturated. The tank was then covered with a clear sheet of plastic to maintain

high temperatures and high humidity optimum for seed germination. Daily temperatures ranged between 24 and 38 C (75 and 100 F).

Figure 3. Artificial wetland tank with greenhouse flats.

Rows were evaluated on 5 May 2005 (15 days after planting) for number of seeds germinated directly within the rows. Plants between rows were considered to be from displaced seeds and were not counted. *Carex* rows were evaluated for the number of plants for the entire 31 cm (12 in) of row, while *Juncus* rows were only evaluated in the middle 10 cm (4 in) because of the large number of seedlings in the *Juncus* rows. Percentage germination was determined by dividing the number of seedlings found by the estimated number of seeds placed in the rows (*Carex*) or row segment (*Juncus*). Data were then subjected to a single factor analysis of variance (ANOVA) and means separated using the Tukey test with a significance level of 0.05 (Zar 1999).

RESULTS

During the flooding we observed numerous seeds floating and being displaced from their rows, especially from the tackifier and surface pressed treatments. These were presumably displaced and redeposited in a random fashion throughout the tank.

Percentage of seed germination within rows was significantly greater for both species with the Submerseed treatment (Table 2). Submerseed pellets did not float and seemed to provide an excellent medium for seed germination. Statistically, the other 3 treatments were not significantly different, except for *Carex* where seed drilling yielded significantly lower germination than the tackifier—seed slurry and surface pressed treatments. Percentage germination was lowest for both species in the drilled treatment. .

Table 2. Percent of seed that remained in place and germinated following a simulated flood event.

Treatment	*Carex*	*Juncus*
Tackifier	22b[1/]	23b
Submerseed	57a	66a
Drill Press	6c	4b
Surface Press	14bc	16b

[1/]Means followed by the same letter are not significantly different. $p \leq 0.05$

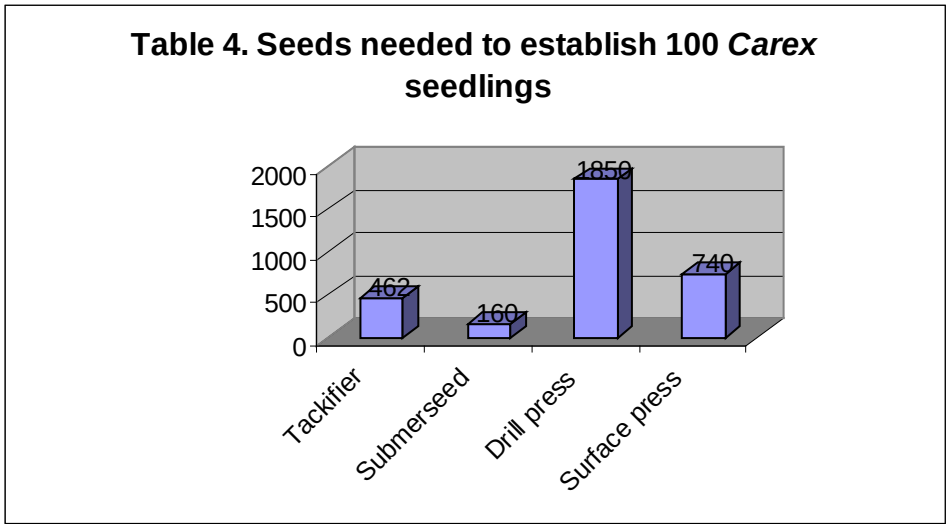
Because a much lower seeding rate was used in the Submerseed treatment (40 *Carex* and 100 *Juncus* seeds/row) than in the tackifier, drilled, and surface pressed treatments (185 *Carex* and 770 *Juncus* seeds/row), certain treatments, especially tackifier—seed slurry and surface pressed,

yielded more seedlings per row than Submerseed despite apparently high levels of seed washout (Table 3). In both species the tackifier—seed slurry and surface pressed treatments were not significantly different from each other, but significantly different from Submerseed and drill treatments.

Table 3. Number of seedlings per segment of row.		
	Carex	*Juncus*
Treatment	#/12" of row	#/4" of row
Tackifier	40a[1/]	57a
Submerseed	23b	22bc
Drill Press	11b	10c
Surface Press	26ab	41ab
[1/]Means followed by the same letter are not significantly different. p≤ 0.05		

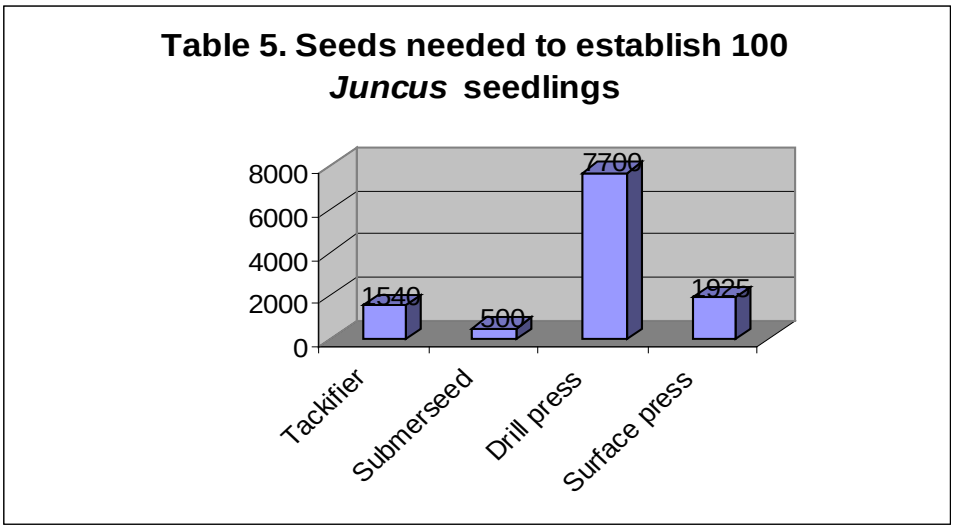
MANAGEMENT IMPLICATIONS

Our results indicate that several options are available for direct seeding wetlands, but drilling seeds is not one of them. If seed is in limited supply and (or) it is important to maintain a uniform planting density, Submerseed has the greatest ability to keep seed in place and provide adequate germination. Tables 4 and 5 show the approximate number of seeds required to establish 100 seedlings for each method. In all cases, Submerseed is most efficient followed by tackifier, surface pressing and finally drilling. For Submerseed, a seeding rate of 200 pellets/m2 (20 pellets/ft²) amounts to approximately 2.25 kg PLS/ha (2.0 lb PLS/ac) of *Carex* and 0.7 kg PLS/ha (0.6 lb PLS/ac) for *Juncus*. Submerseed would require an initial cost for processing the seeds you provide, but pellets can probably be applied to the site at relatively low costs either by tossing pellets from a bucket by hand or by spreading them using a hand-pushed or ATV-pulled fertilizer spreader.



Conversely, if seed is in good supply and movement of seed and possible non-uniform spacing of subsequent plants is not a concern, then good stands can be achieved by using tackifier in a hydro-seeding situation, or by surface pressing the seeds into the soil with a roller or imprinter. Using either the tackifier or surface pressed treatments, however, would require two to three times as much seed as a Submerseed application to obtain equivalent stands. Applying seed in a

slurry with tackifer requires specialized equipment and will probably require contracting with private hydro-seeding operators. Surface pressed methods can be achieved by first broadcasting the seeds by hand or with a mechanical broadcaster followed by a roller or imprinter.



Controlling water levels and flows is probably the most important factor in direct seeding wetlands. Our trial only looked at a single flooding event followed by saturated soil conditions. This may not be representative of natural conditions encountered when seeding a wetland. Multiple flooding events and stronger flows certainly have the potential to wash away or bury more seed than occurred in our study. Long periods of high water levels can also reduce seed-to-soil contact, dissolve tackifier, or degrade submerseed clays and polymers, all of which would release more seed into the water. A high sediment load in the flood waters also has potential of covering surface pressed seeds, tackifier seeds, and Submerseed as the water evaporates or recedes into the soil.

We recommend that additional studies be conducted in the field to determine appropriate seeding rates for each of these methods. We have studies planned to test these direct seeding methods under field conditions in artificial and natural wetlands, and to compare these studies with the cost and effectiveness of greenhouse propagated plugs.

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JUNCUS DIRECT SEEDING METHOD EVALUATION, 2006-2008
STUDY NUMBER: IDPMC-T-0604-WE
2006 PROGRESS REPORT
Derek J. Tilley, Range Conservationist (Plants)
5 September 2006

GOAL: To find what techniques are most efficient and cost effective for seeding Baltic rush (*Juncus balticus*), and to develop seeding rates for use with those methods that will provide adequate establishment for wetland revegetation.

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 will take place in 2007 with the most promising performers from trial 1 and compare each against Submerseed pellets in a controlled outdoor seeding in 4' X 8' tanks. Both of 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 will be chemically treated in 2006 and fumigated in 2007 to ensure a clean, weed-free seed bed for use in seeding evaluations that will take place in 2008.

TRIAL 1- EVALUATION OF BROADCAST CARRIERS AND HYDROMULCHES

Introduction
Spreading seed of very small seeded species has certain inherent difficulties. Many seeders require a minimum volume of seed to prime the seed box. Our commonly used wetland species produce very small seed, over 90 million seeds/pound in the case of Baltic rush, and would be extremely difficult to seed even a large area. Inert carriers have been found to be an effective method of increasing the volume of seeded material and facilitating uniform distribution of seed from the drill or broadcast spreader (St. John and others 2005). Recommended dry inert carriers include rice hulls, shop dry and sand. Hydroseed mulches can also act as an inert carrier in liquid form, much like rice hulls used for dryland plantings. The mulch keeps seed in suspension for more uniform dispersal and also provides structure allowing seed and tackifier to more readily attach to the soil surface. Baltic rush was chosen for this study because the seed exemplifies the problems faced in direct seeding wetlands, i.e. small seeds that float and seed that requires surface planting to allow adequate light to germinate seed.

Materials and Methods
Because tackifier is designed to be used to hold grass and flower seed to dry lawns and slopes it was unknown if the glues could withstand sustained flooding and if so, at what rate tackifier should be applied for use in wetland seedings. "Turbo Tack" tackifier from Turbo Technologies Inc. was tested at 1x, 5x and 10x the recommended rate of tackifier with 100 seeds on Petri dish blotters by mixing seeds and tackifier in water and pouring it out onto saturated blotters. Each treatment contained six replications. The blotters and tackifier were allowed to dry overnight, and the blotters were then put under running water from a faucet to wash away any loose seed. Essentially no seed washout was observed, and no significant differences of seed washout were detected between treatments (data not shown). For these reasons a 5x rate of tackifier was used in trial 1 for ease of measuring and mixing for small scale greenhouse applications.

Trial 1 was initiated on April 17, 2006 and was concluded on May 8, 2006. Eight seeding techniques were evaluated; four dry methods including no carrier, rice hulls, shop dry and sand, and four wet or hydroseeding methods including tackifier (tackifier alone with seed and water), Fertile Fibers hydroseeding pellets, straw mulch and wood mulch.

Three replications of each treatment were seeded in 12" X 18" (1.5 ft²) greenhouse trays placed randomly in a 4' X 8' X 1' artificial wetland tank in the PMC greenhouse. Mulch was applied at the recommended rate of 2000 lb/ac or 31.5g/tray (McClure, 2006). Tackifier was applied in all wet treatments at 5X the recommended rate (0.25g/tray) which equates to 16.25 lb/ac. The seed used for this trial was Sterling Selection of Baltic Rush with a PLS of 89.1%. To more easily handle the very small amount of seed necessary, it was decided to use a very high seeding rate of 500 PLS/ft² (0.055g/tray). Hydroseeding applications were simulated by mixing seed, water, mulch and tackifier into a 2 liter kitchen measuring pitcher. The slurry was mixed and agitated for several minutes allowing tackifier crystals to dissolve and a uniform suspension to be made. The hydroseed slurry was then poured over the soil as evenly as possible. Any large clumps of mulch were smoothed out with a spoon. Hydroseed treatments were applied on April 17 and allowed to dry overnight to allow the tackifier to set (figure 1). Soil in each tray was a 1:1:1 mixture of peat, sand and perlite.

Figure 1. Treatments in greenhouse trays prior to flooding.

The dry treatments were initiated on April 18, so that all treatments could be flooded at the same time. Seed rates for the dry treatments were the same as those for the hydroseed treatments. Seed was mixed with approximately 1 tablespoon of inert carrier (2.0 g rice hulls, 10 g shop dry and 22 g sand). Inert carriers and seed were mixed in a small tray and spread as evenly as possible by hand over the soil. The no-carrier treatment was sprinkled by hand. Following broadcasting, the dry treatments were pressed into the soil with an imprinting jig designed to simulate a packer wheel.

The wetland tank was flooded on April 18 to a depth of approximately 2 inches above the top of the soil, and water was allowed to spill over the edge of the wetland tank. The overflowing of water caused any floating seed, mulch or inert material to be swept over the edge of the tank. This insured that no seed was spread to any other tray in the trial. All treatments were totally submerged for 15 minutes. After the first flooding, the water levels were dropped below the bottoms of the trays so the soil could dry slowly and optimum germination conditions could be met. Seventeen days after planting, on May 4, after the plants had a chance to become established and the soil was beginning to dry, the tanks were flooded again, this time for 24 hours, to test if established plants would wash out. Greenhouse temperatures ranged from 75 to 100º F for the length of the trial.

Seedling emergence was evaluated on May 1 (14 days after planting), and again on May 8 (21 days after planting) following the second flood. Four 2" X 12" strips running the 12" length of each tray were evaluated for seedling emergence. Germinants in each strip were totaled and

added together to avoid pseudo replication. This total was then divided by 750 expected germinants based on 500 PLS/ft² or 750 PLS/tray.

RESULTS

There seemed to be a lot of seed washing out from the dry broadcast treatments, significantly more than from FF and tackifier treatments. Straw and wood mulch appear to be too thick and may be covering *Juncus* seeds and prohibiting germination. A lighter mixture of straw or wood may serve as effective as Fertile Fibers or tackifier. It would be inaccurate to assume at this point that straw and wood mulches don't work, only that they don't work at the tested rates. Fertile Fibers appear to be a thin enough slurry to not cover seeds, and it also works as an effective inert carrier to disperse seed and hold it to the soil. Results from Fertile Fibers and tackifier alone seem promising enough to try these methods in the outdoor trial with 100 PLS/ft² as opposed to 500 PLS/ft. This matches seeding rate to be used with Submerseed pellets and is a more realistic rate for field applications.

Figure 2. Juncus seedlings after 21 days.

Table 1. Seedling Germination

Treatment	5/1 (after 1 flood) Plants/ft²	5/8 (after 2 floods) Plants/ft²
No carrier	44 c	50 b
Rice hulls	67 c	71 b
Shop dry	52 c	55 b
Sand	45 c	48 b
Fertile Fibers	311 a	300 a
Straw	74 c	100 b
Wood	31 c	42 b
Tackifier	211 b	206 a

Results were similar after the second flood treatment except seedling emergence in the Fertile Fibers treatment was not significantly different from the tackifier treatment. No significant gains or losses in number of seedlings were detected between the first and second flooding treatments (data not shown). This indicates that once plants are up and have initiated some root growth into the soil they are very unlikely to be washed out by low energy flooding.

PROPOSED TRIAL 2- OUTDOOR TRIAL OF BEST PERFORMERS

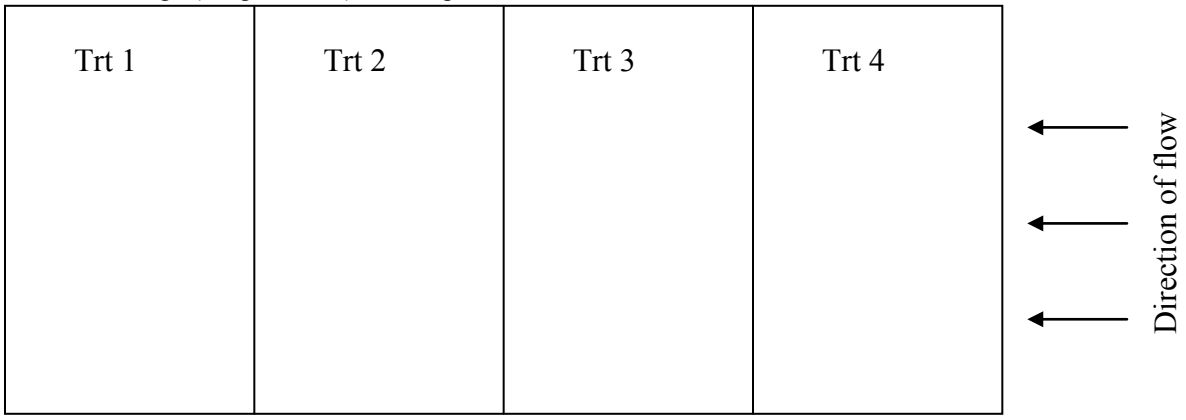
Based on the results from Trial 1 and results from Tilley and Hoag (2006) it is proposed that the following wetland seeding methods be evaluated under controlled, outdoor conditions during the summer of 2007.

- Submerseed
- Broadcast (rice hulls) w/ imprinter
- Hydroseed (tackifier w/o mulch)
- Hydroseed (Fertile Fibers)

This trial is designed to be a bridging step between greenhouse scale trials and large scale field experiments. The experimental design incorporates a high degree of water control and eliminates the concern of volunteer wetland plant germination.

The four treatments would be planted in five 4' X 8' wetland tanks placed outside at the PMC farm. Each tank would be divided into four 2' X 4' plots, one per each treatment. Each tank would thus represent one of five blocks or replications. Because the plot size is so small, seeding with a broadcaster or hydroseeder would be unfeasible; therefore seeding would have to be done in a manner similar to that described for trial 1. However, seed and tackifier rates could be adjusted to the rates recommended for large area plantings and germination rates would more accurately reflect those that might be observed in field plantings.

Pond trial design (5 replications); each rep is 2x4' or 8 ft².



The results of this trial will be used to generate a potential cost analysis between the available methods to revegetate wetlands. Factors such as seed cost, labor, and specialized equipment can be broken down to produce an approximate cost per acre for each method.

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Pre-soaking Dormant Willow and Cottonwood Cuttings

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February 24, 2006

Figure 1. *Cuttings of black cottonwood, coyote willow and peachleaf willow soaking in aerated water*.

Introduction

Dormant cuttings of willow species, cottonwood species and other riparian trees and shrubs are commonly used for restoring or repairing disturbed riparian areas, streambank and bioengineering projects (Schaff et al, 2002; Darris and Lambert, 1993; Hoag, 1993). In an effort to improve the establishment success of planted dormant cuttings, many people recommend pre-soaking the cuttings prior to planting. Some reasons given for soaking cuttings include 1) priming the cutting with water to reduce water stress during initial establishment and 2) initiating root and shoot development during soaking to allow roots and shoots to emerge more quickly following planting (Edwards and Kissock, 1975; Schaff et al, 2002). Schaff et al (2002) found pre-soaking for ten days significantly improved the number of live roots and shoots as well as overall survival rate in black willow (*Salix nigra* Marsh.) cuttings transplanted under greenhouse conditions. This paper is an overview of studies conducted at the Aberdeen Plant Materials Center during 2004 and 2005 to determine the effects of pre-soaking dormant cuttings of a number of western riparian willows and cottonwoods.

Greenhouse Trials, 2004

In 2004 several observational greenhouse studies were conducted involving the soaking of dormant cuttings from six species of western willows and cottonwoods: black cottonwood [*Populus balsamifera* ssp. *trichocarpa* (Torrey & Gray) Brayshaw], Drummond willow (*Salix drummondiana* Barratt), coyote willow (*S. exigua* Nuttall), Geyers willow (*S. geyeriana* Andersson), peachleaf willow (*S. amygdaloides* Anderson) and whiplash willow (*S. lucida* Muhlenberg). The purpose of these experiments was to compare the rate of production of root nodules between species, compare root nodule production rates under different temperatures, compare rate of root growth between species and to compare water uptake between species and different depths of water.

Nodule and root development/species

In this trial, root nodule development on soaked dormant cuttings was examined. Twenty-four, eighteen inch long cuttings, approximately 1 inch in diameter of each species were soaked in 12 inches of water in five gallon plastic buckets at the PMC greenhouse. Soaking began on April 9, 2004 and ran through May 8, 2004. At specific time intervals the cuttings were placed under a sheet of woven plastic with two, one inch sections cut out as windows through which to count root nodules. Cuttings were placed under the plastic sheet so the windows were over the fourth

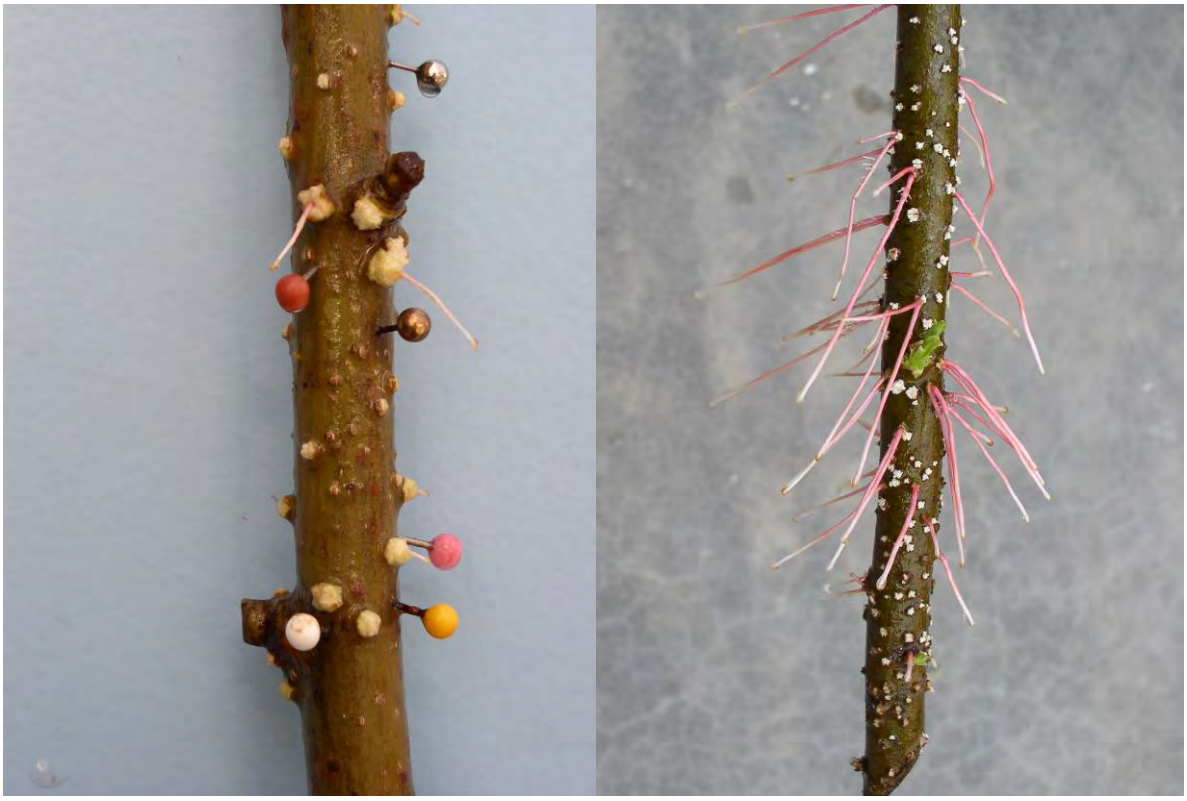


Figure 2. *Cuttings of black cottonwood (left) and peachleaf willow (right) after 13 days of soaking.*

and eleventh inch of the cuttings. Cuttings were rotated and root nodules were counted for the entire circumference of the cutting under each window. The cutting diameter was then used to calculate an average number of nodules per square inch of cutting. Nodules were marked with colored push pins to monitor root growth over time. This trial was conducted both in the greenhouse with controlled temperatures and outdoors to mimic natural temperature conditions.

Indoor greenhouse water temperatures were about 20º C for the entire study, while outdoor water temperatures ranged from 3º C at night at the beginning of the experiment to 25º C during the day toward the end of the trial.

Observations indicate that root nodule development varies dramatically by species (figure 2). The indoor trial of coyote willow quickly produced root nodules and maintained a steady development until reaching a density of approximately 3.5 nodules/in². Very few roots were produced from coyote willow cuttings. Roots were first observed between 7 and 12 days after nodule formation. Peachleaf and whiplash willow both had rapid nodule production followed by fast root production. Roots were first seen about seven days after the first nodules appeared and had grown to an average length of 30 to 60 mm by the thirteenth day following nodule development. Geyer willow showed similar root nodule development trends as peachleaf and whiplash willow but had very little root development or growth. Drummond willow showed slow development of root nodules coupled with little to no root development. Black cottonwood cuttings had the slowest development of root nodules of the species tested. This concurs with findings obtained by the USDA-NRCS Plant Materials Center in Pullman, WA (Stannard and Guenther, ?). Cuttings produced few roots up to 12 days after the nodule formation, but roots developed fairly rapidly after four additional days, averaging 20 mm in length. Similar trends were observed in both the indoor and outdoor trial except the outdoor cuttings did not start producing root nodule until water temperatures had increased to a temperature warm enough to initiate root formation.

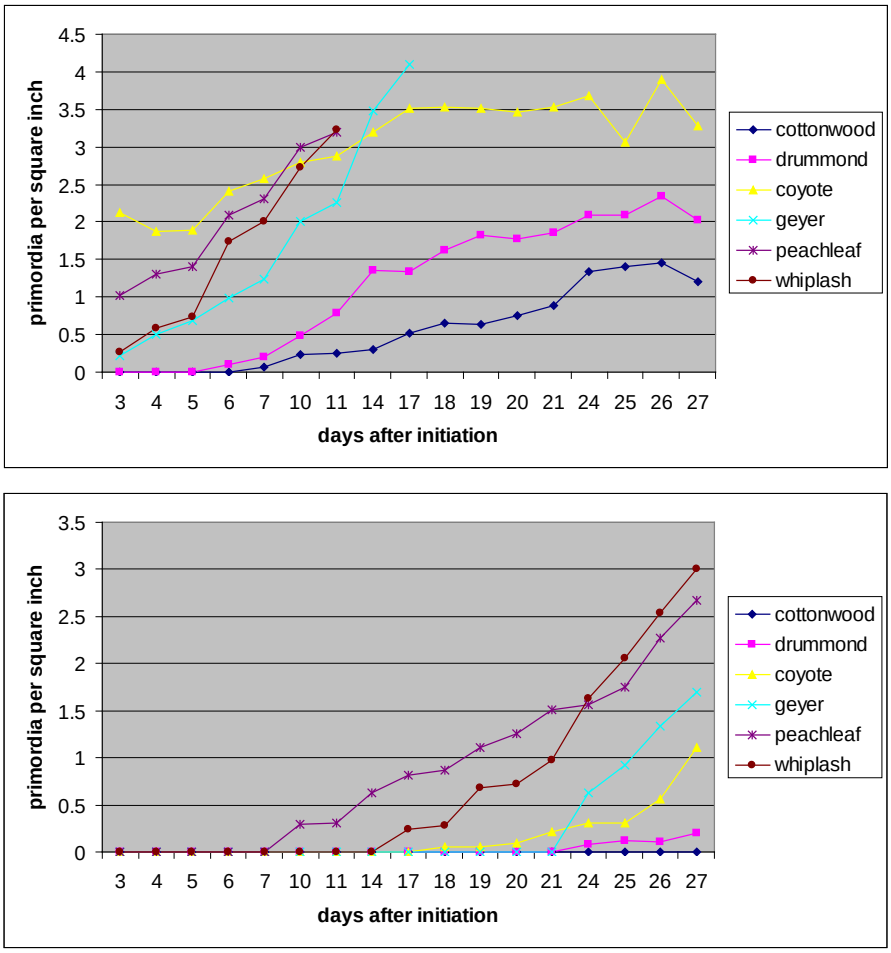


Figure 3. *Root nodule formation over time while soaking in warm greenhouse (above) and natural conditions (below).*

Root nodule formation temperature

Because of the differences observed between temperatures in the nodule and root development trial, we decided to attempt to determine the minimum temperature required for root nodule development. Sixteen 18 inch cuttings of peachleaf willow were soaked in 12 inches of water in five gallon buckets inside a germination chamber with constant temperatures of 3, 10, 15, 20 and 25º C. Cuttings were examined periodically to see when root nodule production began.

Root nodules were observed on cuttings in both the 25º and 20º C temperature treatments shortly after initiation of study (within 7 days). Under the 15º C treatment, root nodules were observed after approximately 10 days. In the 10º C treatment nodule were not observed until 20 days after initiation. In the coldest treatment (3º C) no nodules had formed after 28 days of soaking.

Although no minimum temperature was conclusively found for root nodule development our data show that under colder temperatures, cuttings require more time to develop nodules and thus roots and shoots. This information should be considered when using dormant willow cuttings in early spring or in mountain areas where water temperatures are low. Cuttings may require more soaking time under these conditions to see all the benefits of pre-soaking.

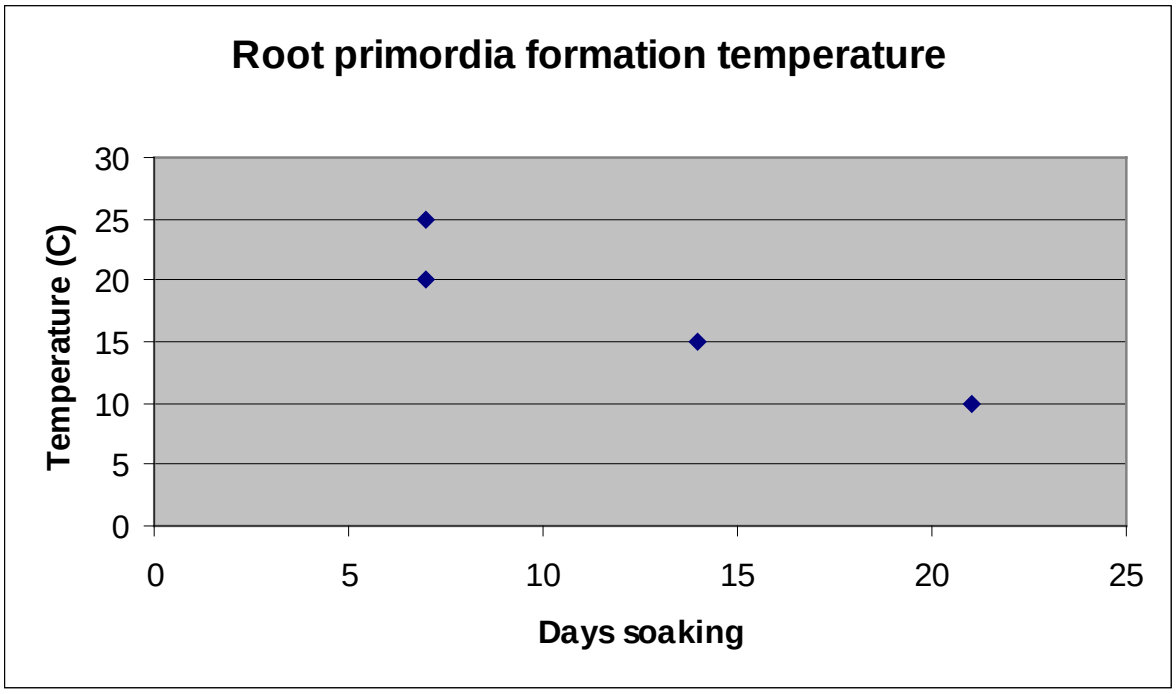


Figure 4. *Days until root nodule formation on peachleaf willow at constant temperatures.*

Figure 5. Bannock Creek study site prior to planting.

Field Trial, 2005

Abstract

In the 2005 study we examined the survival rate of three western riparian tree species, peachleaf willow, coyote willow and black cottonwood following five pre-planting treatments: 1) full soak- completely submerged in water with the cuttings laid horizontally in a 1.0' deep metal water tank for seven days, 2) full soak for 14 days, 3) partial soak- cuttings placed vertically in 18" of water in a plastic garbage can for seven days, 4) partial soak for 14 days, and 5) no pre-soaking. Our results indicate that different species require different pre-soaking treatments for best results. Peachleaf willow showed good survival and no significant difference between treatments; however trends indicated that partial soaking performed better than full soaking or no treatment. Coyote willow had better short-term survival from 7 day soaking treatments over 14 day soaking or no treatment. Black cottonwood showed significantly better survival from partial soaking treatments and no treatment versus fully soaking the cuttings. No significant differences were found for long term survival between treatments. This is most likely due to external factors such as weed competition, lack of cutting to soil contact and cutting placement in relation to the water table.

Materials and Methods

Dormant cuttings of peachleaf willow, coyote willow and black cottonwood were harvested between February 10 and March 14, 2005 at the Aberdeen Plant Materials Center Fish and Game Farm. Cuttings were 36" long and ranged from 1" to 2" in diameter for peachleaf willow and black cottonwood, and 0.5" to 1" for coyote willow at the base. All side and terminal branches were trimmed and the cuttings were stored in a cooler at 38º F until treatment.

Cuttings were divided into five treatments with an equal distribution of various sized cuttings to each treatment. Peachleaf willow and black cottonwood received 24 cuttings per treatment, and coyote willow received 22 cuttings per treatment. The five treatments were as follows: 1) full soak- completely submerged in water with the cuttings laid horizontally in a 1.0' deep metal water tank for seven days, 2) full soak for 14 days, 3) partial soak- cuttings placed vertically in 18" of water in a plastic garbage can for seven days, 4) partial soak for 14 days, and 5) no soak- left in the cooler until planting. All soaking treatments were aerated using a Profile 1500 Aquarium Air-pump in an attempt to increase oxygen levels. Martin et al (2004) found that higher levels of oxygen (>95%) increased shoot and root growth in black willows over low oxygen levels (<15%). Soaking treatments were all timed to end on the day of planting.

On May 18, 2005 cuttings were planted at Bannock Creek approximately 1.0 mile east of Arbon, ID (figure 5). This is a small stream with rocky to sandy soil. The streambanks are dominated by creeping foxtail (*Alopecurus arundinaceus* Poir) and have moderate rates of channel erosion. Prior to planting, weeds were cut to ground level using a gas powered weed trimmer. Cuttings were arranged at three foot intervals with coyote willow in one series closest to the stream and peachleaf willow and black cottonwood in a separate series approximately 18 inches higher up the bank. All cuttings were completely randomized within their series. Cuttings were planted using a water-jet stinger planting tool (Hoag et al, 2001) to a depth of approximately 24 inches with effort being made to reach the water table. A five person crew running two stinger nozzles off of one pump completed the entire planting in less than seven hours.

During planting, a shallow rocky layer was encountered in the soil profile. This layer proved difficult to penetrate with the water-jet stinger. As a result, it was necessary to work the stinger for longer periods of time in one space than is normally recommended. This resulted in washing much of the finer soil material from the hole. We noticed during the evaluation on June 15, 2005, that many of the holes had little to no sediment and entire cuttings were left exposed to the air. Very few, if any, of the cuttings found in this condition survived to the second evaluation.

Cuttings were evaluated on June 15, 2005 (28 days following planting) and September 22, 2005 (4 months after planting). Survival was determined by healthy green leaves or buds present on the cutting. Data were then analyzed using the chi-squared goodness of fit test with an alpha of 0.05 (Zar, 1999). The authors realize that the data obtained here will not represent the long-term survival for the planting. Future evaluations are scheduled for 2006 through 2010.

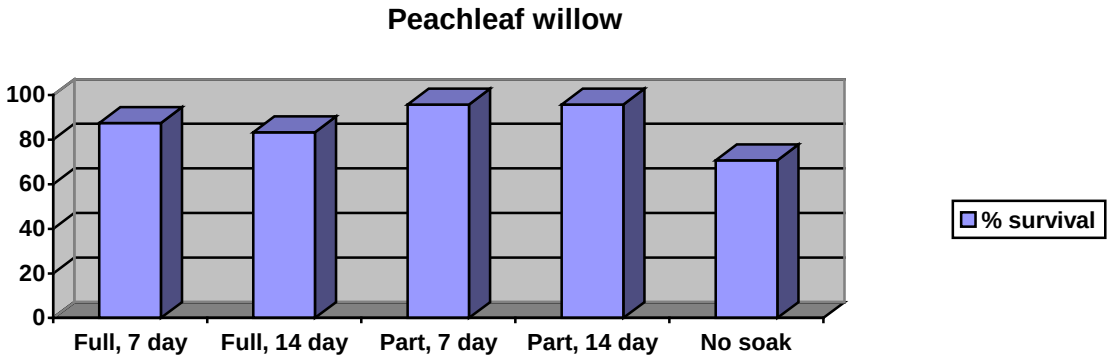
Results

Although the success rates for all treatments of peachleaf willow were extremely high (70.8 to 95.8 %), no significant difference was detected between survival rates for the five treatments ($0.75<p<0.90$). Partial soaking treatments for both seven days and 14 days had excellent survival (95.8%), while full soaking treatments had slightly lower percentages (87.5% from the seven day

treatment and 83.3% for the fourteen day soak). The no soak treatment resulted in the lowest survival rate of 70.8%.

Table 1. Peachleaf willow

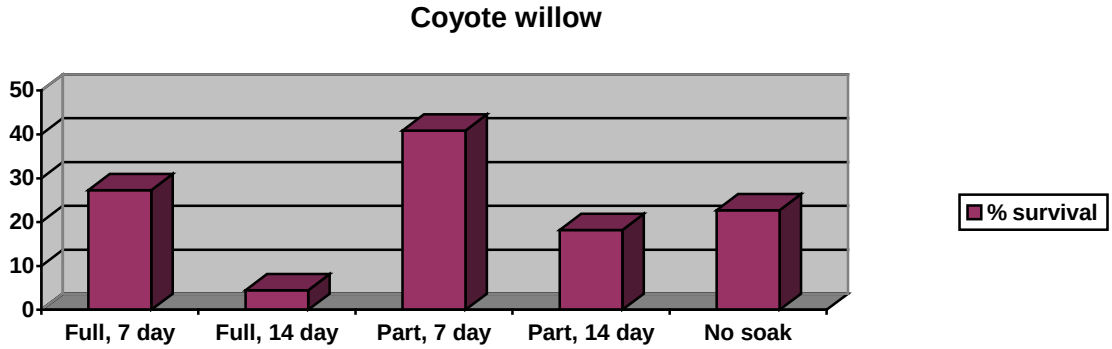
Treatment	Full, 7 day	Full, 14 day	Partial, 7 day	Partial, 14 day	No soak		
# samples	24	24	24	24	24	Total survived	Expected (total/5)
# survived	21 (87.5%)	20 (83.3%)	23 (95.8%)	23 (95.8%)	17 (70.8%)	104 (86.7%)	20.8



Coyote willow showed a much lower survival rate than peachleaf willow among all treatments (table 2). Both seven day soaking treatments performed better than all others, with a seven day partial soak having the best overall success (40.9%). The 14 day treatments had poorer survival rates than even the control. Despite the range of success, chi-squared analysis detected no significant difference between actual and expected results for any treatment ($0.10<p<0.25$).

Table 2. Coyote willow

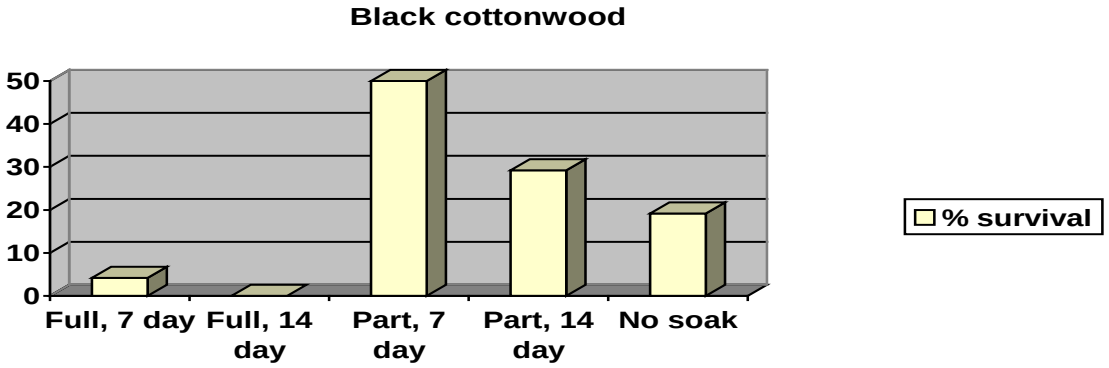
Treatment	Full, 7 day	Full, 14 day	Partial, 7 day	Partial, 14 day	No soak		
# samples	22	22	22	22	22	Total survived	Expected (total/5)
# survived	6 (27.3%)	1 (4.5%)	9 (40.9%)	4 (18.2%)	5 (22.7%)	25 (22.7%)	5



Black cottonwood showed much better survival from the partial soaking versus fully soaking treatments (table 3). Best results came from the partial, 7 day soak with 50% survival followed by the partial 14 day soak with 29% survival. The poorest survival results came from both treatments of fully soaking. The seven day, full soak yielded 4% survival while the full, 14 day soak had no survival. Significance was high between the partial, 7 day soak and the full, 14 day soak ($p<0.05$).

Table 3. Black Cottonwood

Treatment	Full, 7 day	Full, 14 day	Partial, 7 day	Partial, 14 day	No soak		
# samples	24	24	24	24	24	Total survived	Expected (total/5)
# survived	1 (4.2%)	0 (0.0%)	12 (50.0%)	7 (29.2%)	3 (12.5%)	23 (19.2%)	4.6

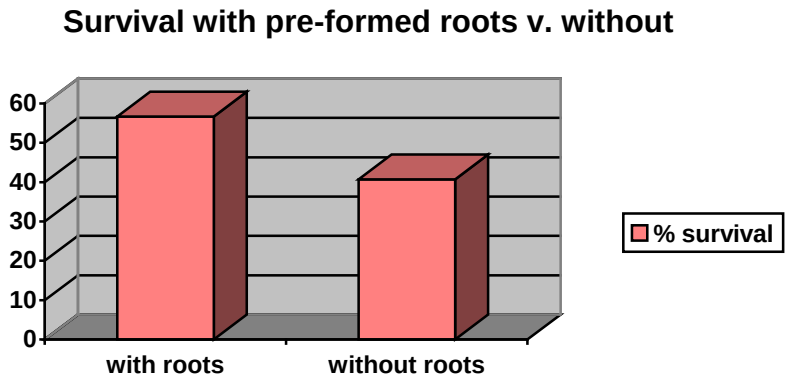


Roots versus no roots

Interestingly, roots were only produced in the partial soak treatments in all three species. It appears that the cuttings need to be at least somewhat exposed to the air in order for roots (or buds) to form. Of the 350 total cuttings used in the experiment, 60 had formed roots at least 0.25 inch long prior to planting. Of these 34 (56.7%) had survived to the first evaluation. In comparison, of the 290 cuttings without pre-formed roots, 118 (40.7%) survived.

Table 4. Roots versus without

	Cuttings with roots	Cuttings without roots	Total Cuttings
	60	290	350
Survived	34 (56.7%)	118 (40.7%)	152 (43.0%)
Expected	25.8	124.7	



The second evaluation took place on September 22, 2005 (4 months after planting). No significant differences between the treatments were found. Total survival per species is shown in table 5. Several factors may have affected the long term survival of the cuttings. Coarse gravelly soil forced planters to keep the water-jet stinger in the ground for longer periods of time than normal, which washed soil out of the holes. During the evaluations, many cuttings were found sitting loose in holes with very poor soil to stem contact. None of the cuttings found in this condition survived to the second evaluation. Also, several cuttings were planted too shallow in the soil because of rocks, resulting in the cutting not being deep enough in the water table. Additionally, heavy competition from perennial grasses (creeping foxtail, reed canarygrass, and quackgrass) may have shaded out cuttings and/or out-competed the cuttings for root space. The high survival rate of peachleaf willow in every treatment, however, suggests this species has very high cutting establishment vigor and it can survive competition better than other species in this study.

Table 5. Cutting survival as of 9/22/05.

	Total survival	% survival
Peachleaf willow	92/120	77
Coyote willow	6/110	5
Black cottonwood	9/120	8

Conclusions

Because this trial was conducted under natural field conditions, we encountered several unexpected challenges which may have affected the results of the experiment. Fluctuating water levels, rocky soil conditions and competition from competitive grasses all played a roll in the survival of the cuttings. More reliable data may be obtained by conducting similar experiments under more controlled conditions (i.e. in irrigated pasture or farmland), but the information provided here shows the reality of field riparian plantings. Placement of the dormant cutting into the proper soil/water profile with good soil to stem contact is probably more critical and important than pre-soaking the cutting. Weed control can also play an important role in cutting survival. By late summer the perennial grasses had grown well over the tops of our cuttings providing competition for root space, nutrients, moisture and sunlight. It is likely that chemical weed treatments prior to planting would have provided much better control of weedy grasses and increased the chance of cutting survival.

Some pre-soaking treatments of dormant cuttings seem to provide increased survival rates during the initial establishment period. Our results show that each species tested here reacts differently

to the various soaking treatments. Care should be taken to use the most beneficial soaking treatment for the species being planted. More testing is necessary to develop soaking protocols for the different riparian species being used in revegetation efforts throughout the Intermountain West. Our results indicate that cuttings with pre-formed roots survive better than cuttings without roots. Many roots are being broken and shorn off during transport and planting; however root tips that have not yet emerged from the nodules are near the surface of the cutting and quickly emerge and aid in moisture and nutrient uptake following planting.

Based on this work and other studies cited herein, it is our recommendation that dormant cuttings be pre-soaked in well oxygenated water for approximately 7 days, depending on species and temperature, prior to planting. When possible, cuttings should be soaked in warm water to allow for faster nodule formation and root initiation. Care should be taken not to completely submerge cuttings in order for roots and shoots to form. Cuttings should be planted when there are large numbers of root nodules but few emergent roots. Certain species will establish and survive more readily from dormant cuttings. Those which quickly produce root nodules followed by rapid formation and elongation of roots while soaking are more likely to survive the stressful conditions of planting. Always chose the species best suited to the local conditions (ie moisture availability, soil type and structure, elevation and climate).

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Stratification Requirements for Sulphurflower and Whorled Buckwheat

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August 2, 2006

Introduction

Sulphurflower buckwheat (*Eriogonum umbellatum*) and whorled buckwheat (*E. heracleoides*) are low stature perennial forbs native to the Rocky Mountains and Intermountain West. The two species are similar, but whorled buckwheat typically has a ring, or whorl, of leaves mid-way up the otherwise leafless stem. Whorled buckwheat flowers are generally cream-white in color while sulphurflower flowers are a bright yellow. Both species grow in mountain foothill to mountain plant communities including sagebrush, mountain shrub, pygmy conifer, and alpine plant communities on rocky/gravelly soil. Sulphurflower typically occupies sites higher in elevation than whorled buckwheat, ranging from 4,500 to over 12,000 feet. Whorled buckwheat ranges from about 3,500 to 10,000 feet. However their ranges overlap significantly and plants can often be found in close proximity to one another.

Buckwheat species show a high potential for use in revegetation and restoration efforts in the western states. Currently there is a high demand for native forb releases for use by Bureau of Land Management, Forest Service, Fish and Wildlife Service and other federal, state and local government agencies, as well as private landowners. Buckwheat has also been identified as important to the life cycle of sage grouse (*Centrocercus urophasianus*). The flowers of the buckwheat plants attract insects during the spring which are the primary food source for sage grouse chicks. At this time there are only two commercial releases of wild buckwheat, 'Sierra' (*E. umbellatum*) from the Sierra Nevada Mountains of California, and 'Umatilla' (*E. niveum*) from northeastern Oregon. For these reasons, the Aberdeen, ID Plant Materials Center (PMC) is beginning an initial evaluation of Intermountain West buckwheat collections for the development of a selected class release that will be well adapted to the Intermountain West.

Little is known about the propagation and management of native buckwheat species. The PMC successfully propagated sulphurflower buckwheat originating from northern California for small scale seed production in the mid 1990's without any seed treatment. Other studies have shown that buckwheat seeds require a period of cold and moist stratification to induce germination (Meyer and Paulsen, 2000). These studies indicate that populations from higher elevations with longer periods of cold and snow have longer pre-stratification requirements than those from lower, warmer sites. According to Dave Dyer, manager of the NRCS Plant Materials Center in Lockeford, California Seed from 'Sierra' sulphurflower buckwheat begins losing viability after one to three years (2006). More needs to be understood about propagating and seed storage of buckwheat species before commercial plant material production will be feasible.

Materials and Methods

Four accessions of buckwheat were evaluated for germination following one of three stratification treatments, 0, 30, or 60 days cold/moist stratification. CNM 514 is a collection of sulphurflower buckwheat from the Craters of the Moon National Monument in eastern Idaho; ERHE is a collection of whorled buckwheat from the same source. ERUM11 is a sulphurflower buckwheat collection made by Nancy Shaw, USDA-FS, at Slater Creek, ID. The commercial

release, 'Sierra' sulphurflower buckwheat was included as a standard for comparison (table 1). All seed was collected in 2005 with the exception of 'Sierra' which was produced commercially in 2003.

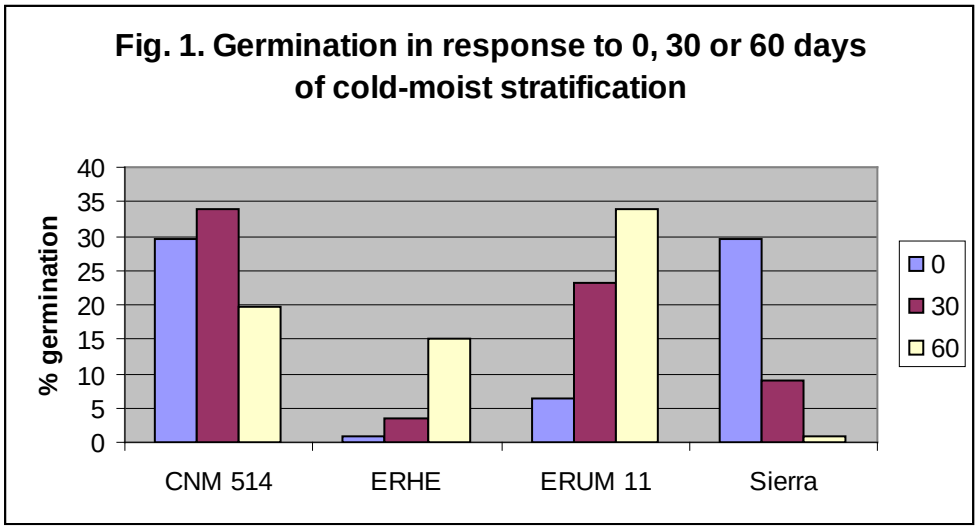
Table 1. Accession and origin

Accession	Species	Location	Approximate Elevation (ft)
CNM 514	*E. umbellatum*	Craters of the Moon NM, ID	5,500
ERHE	*E. heracleoides*	Craters of the Moon NM, ID	5,500
ERUM11	*E. umbellatum*	Slater Creek, ID	unknown
Sierra	*E. umbellatum* ssp. *polyanthum*	South Lake Tahoe, CA	6,500

Seed to be tested was placed in cloth sacks and stapled shut. The sacks were then put in 8 oz plastic ointment jars and situated so the cloth sack was surrounded on all sides by sand mixed with soil moisture at field capacity. Jars were sealed and put in a refrigerator kept at a constant 35º F. After treatment, the seeds were planted in 10 in³ conetainers in the PMC greenhouse. The experimental design contained four replications of seven conetainers; each conetainer was planted with four seeds giving a total of 28 seeds per replication. The cones were evaluated for emergence six weeks after planting. Percent germination was determined as the total number of germinants per replication divided by 28 * 100. Data were analyzed with Statistix 8 analytical software using an Analysis of Variance to determine significance, followed by a Tukey's test to separate means.

Results

Our results showed trends in response to treatment within populations, but these trends did not hold for all accessions of the species. Two of the four accessions tested (ERHE and ERUM11) showed a definite trend of greater germination resulting from longer durations of stratification (figure 1). However, stratification treatments on CNM 514 did not differ from each other and showed a possible negative affect from the 60 day treatment. Sierra showed a distinct negative trend with the best germination coming from the non-treated seed and significantly poorer germination accompanying longer pre-treatments.



Discussion

These results suggest that there may be great variation between species and even populations of buckwheat with regard to stratification requirements. Some populations seem to have no pre-stratification requirement while others respond favorably to a 60 day or longer stratification. However, age of seed was not considered in this experiment and may prove to be a factor in germination. Some species show higher dormancy levels in fresh seed versus older seed. If this is the case for *Eriogonum* species, it would explain why Sierra, collected in 2003, showed decreasing levels of germination with longer periods of stratification. For greenhouse propagated materials, it may be necessary to test individual accessions to determine the best propagation protocol. However, for seed production and range planting, especially of seed collected from Intermountain West populations, the best practice appears to be dormant seeding in late fall to naturally stratify the seed.

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Muttongrass Advanced Evaluation Planting
Study Number: IDPMC-P-0602-RA

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Progress Report October 1, 2006: Establishment Year

Introduction

Muttongrass (or mutton bluegrass), (*Poa fendleriana* Steud. [Vasey]) is an important late successional understory component in juniper and piñon-juniper communities. It is a perennial bunchgrass growing 0.7 to 2.5 feet tall with narrow leaves (1 to 3mm wide). The species is generally considered apomyptic (not requiring fertilization for seed production). The flowers are typically pistillate (only female), but occasional staminate (male) flowers arise giving the species the ability to hybridize with other bluegrasses (Welsh and others 2003). The species is highly drought tolerant and has potential for use in restoration and native diversification projects throughout the West. Its natural range covers southern Canada to Texas and east to the Dakotas. At present there are no industry releases.

In June 1995, Loren St. John (Team Leader, Idaho PMC) and Paul Sladish (NRCS Field Office, Caliente, NV) collected accession 9076402 of "*Poa* sp." in Lincoln County, NV to be included in an initial evaluation trial of the Sandberg bluegrass (*Poa secunda* Presl) complex. In 1999, accession 9076402 was positively identified by Idaho State University Herbarium Curator, Jim Glennon, as muttongrass. Due to its high level of performance noted in the Sandberg bluegrass trial, a 0.10 acre initial seed increase field of 9076402 was planted in 2002 at the PMC home farm to produce seed for future evaluation.

This advanced evaluation trial was established to compare accession 9076402 with other muttongrass collections from the Intermountain West for the following characteristics: 1) establishment, 2) seedling vigor, 3) forage production, 4) seed production, 5) plant and stand longevity, and 6) ease of seed harvest, with the prospect of a future selected class release. The trial includes six accessions, one from the Utah Crop Improvement Association (U1-03), one accession from the Upper Colorado Environmental Plant Center (9024881), three accessions from the Utah Division of Wildlife Resources (U1-05, U2-05 and U3-05), and accession 9076402 from the Aberdeen PMC.

Materials and Methods

On May 5, 2006 the trial was seeded at the PMC Fish and Game Farm 3 miles north of Aberdeen, ID. The trial was planted at the north end of the existing Caribou-Targhee Native Grass Trial in Field 30. Experimental design was a randomized complete block with 4 replications of 20 foot rows. Each plot consisted of 1 row with 3' spacing. Border rows of Tegmar intermediate wheatgrass (*Thinopyrum intermedium* [Host] Barkworth & D. Dewey) were included to reduce edge effect. The target seeding rate was 50 pure live seeds (PLS) per foot of row based on recommended seeding rates from Ogle and others (2006). Seed weight was approximated at 890,000 seeds per pound (Monsen and others 2004). Viability was determined using the "popper method" (Ogle and Cornforth 2000). Seed packets were weighed out for each plot, and mixed with approximately 2.0g (1 tablespoon) of rice hulls for improved flow through the seeder. Seed was planted with a hand pushed belt seeder to a depth of 0.25 inches. Table 1

provides seed and planting information. Plots were irrigated as needed for establishment and weeds were controlled with between-row mechanical cultivation and a late season spray application of 2, 4-D.

Table 1. Seed and planting information

Accession or #	Source and contact	% viability	% purity	% PLS	lb/bu	Bulk/rep (g)
9076402	IDPMC	87	98.0	85.26	13.6	0.60
U1-03	UCIA-S. Kitchen	68	90*	61.2	15.3	0.83
9024881	UCEPC-S. Parr	67	91	61.6	13.6	0.83
U2-05	UTDWR-J.Vernon	56	90*	50.4	10.5	1.01
U3-05	UTDWR-J.Vernon	54	90*	48.6	12.3	1.05
U1-05	UTDWR-J.Vernon	62	73.6	45.6	13.1	1.19

* estimated 90% purity on collections w/o data

The plots were evaluated on June 12, 2006 for percent stand, plant density and seedling vigor. Plots were evaluated again on September 26, 2006 for percent stand, plant density, and seedling vigor as well as plant height. Percent stand was determined by stretching a 20' rope marked with one foot increments over the row. Increments intersecting a plant were counted and divided by 19 (the number of increments) to produce a percentage. For plant density, plants were counted in the center-most two feet of row in the plot and divided by 2 to provide plants per foot of row. Seedling vigor was measured on a subjective scale of one to nine (one being most healthy and nine being dead). Each plot was assessed and given a rating based on overall apparent vigor. For plant height, the plant closest to intersecting the five foot increment was measured at its tallest point in millimeters.

All data were analyzed using Statistix 8 Analytical Software. All data met the assumptions for the Analysis of Variance (unless otherwise specified) using Bartlett's test for equal variances, the Shapiro-Wilk normality test, and Tukey's test for non-additivity.

2006 Evaluations

No significant differences for percent stand, plant density or height were detected ($P<0.05$) for either evaluation date (table 2). Vigor data did not meet all of the assumptions for the ANOVA; therefore means were not separated statistically. All plants looked healthy and were growing well despite pressure from annual weeds such as cutleaf nightshade (*Solanum triflorum* Nuttall) and prostrate pigweed (*Amaranthus blitoides* S. Watson).

Table 2. 2006 Muttongrass evaluations (establishment year)

	% stand	Density (pl/ft)	Vigor	% stand	Density (pl/ft)	Vigor	Height (mm)
Accession or PI #	----------6/12/06----------			----------9/26/06----------			
9076402	53[a]	20[a]	1.00[b]	54[a]	7[a]	2.00[b]	85[a]
U1-03	58	13	1.00	46	5	2.00	74
9024881	64	20	1.00	53	5	2.50	69
U2-05	64	22	1.25	62	7	1.75	81
U3-05	67	25	1.00	59	8	2.00	76
U1-05	53	15	2.00	53	4	2.753	56

[a] No significant differences detected ($P<0.05$).
[b] Assumptions for ANOVA not met. No ANOVA performed.

Because this evaluation covers only the establishment year, it is too early to determine the feasibility of a release of any of the test accessions. In the spring of 2007 this study will be evaluated for percent stand, plant density and vigor to determine the winter-hardiness of the accessions and will also be evaluated for biomass (forage) and seed production. Forage and seed production data will continue to be collected in 2008, 2009 and possibly beyond to evaluate stand longevity and seed production sustainability.

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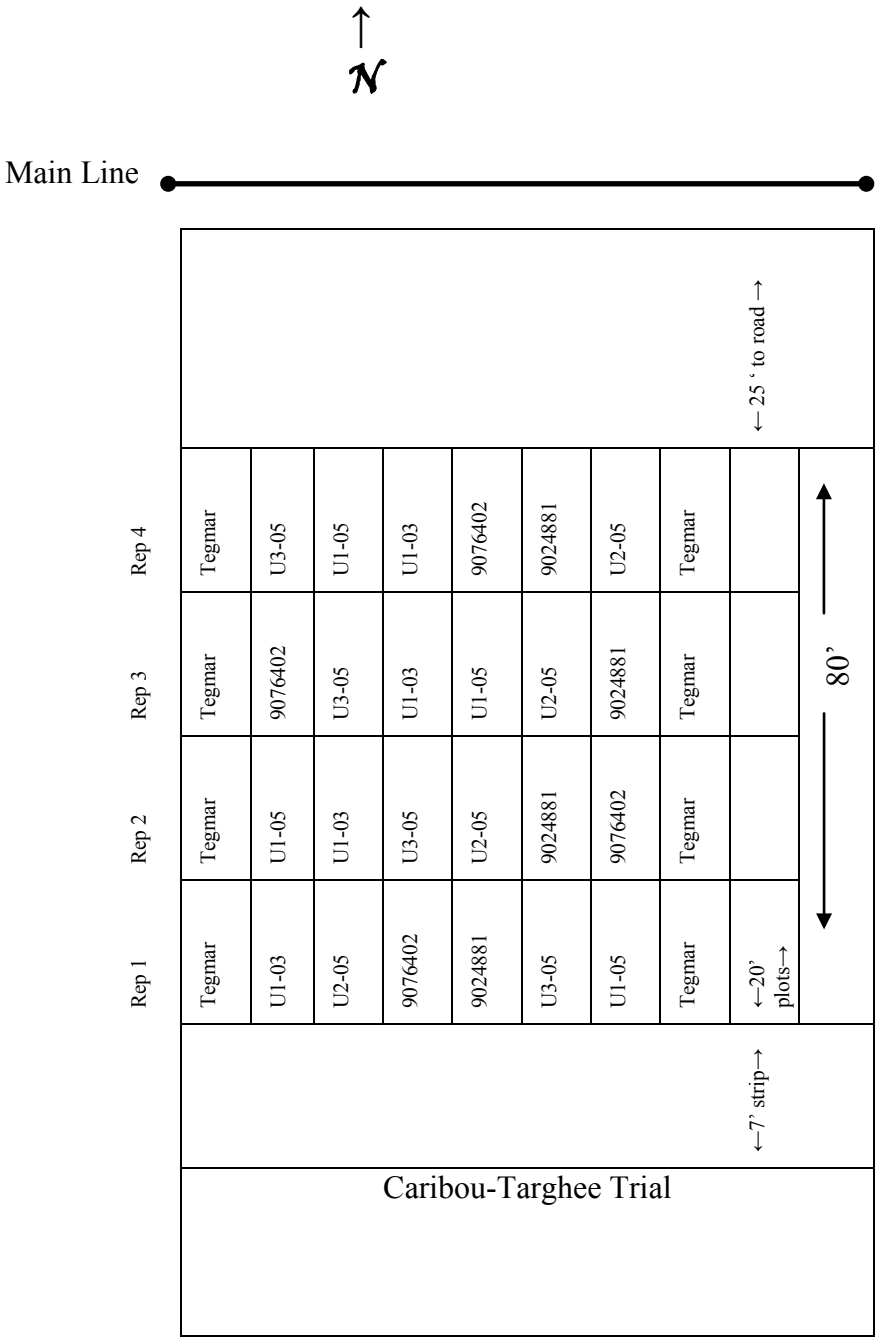
Muttongrass Advanced Evaluation Planting, 2006
Study Number: IDPMC-P-0602-RA
Field 30, North End



Growth Curve Study for Anatone Bluebunch Wheatgrass
Study Number: IDMPC-T-0605-RA

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October 1, 2006

Introduction

Land managers need to know and understand the phenology and forage production characteristics of different rangeland grasses to better manage grazing practices. The Aberdeen Plant Materials Center (PMC) initiated a growth curve development study in 2006 to create growth curve information for commonly grown rangeland species. Growth curves can be used as a tool to help adjust grazing management to protect and enhance rangeland values. For the first season of the study, it was decided to begin with a single species, bluebunch wheatgrass (*Pseudoroegneria spicata* Pursh [A. Löve]), and to use 'Anatone' germplasm as a representative variety.

Methods

On April 19, 2006 twenty Anatone plants were randomly chosen, flagged and labeled 1 to 20 at the PMC grass display nursery for sampling. All plants were planted and established in 2002 and have been grown and maintained under irrigated conditions designed to approximate 12 inches or less annual precipitation.

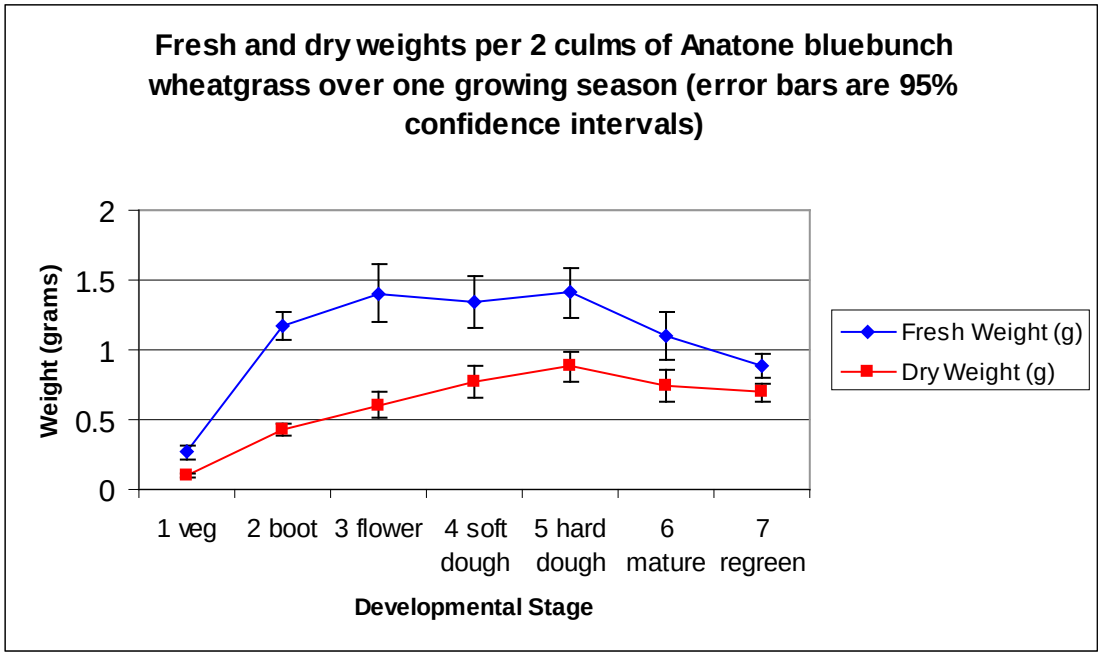
Two culms were cut from each plant at each of seven easily recognizable growth stages: vegetative, boot, flower, soft dough, hard dough, seed mature and fall greenup (or regreen). Samples were harvested as close to ground level as possible with scissors and transported in paper sacks. Samples were then weighed and fresh weights recorded. The first sample was then micro waved at 30 second intervals until weight change was no longer detectable or plants started to burn. Typically this ranged from 1 to 2 minutes. The total length of time required to dry sample 1 was then used to dry each of the remaining 19 samples. Dry weights were recorded and percent moisture extrapolated from those data.

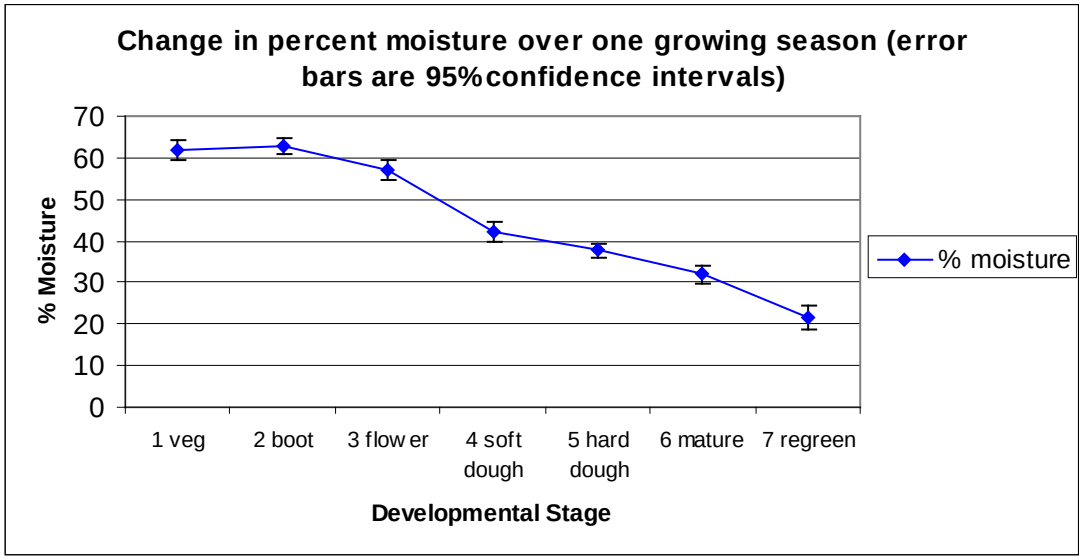
Developmental Stage	Sampling Date
Vegetative	19-Apr
Boot	22-May
Flower	5-Jun
Soft dough	20-Jun
Hard dough	28-Jun
Mature seed	13-Jul
Regreen	27-Sep

Results

Plants grew until they reached flowering stage then began to put more energy into producing seed instead of growing. Once seeds reach hard dough the plants started to dry out. The observed decrease in dry weight from hard dough to mature seed is probably the result of some seed shatter. Also, there is probably a point between stages 6 and 7 (mature seed and regreen) where

percent moisture is at its lowest; this is why we don't see an increase in percent moisture at the end. However, fall greenup mostly applies to a flush of new growth of culms and leaves, and not from rejuvenating or hydrating mature culms.





In 2007 the PMC plans to produce similar growth curves for the following species: Snake River wheatgrass (*Elymus wawawaiensis* J. Carlson & Barkworth), Idaho fescue (*Festuca idahoensis* Elmer), Sandberg bluegrass (*Poa secunda* J. Presl.) and basin wildrye (*Leymus cinereus* [Scribn. & Merr]) A. Löve).

OFF-CENTER ACTIVITIES

Truax Rough Rider Rangeland Drill - Modifications

Brent Cornforth, Boyd Simonson, Loren St. John
USDA-NRCS
Aberdeen Plant Materials Center

The cooperators of the IFAFS Project chose to use the Truax Rough Rider Rangeland drill to seed Experiment 1 (common garden studies) and Experiment 3 (restoration treatments) because the drill was considered the best available technology for rangeland seedings in the western United States.

Personnel from the USDA-NRCS Plant Materials Center (PMC) were responsible for completing modifications to ensure both small (10 x 20 foot) plots in Experiment 1 and large (acreage size) plots in Experiment 3 would be planted accurately.

The Truax drill was delivered to the PMC in July, 2003 so that modifications to the drill could be completed. Due to safety issues identified by the drill manufacturer, the drill was recalled to the factory in mid-August. The drill was returned to the PMC in late September, 2003. The following modifications were made prior to the first seeding project:

- Replace accordion style drop tubes with smooth, clear tubes to facilitate seed flow from the seed box
- Fabrication of V-shaped trough over individual seed cups to facilitate changing seed for each plot and cleanout between plots
- Mounted generator, vacuum cleaner and bag holder for changing seed between plots
- Mounted a handle on drive wheel for calibration and drill priming
- Modifications to facilitate calibration
- Removed agitator in cool season box to facilitate cleaning between plots
- Installed seats on drill platform
- Adjustment of press wheels to ensure accurate tracking behind openers

On October 19, 2003 PMC personnel transported the drill to the Canyon Creek Site to begin seeding the common garden study (Experiment 1). Due to the time constraints imposed by the recall of the drill in August, PMC personnel had not had a chance to actually test the drill under field conditions to determine how well the drill placed seed into the soil. It was assumed that the manufacturer had tested seed placement under rangeland conditions. Seeding began after delays in procuring the proper hitch and hydraulic connections between the drill and the tractor which was supplied by ARS.

Once seeding commenced, PMC personnel found seed bridging in the seed drop boot, drastically impeding seed flow to the soil. It was determined that the disk openers were not cutting a slot wide enough for seed to contact soil. The location where the seed left the boot was altered to direct more seed into the slot formed by the disk. Modifications to the drill while in the field were extremely limited due to lack of appropriate tools and materials. The Idaho sites (Canyon Creek and Cinder Cone Butte) were seeded under less than ideal conditions and a good portion of the seed was not adequately covered with soil by the drill.

The following week the Oregon sites were seeded. PMC personnel were able to make additional modifications prior to seeding. Seed tubes were extended past the boot re-directing where the seed dropped, which greatly improved seed placement. Drag chains were also installed behind the press wheels to improve seed coverage. The Nevada and Utah sites were seeded following completion of the Oregon sites.

Prior to the seeding occurring in the fall of 2004, the following additional modifications were completed:

- Wedges (from the manufacturer) were installed to adjust toe-in (7°) on disk openers (this widened the slot that the seed falls into)
- Added flute adjustment crank wheel to improve adjustment of calibration
- Constructed side load trailer ramps on 35 foot trailer in order to haul both the drill and tractor with one truck
- Constructed hitch pin sleeve to use with clevis-type tractor drawbar to reduce the amount of play in pintle eye on drill
- Fabricated pintle hitch for tractor loader in order to side load drill with tractor

The second year seeding of Experiment 1 plots were completed in late October and early November, 2004. The ability to transport both the tractor and drill from site to site with one truck improved the efficiency of the project. A cover crop (triticale) was seeded on the Experiment 3 site in early November. The additional modifications significantly improved the seed placement and soil cover of the seed. The drill performed very well in maintaining seeding depth which was set at ½ to ¾ inch depth for the small grain cover crop.

In 2005, a new drill was used to seed Experiment 3. Many of the modifications that were made to the drill used the prior 2 years were installed on the drill. Additional modifications included:

- Windshields added around seed cup drops to reduce seed loss during windy conditions

- Broadcast seeders added to alternate rows to facilitate planting shallow seeded species as well as deeper seeded species in a single operation

- Repositioned mounting brackets for broadcast seeders

This drill was used for the Crested Wheatgrass Diversification Project (Great Basin Native Plant Selection and Increase Project) and Experiment 3.

Mr. Jim Truax visited the seeding sites for the Crested Wheatgrass Diversification Projects in Utah and Oregon and was able to see how well the drill performed with the modifications that had been made. After the first seeding project was completed in Utah, Mr. Truax manufactured new seed drop boots that were steeper, to improve seed drop. The new boots were installed on the drill and were used in Oregon (Crested Wheatgrass Diversification Project) and the seeding of Experiment 3.

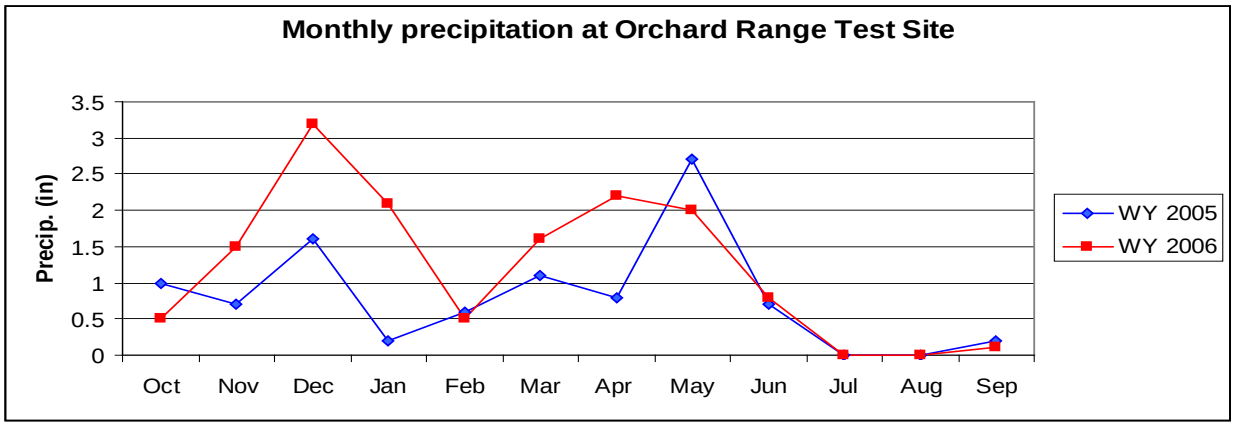
Since completion of the seedings in 2005, Mr. Truax has manufactured a new seed drop boot that should further improve seed placement. The new boot will be installed and used in upcoming seeding projects. All of the modifications that have been made have incrementally improved the performance of the Truax rangeland drill. The Truax rangeland drill is a vast improvement over the older rangeland drills which had very poor control of seeding depth.

The cooperators of the IFAFS project thank Mr. Jim Truax for providing the drill for the project and his willingness to work with the project to make improvements to the drill. The excellent cooperation will undoubtedly pay great dividends in future rangeland seeding projects throughout the western United States.

Orchard Display Nursery
Evaluation Summary (2005-2006)
Derek J. Tilley, Range Conservationist (Plants)
Loren St. John, Team Leader Aberdeen Plant Materials Center

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 contains 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, and total accumulated precipitation for water year 2006 was 14.4 inches (USDA 2006).



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. Plots were evaluated for initial establishment on April 27 and May 5, 2005. During the first evaluation most plots contained high numbers of Russian thistle (*Salsola* sp.) and moderate amounts of bur buttercup

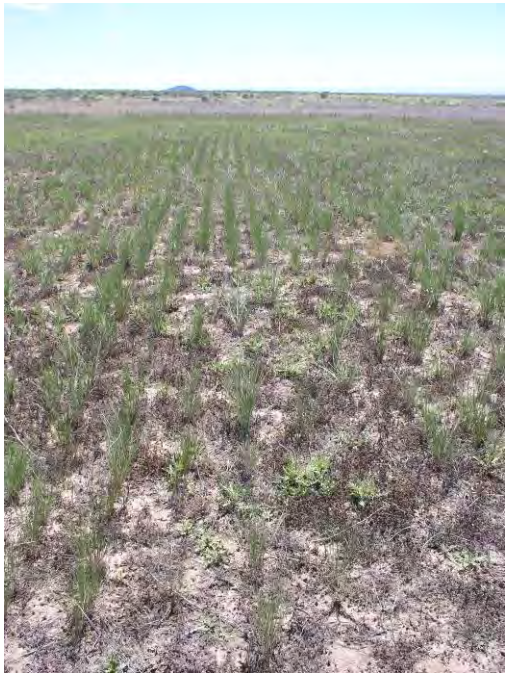
(*Ranunculus testiculatus* Crantz) plants. Russian thistle plants were approximately two to three inches tall and the buttercup plants had already flowered. At the time of the second evaluation, there was a heavy infestation of tumble mustard (*Sisymbrium altissimum* L.). Plots were consequently sprayed again on June 9, 2005 with 16 oz. 2, 4-D and 8 oz. Clarity per acre to control the mustard.

Materials and Methods

The first evaluation of the plots 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 of 2005 occurred on May 25, 2005. The 2006 evaluation was conducted on May 31.. The methods followed for 2006 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 in density from 2005 to 2006 with the exception of Covar sheep fescue and all of the Sandberg bluegrass accessions. These may have been plants that germinated late in the first growing season or, more likely, were too small to notice under the heavy growth of mustards and were more



Columbia bluebunch wheatgrass, May 2006

easily observed in 2006.

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. By 2006 there were no plants of any Indian ricegrass accessions observed in the evaluation grids and very few seen within their respective plots. In 2006 all squirreltail accessions had decreased. Fish Creek maintained the best plant density with 0.26 plants/ft^2. Bannock thickspike wheatgrass had a density of 1.04 plants/ft^2 and increased slightly to 1.07 plants/ft^2 at the second evaluation. In 2006 Bannock had dropped to nearly half of the original density to 0.58 plants/ft^2. 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. 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.

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. The three Snake River wheatgrasses dropped to just over 0.50 plants/ft^2. The basin wildrye accessions densities also decreased; U108-02 and Trailhead retained the highest densities at 0.24 and 0.26 plants/ft respectively. Sheep fescue stands remained poor from 2005 to 2006 with Covar slightly increasing from 0.00 to 0.07 plants/ft. Thurber's needlegrass had no plants in the evaluated grids. 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.

		4/27/05	**5/25/05**	**5/30/06**
Species	**Name or accession**	**Plants/ft²**	**Plants/ft²**	**Plants/ft²**
Indian ricegrass	Rimrock	0.37	0.20	0.00
	White River	0.56	0.17	0.00
	Nezpar	0.42	0.17	0.00
	Ribstone	0.14	0.09	0.00
	Paloma	0.05	0.00	0.00
Squirreltail	Fish Creek	0.97	0.54	0.26
	Shaniko Plateau	0.81	0.52	0.06
	Sand Hollow	0.37	0.20	0.19
	Toe Jam Creek	0.58	0.17	0.00
	9019219	0.02	0.02	0.00
Thickspike wheatgrass	Bannock	1.04	1.07	0.58
	Critana	0.90	0.56	0.24
	Schwendimar	0.69	0.52	0.39
	Sodar	0.37	0.30	0.15
Slender wheatgrass	Revenue	1.00	0.93	0.00
	San Luis	0.60	0.69	0.00
	Pryor	0.30	0.30	0.02
Western wheatgrass	Rodan	0.28	0.35	0.13
	Rosana	0.05	0.20	0.04
	Arriba	0.16	0.15	0.06
Bluebunch wheatgrass	P-12	1.34	1.59	1.04
	Wahluke	0.97	1.26	1.02
	Columbia	1.30	1.23	0.84

	P-7	0.93	1.15	0.67
	Anatone	0.81	1.15	0.80
	Jim Creek	0.83	1.02	1.02
	P-15	0.60	0.93	0.54
	P-5	0.42	0.61	0.22
	Goldar	0.51	0.37	0.33
Snake River wheatgrass	Expedition	1.27	1.44	0.54
	Secar	1.00	1.11	0.76
	SERDP	1.02	0.94	0.67
	E-26	0.21	0.23	0.22
Basin wildrye	U108-02	0.56	0.57	0.24
	Trailhead	0.60	0.52	0.26
	U100-01	0.53	0.41	0.11
	U70-01	0.30	0.22	0.02
	Magnar	0.28	0.22	0.04
	Washoe	0.21	0.09	0.09
Sheep fescue	Initial Point	0.21	0.04	0.02
	Covar	0.16	0.00	0.07
Thurber's needlegrass	Thurber's	0.00	0.00	0.00
Sandberg bluegrass	High Plains	0.25	0.00	0.54
	Sherman	0.00	0.00	0.02
	Mountain Home	0.00	0.00	0.35
	Toole County, MT	0.00	0.00	0.04
	Hanford Source	0.00	0.00	0.19

Introduced Grasses

Although many of the introduced grass accessions had fair emergence, we noted an outbreak of black grass bugs at the time of the first evaluation in 2005. 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 the crested wheatgrass plots were very small when compared to the other wheatgrasses in the nursery and still appear to be recovering from black grass bug pressure.

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. Both Siberian wheatgrass accessions similarly increased from 2005 to 2006, but the three pubescent wheatgrass accessions decreased with the highest density in 2006 coming from Manska at 0.28 plants/ft^2. Rush intermediate wheatgrass, along with Prairieland and Eejay Altai wildrye had zero plants in 2006. Pearl Altai wildrye had 0.02 plants/ft. 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.

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

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.

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

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 been 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. The low precipitation at the site, especially the lack of moisture in July and August of 2005, 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. 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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FIELD PLANTING, DEMONSTRATION AND DISTRICT SEED INCREASE EVALUATION SUMMARIES

PLANT MATERIALS

2006

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.

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 2007.**

ID04002 Dave Wattenburger Field Planting. Delar small burnet ordered August 19, 2003. Planting seeded fall 2004. No report FY05 and FY06.

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 no report.

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 no report.

FIELD OFFICE: COUER D'ALENE
None

FIELD OFFICE: PLUMMER
None

FIELD OFFICE: SANDPOINT
ID96029 Lee Johnson wood fiber mulch, Niner sideoats grama, Alma blue grama, annual rye, Durar hard fescue, Durar hard fescue/clover, prairie junegrass, and alpine bluegrass field plantings - tree nursery ground cover trial. Site loam soil (low to mod. permeability/high erosion potential), 5-10% slopes on SE exposure. FY96 planted 5/31/96. 1. Wood mulch is doing excellent job of weed control and no rodent activity to date - mulch was about 10 inches deep when applied 2. Excellent stand of annual rye established, Durar hard fescue plants are very small and establishing beneath cover crop 3. Many young Durar hard fescue plants were establishing, but very few clover plants - soil may have been too loose when seeded and clover seed may be too deep 4. Excellent initial stand of sideoats and blue grama establishing - could not tell which species was doing the best 5. Very few prairie junegrass plants establishing - appears some germination is occurring this fall 6. A lot of alpine bluegrass seedlings - appears germination did not occur until fall. FY97 and FY98 no evaluations. FY99 Treatment 1: Control no cover and normal weed control - 0 percent desirable cover with 50-80 weeds. Treatment 2: Cedar bark mulch 6-8 inches thick – 100 percent desirable cover in rows with 5 percent weeds invading mulch and some evidence of rodents in mulch. Trees near cedar mulch are more chlorotic than other treatments. Treatment 3: Durar hard fescue and annual ryegrass – 50-70 percent desirable cover with up to 20 percent weeds. Fescue blends provide more biomass than other seedings and good cover – almost 100 percent cover if mowed. Treatment 4: Durar hard fescue and Berseem annual clover – 60-80 percent desirable cover and up to 15 percent weeds. Treatment 5: blue grama and sideoats grama – 20-50 percent desirable cover with 30-80 percent weeds. Clearly the worst treatment in trial. Treatment 6: Prairie junegrass – 60-80 percent desirable cover and 10-15 percent weeds. A good alternative since this is a low growing cover. Treatment 7: Alpine bluegrass – 50-80 percent cover with 5-10 percent weeds. Less biomass produced than fescue or prairie junegrass. The alpine bluegrass produced more of a thick sod with seedheads 6-8 inches tall. This would be a better choice for nurseries that are concerned with the shading effect of taller grasses on lower branches. It also covers the ground better once established, especially in shady areas. One potential problem is its ability to spread, including into the tree rows. **This planting was canceled.**

ID00004 Paul Jayo Regar meadow brome field planting – irrigated/non-irrigated and hay/grazing trial. Seed ordered January 21, 2000 for delivery in early April. Site is 30-acre field with Hoodoo silt loam soil, 0-1 percent slopes, 32-inch rainfall zone, and 2485 feet elevation. FY00 planting was delayed due to dry spring weather. Cooperator plans to plant fall 2000. FY01 - FY05 no evaluations. **This planting was canceled.**

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.

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.

ID04010 Marcia Heaton riparian planting. 9023733 redosier dogwood, 9023739 redosier dogwood, 9023740 redosier dogwood, Laurel willow, White willow, Coyote willow, and Golden willow. Cuttings ordered March 5, 2004. Site characteristics: Wilkems silt loam soil, 2980 feet elevation, 24 inch precipitation, non-irrigated, T31N R3E NE1/4 Section 34. FY04 – approximately 60% survival for all willow species and about 20% survival for dogwood species. FY05 no evaluation. **FY06** (4/26/06) very poor survival – **Cancel.**

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

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.

ID05005 Tim Boddine – medusahead control project. Newhy hybrid wheatgrass, Bannock thickspike wheatgrass, Bozoisky Russian wildrye and Rosana western wheatgrass were ordered February 4, 2005. Site characteristics: 3 acres, MLRA B9, Ferdinad loamy soil, 5 percent slopes, south aspect, elevation 3080 feet, 20 inch precipitation zone, non-irrigated, T31N, R2E, SE ¼ section 10. FY05 site was sprayed with Plateau herbicide on 4/6/05, two weeks after planting. Plant establishment is very poor for all species and it is thought that the herbicide application may have interfered with seed germination, or herbicide may have killed seedlings as they emerged. Recommend additional evaluation next year to verify these preliminary conclusions. **FY06** medusahead was too much competition and planting failed – **cancel**.

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** no evaluation

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 and FY06 not planted.

ID05008 Ray Stowers – Deer Creek project. Newhy hybrid wheatgrass, Bannock thickspike wheatgrass and Rosana western wheatgrass were ordered on February 4, 2005. Site characteristics: 0.25 acres, MLRA E43a, Tanahill loam soil, 2-7 percent slopes, south aspect, elevation 2700 feet, 18 inch precipitation, non-irrigated, T27N R1E SW ¼ section 8. FY05 this seeding germinated well in the spring of 2005 with good spring rain, but went dormant and/or withered and died with no rainfall from early June through September. Spring 2006 evaluation will determine seeding success. **FY06** seedbed preparation was poor and seeding failed due to excessive competition from reed canarygrass – **cancel**.

ID05013 Barney Chambers – Hanley Creek riparian planting. Coyote willow, golden willow and Laurel willow were ordered February 4, 2005 for shipment in early April. FY05 - golden willow 80% survival with good vigor and 4 feet plant height. Coyote willow 50% survival with good vigor and 4 feet plant height (note coyote willow was accidentally sprayed with herbicide causing the partial plant death). Laurel willow 80% survival with good vigor and 3 feet plant height. **FY06** golden willow 60% survival with good vigor and 4 feet height; Laurel willow 60% survival with good vigor and 3 feet height; coyote willow 30% survival with good vigor and 4 feet height. Cooperator destroyed planting in late fall – **cancel**.

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.

FIELD OFFICE: LEWISTON

ID82001 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. FY05 and FY06 no evaluation.

ID95028 Dau Bannock thickspike wheatgrass and Rush intermediate wheatgrass field planting. Seed ordered 4/3/95. FY95 - FY99 no evaluations. FY00 40 plants per foot squared of Rush intermediate wheatgrass. Bannock thickspike wheatgrass failed. FY01 40 seedheads per foot squared, 4.5 feet tall, 3000 pounds per acre, estimate 500 pounds per acre seed production and stand is weed free. FY04 good stand with good vigor. This stand is suppressing yellow starthistle fairly well and also providing excellent erosion control. FY05 and FY06 no evaluation.

ID98016 Fred Kaufman Hycrest crested wheatgrass, Vavilov Siberian wheatgrass and Sherman big bluegrass field planting. FY98 and FY99 no evaluations. FY00 excellent stands of Hycrest and Vavilov established. FY02 excellent stand with excellent vigor for each cultivar. Hycrest crested wheatgrass suppressing cheatgrass better than Vavilov Siberian wheatgrass. FY04 excellent stand and vigor of Vavilov, Hycrest and Sherman. Stands are doing good job of suppressing weeds, providing erosion control and very good habitat for upland game birds (pheasants and quail). FY05 and FY06 no evaluation.

ID04014 City of Lewiston – Mike Bowman Delar small burnet field planting. Seed ordered April 6, 2004. Site characteristics: MLRA B9, 4 acres, Tainey silt loam soil, 5-10 percent slope, west to north aspect, 3000 feet elevation, 26-28 inch precipitation zone, non-irrigated. FY04 – FY05 no evaluation. FY06 Mike Bowman, Lewiston City Forester retired and is not returning phone calls. The planting may or not have occurred and if it did the planting location is not known. **Cancel**

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.

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.

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 silit loam soil, 20 percent slopes, south aspect, elevation 2900 feet, 23 inch precipitation, non-irrigated, T36N R1E SW ¼ section 19. FY05 no evaluation. **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. Heavy competition from weeds such as starthistle, medusahead and ventenata is present.

FIELD OFFICE: OROFINO
ID99010 Ray Geidl field planting. Species include Coyote willow, Geyer 435 willow, Geyer 448 willow, Geyer 483 willow, Geyer 491 willow, Snowberry, Elderberry, Dogwood 733, Dogwood 740, and Chokecherry. FY99 and FY00 and FY01 no evaluations. FY02 Plantings are located in area with heavy reed canarygrass competition. Good survival for all willow and dogwood accessions with 4 of 5 cuttings for each still surviving, fair vigor for each, 40 inch height for all willows and 20 inches height for all dogwoods. Snowberry, Elderberry and chokecherry failed. FY03 – FY06 no evaluations.

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.

ID04012 Ray Geidl Project. 9067541 peachleaf willow, 9067546 peachleaf willow, 9067549 peachleaf willow, 9023733 redosier dogwood, 9023739 redosier dogwood, 9023740 redosier dogwood and Okanogan snowberry. Cuttings ordered March 5, 2004. Site characteristics: fine loamy soil, flat aspect, 3000 feet elevation, 35 inch precipitation, non-irrigated (naturally sub-irrigated). FY04 – FY06 no evaluations.

ID04013 Paul Schroder Project. 9067541 peachleaf willow, 9067546 peachleaf willow, 9067 549 peachleaf willow, 9023733 redosier dogwood, 9023739 redosier dogwood, 9023740 redosier dogwood and Okanogan snowberry. Cuttings ordered March 5, 2004. Site characteristics: Fine loamy soil, flat aspect, 3000 feet elevation, 35 inch precipitation, non-irrigated (naturally sub-irrigated). FY04 – FY06 no evaluations.

IDAHO DIVISION III
PLANT MATERIALS PLANTINGS

FIELD OFFICE: CALDWELL

ID99006 Jacy Gibbs-cooperator will complete evaluations 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.

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. **Cooperator will complete evaluations. 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.

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.

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- FY06 no evaluation.

FIELD OFFICE: MARSING/GRANDVIEW
None

FIELD OFFICE: MERIDIAN
ID07002 Doug Austin field planting. Regar meadow brome, orchardgrass and alfalfa field planting. Seed ordered August 28, 2006. Seed will be 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.

ID07001 Wayne Newbill 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.

OTHER PLANTINGS MANAGED BY PMS
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.

ID07005 Gwen Denton field planting. Regar meadow brome and Rush intermediate wheatgrass interseeding trial. Seed was ordered November 13, 2006. Planting will be dormant fall (Dec. – Jan.).

FIELD OFFICE: MOUNTAIN HOME
None

FIELD OFFICE: PAYETTE
None

FIELD OFFICE: WEISER
ID91029 Grafe Bannock and Critana thickspike wheatgrass field planting. Site is a sandy loam soil, non-irrigated, 12-14 inch ppt, 2500 feet elevation, and 4-8% slopes on west exposure. FY92 estimate 20% stand. FY93 survival is 90% for both species. The existing plants are healthy and holding their own with competition. Neither species is as vigorous as Oahe on same sites. FY94 survival is 95% for each species, good stands, and excellent vigor. This trial continues to improve; the stands are spreading and filling in open ground. Both species appear well adapted to site even considering the extended drought conditions. Total forage production is less than adjacent intermediate wheatgrass, but is more palatable. Plants are producing seed this year. The stands are starting to provide competition for annual weeds, grasses and cereal rye. I am now starting to see the value of these plants on some of our most droughty and limiting sites. FY95 Good stands for both Bannock and Critana (95% survival). Both species continue to improve over time. Cereal rye is not affecting growth. Neither thickspike wheatgrass is producing as well as Oahe intermediate wheatgrass. Both species would fit well with similar palatability grasses in mixture (suggest Goldar or Secar bluebunch wheatgrass). FY96 good stands of both with 6 plants/ft2 of each and excellent vigor. Growth of both species is still very good and weed competition is light. Total production continues to be less than adjacent intermediate wheatgrass. FY97 good stands (5 plants per foot), survival, and vigor for both Bannock and Critana. Growth and vigor for both does not reflect the excellent moisture year we had and stands are maintaining or declining slightly. FY98 no evaluation. FY99 good stands of both species with 90 percent survival and good vigor. Producing between 500 and 1000 pounds per acre in an extremely dry April through November year. Bannock is slightly taller at 18 inches than Critana at 16 inches. Heavy grasshopper damage this year. Cheatgrass invasion is slight. FY00 no evaluation. FY01 stands of both Bannock and Critana were rated poor, with 1 plant per square foot, fair vigor and 200 pounds of production per acre. Two years of drought has heavily impacted this planting and cheatgrass is invading. FY04 – plots continue to be plagued by drought conditions and severe cheatgrass infestations. They are adapted to site, but suppressed due to these factors. FY05 no evaluation. FY06 no evaluation.

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 and FY06 no evaluation.

ID94026 Weber Goldar bluebunch wheatgrass, Rush intermediate wheatgrass, Luna pubescent wheatgrass, Secar Snake River wheatgrass, Greenar intermediate wheatgrass, Schwendimar thickspike wheatgrass, Bozoisky Russian wildrye, Bannock thickspike wheatgrass, Delar small burnet, Firecracker and Alpine penstemon, Sherman big bluegrass, Wytana fourwing saltbush, and Rincon fourwing saltbush demo plots. Site is stony clay loam soil, non-irrigated, 16 inch ppt, 3200 feet elevation, 0-2% slopes. Seed ordered July 1994. FY94, FY95, and FY96 due to drought conditions, seeding not planted. FY97 seeded May 16, 1997 with good rains following planting. Weed competition is high. In general initial establishment was good for wheatgrasses, fair for wildryes and poor for forbs. FY98 rainfall was 150 percent of average this year resulting in a flush of weeds. All plots except forbs were sprayed for broadleaf weed control and were shredded to reduce overstory competition. The most successful plants include: GRASSES Rush is by far the superior plot from standpoint of vigor, total growth, and total production. Luna is rated second and Reliant is rated third. Other grasses are only marginally successful to non-existent due to possibly saturated soils and weed competition during the establishment year. FORBS Delar is doing very well and appears very hardy and adapted to wet soil conditions. Penstemons and Lupine did not establish. SHRUBS Rincon is taller (10-15 inches) than Wytana (4-6 inches). FY98 no evaluations. FY99 Weeds and saturated soils are a problem on this site. Most successful plants – grasses: Rush intermediate wheatgrass followed by Luna pubescent wheatgrass, and Reliant intermediate wheatgrass, with others only marginally successful; Forbs: Delar small burnet is performing very well and no other forbs established; Shrubs: Rincon fourwing saltbush is superior to Wytana fourwing saltbush on this site. FY00 no evaluation. FY01 following two years of extreme drought Greenar intermediate wheatgrass was the most productive and vigorous followed by Reliant intermediate wheatgrass and Luna pubescent wheatgrass. Rush intermediate wheatgrass, Mankota Russian wildrye, and Manska pubescent wheatgrass did not grow much this year. Magnar basin wildrye was superior to Trailhead basin wildrye in production and survivability. Thickspike wheatgrass and Russian wildrye accessions grew very slowly. Delar small burnet plants are not handling drought well and are dying. Rincon fourwing saltbush is better than Wytana fourwing saltbush with some plants to 18 inches in height. Weeds are infesting site. FY02 was a very dry growing season. Intermediate wheatgrasses - Greenar is producing more forage than any other species, Greenar is not spreading as fast as Rush or Reliant which is probably an advantage on this droughty site, Luna is the best pubescent wheatgrass, but not producing as much as Greenar. Basin wildryes - Magnar and Trailhead are nearly identical in production with Magnar slightly higher with more vigor than trailhead. Russian wildrye - Bozoisky is by far the best performer of the R. wildryes. Small burnet - Delar is no longer present. Fourwing Saltbush - Rincon is a little better than Wytana, but they lack vigor. Thickspike wheatgrass - all accessions are barely surviving. FY06 no evaluation. **Next evaluation scheduled for 2007**.

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 and FY06 no evaluation.

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 no evaluation.

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 - FY06 no evaluations.

ID02014 Mink Land and Livestock Riparian Planting. 9067549 Peachleaf willow - Prairie City source and local source coyote willow, 2002 for shipment in late March 2002. To be planted with waterjet stinger. FY02 Peachleaf willow survival 50% and Coyote willow survival 10%. Planting depth (soils were very dry for most of season) was probably too shallow and plant perhaps should have been completed sooner. FY03 Peachleaf willow 80 percent survival with 48 to 96 inch height. Coyote willow local cuttings have 65 percent survival with 24 to 36 inch heights. FY04 – FY06 no evaluations.

ID02017 Jim Eckhardt Field Planting - Plateau Herbicide Trial (4 oz, 8 oz, 12 oz, Control 4 oz, 8 oz, 12 oz). Seed ordered March 20, 2002 for shipment in early October. Species include: Magnar basin wildrye, Trailhead basin wildrye, Bozoisky Russian wildrye, Mankota Russian, Bannock thickspike wheatgrass, Critana thickspike wheatgrass, Goldar bluebunch wheatgrass, High Plains Sandberg bluegrass, Vavilov Siberian wheatgrass, CD-II crested wheatgrass and Hycrest crested wheatgrass. Site Characteristics: MLRA B10, Deshler-Devon silty clay loam soil, 2-5 percent slope, south aspect, 2600 feet elevation, 12 inch rainfall zone, T11N R6W NE 1/4 NW1/4 Section 1. FY02 Plateau was applied (4, 8 and 12 ounce rates) March 27, 2002 by Joe Vollmer. Did not control salsify, fiddleneck or sunflower. Planted November 4, 2002 under dry/cold conditions with a rangeland drill at 12-inch spacing. FY03 three planted species established this year: 1) Vavilov Siberian wheatgrass had the best stand and was the most vigorous. It did not grow in the untreated control plot – established well in the 4 and 8 ounce treatments – did not establish in the 12 ounce treatment; 2) CD-II crested wheatgrass was not as vigorous as Vavilov and had fewer plants established. It had no establishment in the no treatment - some establishment in the 4 ounce treatment – good establishment in the 8 ounce treatment – no establishment in the 12 ounce treatment; 3) Hycrest crested wheatgrass was the least vigorous of the establishing species with 30-35 percent fewer plants than Vavilov and CD-II. It had no establishment in the untreated plot - spotty establishment in the 4 and 8 ounce plots – no establishment in the 12 ounce plots. At this evaluation the 8 ounce treatment appears to be the best rate for Plateau herbicide. FY04 – The best stands include: Vavilov Siberian wheatgrass with good stand with good vigor; CD-II crested wheatgrass with fair stand with fair vigor; Hycrest crested wheatgrass with fair stand with fair vigor. All other planted species appear to have failed. The best cheatgrass control rate was 8 ounces/acre of Plateau herbicide. 4 ounces is not enough and 12 ounces effects perennial plant growth. The Plateau application has helped existing bottlebrush squirreltail. Conservationist would not recommend this method seedbed preparation because he does not feel the additional expense warrants the limited vegetation produced. FY05 and FY06 no evaluation.

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 FY08.**

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 FY08.**

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 FY08.**

FIELD OFFICE: GOODING/FAIRFIELD

ID00005 Camas SCD (Koonce) formerly ID86010 Koonce multiple species demo plots. FY99 field evaluation determined these plots to be contaminated and planting was destroyed, site cleaned-up and fallowed during 1999, and was replanted in the spring of 2000. Plots replanted May 1, 2000. Plots will be irrigated the first growing season. **FY00** plots were irrigated until mid June, and then discontinued. Most of the wheatgrasses sprouted in the central and northern portions of the plot, but remained small at evaluation time due to dry season. Plot remains relatively weed-free except the southernmost 15 feet of the plot (sheep fescue area) which is a solid stand of globe mallow. The fescue is sprouted underneath the large mallow leaves. This is a particularly difficult weed to control once established. Special attention needs to be directed here in spring 2001. **FY01** the plots have been subjected to two seasons of unfavorable plant growth (dry springs) and one of the lowest winter snow pack recorded on the Camas Prairie. Still, all varieties exhibit some level of success except for the following varieties which could not be found for observation: Durar hard fescue, Nezpar Indian ricegrass, 9043501 Salina wildrye, and Thurber's needlegrass. These varieties did not establish at all or remain yet as dormant seed due to drought. Some of the absent species may have germinated but died unnoticed due to drought. Weed competition most likely is not a factor of establishment difficulties in the plot. Possible exceptions may be in the Covar sheep fescue area that had significant amounts of common mallow in 2000 but is now under control due to spot spraying. Scouringrush is invading in the Bighorn sheep fescue and Magnar basin wildrye areas and may be a factor there. The entire demo plot was spot-sprayed in 2001 twice (last of June and first of August) with 2, 4-D/Banvel. At the time of this evaluation the plot did not contain weed problems significant to grass establishment. The wheatgrasses are performing the best. The highest performing wheatgrasses include Rush and Reliant intermediate wheatgrasses, Manska and Luna pubescent wheatgrasses, CDII and Nordan crested wheatgrasses, Bannock thickspike wheatgrass, and Pryor slender wheatgrass. Weak wheatgrass performance was observed with Arriba western, Whitmar beardless wildrye, San Luis slender wheatgrass, Critana thickspike wheatgrass, Ephraim crested wheatgrass, Douglas crested wheatgrass, and P27 Siberian wheatgrass. Bozoisky and Mankota Russian wildrye performed moderately, but the other wildryes either did poorly (Volga Mammoth and Magnar) or did not establish (Salina and Trailhead). Manchar and Liso smooth bromes have done well considering the drought with moderate performances, but Garnet and Bromar mountain bromes and Regar meadow brome did not fare so well and have overall weak ratings. The fescues, needlegrasses, orchardgrasses, ricegrasses, timothy, and foxtail are currently performing weakly or did not establish. Sherman big bluegrass had low establishment density but the existing plants have good vigor with many seedheads produced. **FY02** drought continues. Excellent plots include: Rush, Greenar, Reliant, Topar, Manska, Luna, Bozoisky, CD-II, Hycrest, and Nordan. Good plots include: Rosana, Manchar, Regar, Alkar, Jose, Liso, Oahe, Tegmar, 238, Goldar, P-7, Mankota, Secar, Pryor, Bannock, Schwendimar, Sodar, Sherman, Vavilov, and Magnar. Fair plots include: Latar, Garrison, Arriba, Climax, Covar, Volga, Whitmar, San Luis, Critana, Ephraim, Douglas, P-27, Rimrock, High Plains, and Trailhead. Poor plots include: Paiute, Garnet, Bromar, Durar, 902484, and 9040137. Failed plots include: Salina and Nezpar. **FY03** plants with best density, vigor and seed production include: Rush, Reliant, Manska, Bozoisky, CD-II, Nordan, Arriba, Greenar, Topar, P7, Mankota, Hycrest, Vavilov, Alkar, Jose, Oahe, Tegmar, Luna, Ephraim, and P27. Generally, the wheatgrasses are out performing the fescues, wildryes, needlegrasses, bromes, bluegrasses, timothy and orchardgrass. Plants that have failed include: Paiute, Rimrock, 9040137 needlegrass, Nezpar, Volga, 9043501 Salina wildrye, Bighorn sheep fescue. **FY04** wheatgrasses as a group dominate as the best adapted species for this site. Intermediate (Rush and Reliant) wheatgrass, pubescent (Manska and Luna) wheatgrass, Sherman big bluegrass and Trailhead basin wildrye improved over last year despite unfavorable conditions. All other plots remained static or declined in performance. Garnet and Bromar mountain brome and San Luis slender wheatgrasses (all short-lived perennials) died out this past year. **FY05** cooperator would like to **cancel** this plot due to maintenance issues – SCD will look for another plot location.

ID00006 Bill Simon Bannock thickspike wheatgrass District Seed Increase. Seed ordered February 10, 2000 for mid April delivery. FY00 this new Bannock seeding in spring 2000 was installed adjacent and south of existing Bannock field under file ID98020. Bannock was drilled at 3 pounds per acre PLS on 24-inch centers. The field was helicopter sprayed with 2, 4-D the third week of June. Where helicopter missed, Russian thistle prevailed this year but should diminish next year. At evaluation time on November 1, 2000, the stand was well on its way to establishment considering the dry year. FY01 unfavorable moisture year - 200 pounds per acre seed production. FY02 unfavorable moisture year - 110 pounds per acre seed production. FY03 good stand and vigor – field produced 43 pounds per acre probably due to spring frost (May 19 - 16^0, May 20 – 21^0, June 23 – 26^0), low precipitation, and very hot summer. FY04 - good stand and vigor with field producing 90 pounds of clean seed per acre. Producer feels too much vegetative growth was produced this year due to spring rains hurt seed production. Producer plans to maintain stand for seed production one more year. FY05 Wet spring, dry summer and fall. Bill said about 150 pounds per acres clean seed on this field, up from 90 pounds last year. Sprayed with 2 pints/ac 2,4-D in mid June. No fertilizer. Bannock is first seed harvested on the Camas Prairie, about August 1. FY05 wet spring – harvested about 150 lb/ac clean seed on August 1. Field was sprayed with 2 pints/ac 2,4-D in mid June, field was not fertilized. FY06 no evaluation.

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.

Planting Site 2: Seeding cancelled, property ownership change. Winterfat and Four-wing seed retained by Dan Butler.

ID02015 Bob Josaitis Field Planting. 905439 switchgrass (Bridger PMC) and Blackwell switchgrass (Manhattan PMC) were ordered March 15, 2002 for shipment about April 1, 2002. Purpose: portion of seed mix for wildlife nesting cover. Site Characteristics: MLRA 11a, Harsand fine sandy loam soil, 0-2 percent slope, 3700 feet elevation, 11 inches precipitation, full irrigation, T6S R15E Section 4. FY02 - FY04 seed not planted due to drought and field change. Seeding planned for spring 2005. FY05 905439 and Blackwell switchgrass seeded on different halves of same field via Brillion drill on July 4, 2006. Late drilling was to favor establishment of warm season switchgrass over the cool season grasses which dominate the mix. Due to round smooth small seeds both switchgrass varieties added by hand into small seed box on Brillion as field was being drilled. Large seed box contained mixture of Bannock thickspike wheatgrass, Alkar tall wheatgrass, Rush intermediate wheatgrass, Eski sainfoin, and Delar small burnet. Site was smooth and firm prior to drilling. Much seed after drilling was not adequately covered by Brillion press wheels. Field was therefore harrowed after drilling, all seed thereafter covered. Irrigated immediately and for remainder of season. Young redroot pigweeds dominating by end of July, killed with 0.5 pint/ac LV-4 (2,4-D). Some sainfoin germinated by then but not affected by LV-4. Sainfoin well respresented by end of season. Bannock germinated within 7 days of seeding, was main planned grass at end of season. Other species in mix including switchgrass appeared to remain dormant this first season. Site dominated by bristlegrass this first year (Setaria), should diminish or disappear in 2006. Evaluate in 2006 growing season. Site was seeded for permanent nesting habitat.

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.

FIELD OFFICE: JEROME
None

FIELD OFFICE: RUPERT
None

FIELD OFFICE: SHOSHONE/HAILEY
None

FIELD OFFICE: TWIN FALLS

ID00007 Twin Falls SWCD/Twin Falls Highway District 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. FY06 no evaluation.

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. FY06 no evaluation.

ID03001 Walt Coiner Field Planting. 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.

	Stand				Vigor			
Species	2003	2004	2005	2006	2003	2004	2005	2006
Irrigated Perennial Cover								
Sherman big bluegrass	good	fair	fair	fair	exc.	fair	exc.	exc.
Talon Canada bluegrass	good	exc.	exc.	exc.	exc.	exc.	exc.	exc.
Foothills C. bluegrass	exc.	exc.	exc.	exc.	exc.	exc.	exc.	exc.
Durar hard fescue	fair	exc.	fair	good	exc.	exc.	fair	good
Semi-Irrigated Perennial Cover								
Covar sheep fescue	poor	fair	good	good	fair	good	exc.	exc.
Quatro sheep fescue	poor	good	exc.	good	fair	good	exc.	exc.

Newhy hybrid wheatgrass	poor	failed	fair	fair	fair	v. poor	good	good
Roadcrest c. wheatgrass	good	fair	poor	poor	good	good	good	fair
Ephraim c. wheatgrass	exc.	fair	exc.	exc.	good	fair.	exc.	exc.
Sodar s. wheatgrass	good	poor	poor	poor	fair	poor	poor	poor
Paiute orchardgrass	fair	fair	fair	fair	fair	fair	fair	fair
Dryland Perennial Cover								
Vavilov S. wheatgrass	good	exc.	exc.	good	good	exc.	exc.	good
Bozoisky R. wildrye	poor	v. poor	good	good	fair	poor	good	good
Sherman big bluegrass	v. poor	v. poor	good	good	poor	v. poor	good	good
Rosana w. wheatgrass	fair	good	exc.	exc.	good	good	exc.	exc.

Recommendations based on four 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, Bozoisky.

Dryland – Vavilov Siberian wheatgrass mixed with Rosana western wheatgrass or Bozoisky.

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.

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.

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.

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.

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.

IDAHO DIVISION V
PLANT MATERIALS PLANTINGS

FIELD OFFICE: AMERICAN FALLS/ABERDEEN
None

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 and FY06 no evaluation. 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.

ID03005 ShoBan High School field planting. Common Camas bulbs. Bulbs ordered from Corvallis PMC January 14, 2003. Site - MLRA B11b, 10-12 inch precipitation, sub-irrigated wet to semiwet bottomlands, non-irrigated. FY04 Camas bulbs were planted in the fall of 2003 and no evaluation has been completed. FY05 could not find any camas plants – recommend evaluation one additional year to ensure this planting is a failure – might recommend collecting camas bulbs from more local location for future studies and evaluations. FY06 planting failed. **Cancel**

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.

FIELD OFFICE: MALAD
ID04005 Hybrid poplar study – Don Buhler field planting. Robust polar, Carolina poplar, Siouxland poplar, Simon poplar, OP367 poplar and 52-225 poplar cuttings were ordered March 5, 2004. Site Characteristics: Zukom silt loam soil, 7.4-8.4 soil pH, very wet site in early spring, 0-1% slopes, south aspect, 18-20 inch precipitation, non-irrigated, 5180 feet elevation. FY04 - Robust polar 20 percent survival with fair vigor. Carolina poplar 13 percent survival with fair vigor. Siouxland poplar failed. Simon poplar 53 percent survival with good vigor. OP367 poplar 20 percent survival with poor vigor. 52-225 poplar 13 percent survival with poor vigor. FY05 and FY06 no evaluation.

FIELD OFFICE: MONTPELIER
None

FIELD OFFICE: POCATELLO
None

FIELD OFFICE: PRESTON

ID95036 Franklin County Bannock thickspike wheatgrass and Sodar streambank wheatgrass critical area planting. Site is landfill, Wheelon/Collonston soil, non-irrigated, 14-15 inch ppt, 5000 feet elevation, 12-20% slopes on north exposure. Seed ordered 5/5/95. FY95 seed planted 5/17/95 in good clean seedbed. Fall evaluation indicated good stand establishing for both species. FY96 good stands of both species with 3 plants/ft2 and spreading. Species are providing good erosion control. FY97 and FY98 no evaluations. FY99 good stand of each specie with 3-4 plants per square foot, good vigor, good ability to spread, and good erosion control under these conditions. Weed infestation of planting is very low. FY00 Bannock and Sodar stands are good with good vigor and 4 plants per square foot. FY01-FY05 no evaluations. **Cancel**

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 evaluated 10/27/06.

Species	Percent Stand			Vigor			Height		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Kura Clover	failed	---		---	---		---	---	
Forager alfalfa	exc.	fair		good	good		24”	grazed	
Lutana cicer milkvetch	good	poor		good	good		6”	grazed	
Alice white clover	poor	poor		fair	fair		4-6”	grazed	
Birdsfoot trefoil	fair	fair		good	good		3”	grazed	
Eski sainfoin	good	good		good	good		12”	grazed	
Baridana orchardgrass	poor	good		good	good		16”	grazed	
Tekapo orchardgrass	fair	good		good	good		12”	grazed	
Paiute orchardgrass	poor	poor		fair	fair		12”	grazed	
Latar orchardgrass	poor	poor		fair	fair		12”	grazed	
Potomic orchardgrass	fair	fair		good	good		12”	grazed	
Satin orchardgrass	poor	poor		good	good		8”	grazed	
Renagade orchardgrass	fair	good		good	good		18”	grazed	
Rebound meadow brome	good	good		good	good		24”	grazed	
Cache meadow brome	fair	fair		good	good		30”	grazed	
Regar meadow brome	fair	fair		good	good		12”	grazed	
Lakota prairie brome	good	v.poor		exc.	v.poor		36”	grazed	
Hakari Alaska brome	exc.	good		exc.	exc.		12”	grazed	
Seine tall fescue	poor	fair		good	good		24”	grazed	
Johnstone tall fescue	poor	fair		good	good		18”	grazed	
Bronson tall fescue	fair	good		good	good		24”	grazed	
Bariane tall fescue	fair	fair		good	good		12”	grazed	
Dovy tall fescue	fair	fair		good	good		18”	grazed	
Pradel tall fescue	fair	fair		good	good		12”	grazed	
Garrison creeping foxtail	v.poor	poor		fair	fair		12”	grazed	
Rush intermediate whtgrs	fair	good		fair	fair		6”	grazed	
Bozoisky Russian wildrye	fair	fair		poor	good		4”	grazed	
Kemal festolium	exc.	exc.		exc.	exc.		24”	grazed	
Mara perennial ryegrass	exc.	exc.		good	exc.		8”	grazed	
Barliza timothy	poor	poor		poor	poor		4”	grazed	
Outlaw timothy	fair	v.poor		poor	poor		8”	grazed	

Blackwell switchgrass	v.poor	poor	fair	poor	18”	grazed
9005439(MT) switchgrass	v.poor	v.poor	fair	fair	8”	grazed
Garrison sorgum-sudan	exc.	--	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.

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.

FIELD OFFICE: DRIGGS

ID91006 Fair Grounds Multiple Species Demo Plots. FY92 planted spring 1992 excellent survival on all species except trefoil, mountain brome and cicer milkvetch which will have to be replanted. FY93 Remont, Bromar, Lutana planted spring of 1993. Remont is not tolerant of frequent irrigation. Bozoisky exhibits poor seedling vigor, Goldar has poor plant vigor, Canbar not recommended for pure stands, Magnar not adapted to shallow soils, Newhy lacks seedling vigor, Manchar exhibits poor summer regrowth, Whitmar is not tolerant of excessive moisture, and Garrison adapted to wet soils. Magnar, Bromar, Rush, and Lutana are all doing poorly. Ordered Rush, P27, Magnar, Canbar, and Bozoisky on 3/17/94 to be included in plots. FY94 all plots good to excellent stand except Lutana, Remont and Delar. These plots are all irrigated so evaluations for drought, flood, salt and acid tolerance not possible. This planting does provide excellent trials for irrigated varieties in high mountain valleys. FY95 best performers are Hycrest, Critana, Alkar, Tegmar, Luna, Greenar, Topar, Rush, Regar, Manchar, Latar, Paiute, Sodar, Newhy, Durar, Sherman, Canby and Delar. Complete evaluations are available on request. FY96 not evaluated. FY97 Durar and Delar good to excellent stands with high vigor; Regar, Amur, Manchar, Latar, Paiute good stands with excellent vigor; Rush fair stand with fair vigor; Sodar, Goldar, Cascade, Appar poor stands with fair vigor; Hycrest, Critana, Alkar, Tegmar, Luna, Greenar, Topar, Lutana, Garrison, Whitmar, Secar, P27, Bromar, Magnar, Bozoisky, Canbar, Sherman, Kalo, very poor to failed stands. All plots are subject to turfgrass encroachment. February 9, 1998 ordered Hycrest, CD-II (Hycrest II), Sherman, Newhy, Critana, Bannock, Garrison, and Bozoisky for plots. FY98 species with good to excellent stands include Amur, Rush, Manchar, Latar, Durar, Cascade, and Delar. Species with poor to fair stands include Alkar, Luna, Topar, P27, Bromar, Paiute, Magnar, Appar, and Bozoisky. Failed stands include Hycrest, Critana, Tegmar, Greenar, Secar, Whitmar, Garrison, Lutana, Regar, Sodar, Newhy, Kalo, Sherman, Canbar, and Goldar. FY99- FY05 no evaluations. **Cancel**

ID99018 SCD field planting – leafy spurge competition study. Species include Rush intermediate wheatgrass, Luna pubescent wheatgrass, Regar meadow brome, Bromar mountain brome, Durar hard fescue, Bozoisky Russian wildrye, and Climax timothy. Seed ordered April 28, 1999 for shipment about May 17, 1999. FY99 Roundup was applies on June 10th to leafy spurge plots with up to 200 stems per 9.6 square foot hoop. Grass was drilled into plots on July 1, 1999 using a Brillion drill. Evaluation of germination and establishment will be performed in the spring of 2000. Replicated plots will be installed in May of 2000. FY00- FY05 no evaluations. **Planting failed - Cancel**

ID02019 Lowel Curtis field planting. Species include Garrison creeping foxtail, Regar meadow brome and Johnstone tall fescue. Seed ordered April 8, 2002. FY02- FY05 no evaluations. **Never installed - Cancel**

FIELD OFFICE: IDAHO FALLS

ID94020 Winterfeld Magnar basin wildrye and Trailhead basin wildrye vegetative terraces field planting. Seed ordered 3/94. FY94 planted 5/94. Good initial stand establishment with good vigor. FY95 excellent stand establishment with over 3 plants/ft2. Plants average 24" height. Grouse are using basin wildrye for nesting cover. Working well for erosion control. FY96 excellent stands with excellent vigor Trailhead and good vigor Magnar. Excellent wildlife use by game birds, deer, owls, and coyotes. Both species are very good for snow catchment and field windbreaks. FY97 100% survival, Trailhead spreading a little faster than Magnar. Plant height about 96 inches for each. Cooperator notes that Trailhead is more drought tolerant and Magnar is more robust. FY98 100 percent survival for both species. Cut for seed this year with 140 pounds of clean seed per acre. FY99 excellent stands: Magnar 96 inches tall with little to no spread; Trailhead 84 inches tall with good spread via seed shatter. FY00 excellent stands with excellent vigor for both Magnar and Trailhead. Magnar is more robust with 96 inches height. Trailhead is spreading rapidly, is more drought tolerant, and approximately 84 inches tall. FY01 excellent stand and vigor with 96 inch height. Seed production was approximately 100 pounds per acre. Straw yield was 1.6 tons per acre. FY02 Trailhead plowed out. Magnar excellent stand with excellent vigor, 72 inch height, and 4000 pounds per acre production. FY03 no seed crop due to insect damage.FY04 – excellent stands with excellent vigor and each accession was approximately 96 inches tall this year. Trailhead is spreading beyond original planting. **FY06 plowed out – cancel.**

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.

ID03007 Winterfeld San Juan 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.

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.

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.

ID07003 Winterfeld Appar blue flax for seed increase. Seed shipped September 26, 2006.

ID07004 Winterfeld Sodar streambank wheatgrass for Foundation seed increase.

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 2008.**

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 2008.**

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 2008.**

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 2008**.

FIELD OFFICE: RIGBY/TERRETON

ID96019a Mud Lake Willows and cottonwood demo planting Laurel, Coyote, White, Robusta poplar, Siouxland poplar, and Carolina poplar. Cuttings ordered 2/20/96. Planted May 8, 1996 using fabric mulch material and drip irrigation. FY96 Water application, started July 5th with willows receiving 7 gallons/week and poplars receiving 12 gallons/week. Flood irrigation by Park officials resulted in over-irrigation and drip system was cut back. 100% survival of all species except coyote which had 70% survival. Good vigor for all species except Carolina poplar which had fair vigor. Growth: Carolina 3.2 feet; Siouxland 5.7 feet; Robust 5.5 feet; Laurel 2.7 feet; White 3.7 feet; Coyote 4.0 feet. FY97 Irrigation: 3 gallons/tree from May through September. Survival/Vigor/Height: Carolina poplar 75%/good/10.5 feet; Siouxland poplar 100%/excellent/14 feet; Robust poplar 100%/fair/7 feet; Laurel willow 100%/excellent/7.5 feet; White willow 100%/excellent/9 feet; Coyote willow 67%/fair/ 4.5 feet. FY98 Survival/ Vigor/Height: Carolina poplar 75%/good/15 feet; Siouxland poplar 100%/excellent/ 20 feet; Robust poplar 100%/fair/12 feet; Laurel willow 100%/excellent/10.5 feet; White willow 100%/good/14 feet; Coyote willow 70%/good/6.5 feet. FY99 Carolina poplar 75% survival with good vigor and 21.2 feet height. Siouxland poplar 100% survival with excellent vigor and 26.4 feet height. Robust poplar 100% survival with poor vigor (yellow leaves) and 16.6 feet height – seedlings are vigorous with good color and suspect Aberdeen stock may have disease. Laurel willow 100% survival with good vigor and 12.4 feet height. White willow 100% survival with good vigor and 18.5 feet height. Coyote willow 70% survival with fair vigor and 6.9 feet height. FY00 Flood irrigated every two weeks with drip irrigation 6-10 gal/week. Carolina poplar 75 percent survival with excellent vigor and 320 inch height. Siouxland poplar 100 percent survival with excellent vigor and 354 inch height. Robust poplar 100 percent survival with poor vigor (disease) and 216 inch height. Laurel willow 100 percent survival with excellent vigor and 180 inch height. White willow 100 percent survival with fair vigor and 240 inch height. Coyote willow 66 percent survival with fair vigor and 90 inch height. FY01 6-year-old planting was flood irrigated every two week this year. Carolina poplar (10-15 feet spacing recommended) - 75% survival, excellent vigor, 36 feet height, 16 feet crown width, and 5.5 inch DBH. Siouxland poplar (10-15 feet spacing recommended) – 100% survival, excellent vigor, 38 feet height, 15 feet crown width, and 5 inch DBH. Robust poplar (10-15 feet spacing recommended) – 100% survival, poor vigor, 25 feet height, 9 feet crown width, and 3.5 inch DBH. Laurel willow (8-10 feet spacing recommended) – 100% survival, good vigor, 17 feet height, 12.5 feet crown width, and 2 inch DBH. White willow (10-12 feet spacing recommended) – 100% survival, fair vigor, 20 feet height, 12 feet crown width, and 2 inch DBH. Coyote willow (3-5 feet spacing recommended) – 70% survival, fair vigor, 8 feet height, and 3 feet crown width. FY02 Carolina poplar 75% survival, excellent vigor, 439 inch height, and 5.75 dbh. Siouxland poplar 100% survival, excellent vigor, 455 inch height, and 17.5 inch dbh. Robusta poplar 100% survival, fair vigor, 319 inch height, and 4 inch dbh. Laurel willow 100% survival, good vigor, 211 inch height, and 2.25 dbh. White willow 100% survival, good vigor, 235 inch height, and 2.25 inch dbh. Coyote willow 66% survival fair vigor, and 139 inch height. FY03 100 percent survival of Carolina poplar (good vigor – 40 feet height), Souixland poplar (good vigor – 44 feet height), Robust poplar (fair-good vigor – 25-25 feet height), Laurel willow (good vigor – 22 feet height – lower limbs dieing), and White willow (excellent vigor – 16 feet height – good density). 50 percent survival of Coyote willow (fair-good vigor – 21 feet height). Souixland best choice of poplars – White willow best choice of willows. **Next evaluation 2007.**

ID96019b Rigby Cottonwood demo planting - Carolina, Siouxland, Robusta. Planted April 29th using fabric mulch and drip irrigation. FY96 Water application 10-14 gallons per week. Growth Carolina 2.0 feet; Siouxland 3.2 feet; Robust 4.0 feet. FY97 100% survival for all poplars. Good vigor for Carolina and Siouxland / poor vigor for Robust. Height 8-9 feet Carolina and Siouxland / 3 feet Robust. FY98 Survival/Vigor/Height: Carolina poplar 100%/good/15 feet; Siouxland poplar 100%/ excellent/18 feet; and Robust poplar 100%/poor/5.5 feet. FY99 Carolina poplar 100% survival with fair vigor and 21 feet height. Siouxland poplar 100% survival with fair vigor and 21 feet height. Robust poplar 100% survival with very poor vigor and 7 feet height. Note – Robust poplars from Lawyers Nursery are thriving, so suspect Aberdeen cuttings may be carrying a disease. FY00 Drip irrigated (14 gal/week) – Carolina poplar 100 percent survival with fair vigor and 240 inch height; Siouxland poplar 100 percent survival with fair vigor and 252 inch height; Robust poplar 100 percent survival with poor vigor and 84 inch height. FY01 6-year-old planting is irrigated with drip irrigation system at 7 gallons per week. Carolina poplar – 100% survival, poor vigor 22 feet height, 7 feet crown width, and 2.5 inch DBH. Siouxland poplar – 100% survival, poor vigor, 24 feet height, 6 feet crown

width, and 3 inch DBH. Robust poplar – 100% survival, very poor vigor, 7 feet height, 4 feet crown width, and 1 inch DBH. Drought stress is evident and drip irrigation system is probably not fully functioning with plugged emitters, need for additional emitters, and need for longer watering sets. FY02 Carolina poplar 100% survival, very poor vigor, 300 inch height, and 2.5 inch dbh. Siouxland polar 100% survival, fair vigor, 330 inch height, and 2.75 dbh. Robusta poplar 100% survival, very poor vigor, 92 inch height, and 1 inch dbh. Irrigation system problems were repaired and irrigation sets have been extended - expect improvement next year. FY03 100 percent survival of Carolina poplar (fair to good vigor – 10 feet height – some winter die back), Souixland poplar (good vigor – 28 feet height) and Robusta poplar (very poor vigor – 8 feet height). Best choice Souixland poplar. **Next evaluation 2007.**

ID98013 Jefferson County Landfill Field planting 1) Ephraim crested wheatgrass, Sodar streambank wheatgrass, and Bannock thickspike wheatgrass; 2) Covar sheep fescue, Schwendimar thickspike wheatgrass, and Secar Snake River wheatgrass. Seed ordered Feb 9, 1998. Site is silty clay loam soil, 0-1 % slope, east aspect, 4785 feet elevation, 10-12 inch ppt, non-irrigated, T6N R33E SEl/4 Section 14. FY98 initial evaluation showed very poor to no establishment of Covar, Schwendimar, Secar, Sodar, and poor to very poor establishment of Ephraim and Bannock. The clay soil portions of the seeding crusted and the sandy soil portion of the seeding may have been too dry. Site should be evaluated one more season before a decision to reseed is made. FY99 Covar – fair stand with poor vigor and .2 plants per square foot. Schwendimar – very poor stand with poor vigor and .1 plants per square foot. Secar – very poor stand with poor vigor and .1 plant per square foot. Bannock fair stand with poor vigor and 1 plant per square foot. Sodar – poor stand with poor vigor and .1 plants per square foot. Ephraim – fair stand with fair vigor and 1 plant per square foot. FY00 Planting Mix 1 – fair stand of Ephraim/Sodar/Bannock is establishing with fair vigor and stand is limiting weed growth. Planting Mix 2 – poor stand of Covar/Schwendimar/Secar is establishing with fair vigor. Secar and Schwendimar failed in planting for the most part, but Covar is establishing slowly. Stand is dominated by kochia weed. Planting 3 – Bannock has good stand with fair vigor. Windbreak planting (drip irrigated) is irrigated once per week for 12-16 hours, is doing very well, and trees are uniform – Russian Olive 5-8 feet height with 5 feet crown width; Rocky Mountain Juniper 3-5 feet height with 3 feet crown width; Siberian Peashrub 4-7 feet height with 4 feet crown width. FY01 the Ephraim-Bannock-Sodar mix and Bannock only plantings are increasing and spreading. Covar in the Covar-Schwendimar-Secar mix is also increasing. Grass densities of 2+ plants per foot squared occur on more favorable sandy soils. The hard packed clayey areas have few grass seedlings established. The windbreak planting is doing very well with 100% survival and very good maintenance for water (drip irrigation system) and weed control. Russian olive is averaging 9 feet tall and 7 feet crowns on sandier soils and 5-6 feet tall with 5 feet crowns on clayey hard packed soils. Junipers and Siberian peashrub are not affected as much by varied soil conditions with Junipers averaging 5 feet tall with 4 feet crowns on sandy soils and 4.5 feet tall with 4 feet crowns on clayey soils. The Siberian peashrub is averaging 6 feet tall with 5 feet crowns on sandy soils and 5.5 feet tall with 5 feet crowns on clayey soils. FY02 grass planting are doing very well and spreading with over 3 plants per square foot. FY03 planting is doing well. **FY06** mix 1- Covar, Schwendimar, Secar - fair stand with 1-2 plants/ft2 and poor vigor; mix 2- Ephraim, Sodar, Bannock – good stand with 2-3 plants/ft2 and fair vigor – Ephraim stands out as the best performing grass at this site; mix 3- Bannock – fair stand with 1-2 plants/ft2 and fair vigor. Windbreak evaluation – excellent survivability considering site and lack of irrigation. Rocky Mountain juniper – 6-7 feet tall with excellent survival; Russian olive – 6-9 feet with excellent survival; Siberian peashrub – 5-8 feet tall and drought stressed in portions of row (leaves curling). Recommend this evaluation be **cancelled**.

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.

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, and 9/99. FY03 evaluated May 21, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY07**.

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, and 9/99. FY03 evaluated May 21, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY07**.

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

ID82101 BLM Hole In Rock Multiple Adaptation Evaluation. Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 7/7/92, 9/95 and 9/99. **Access to site is very difficult and future evaluations will be cancelled - maintain file for reference.**

ID83100 FS Nip & Tuck Multiple Adaptation Evaluation. Evaluations 7/6/92. 9/95 and 7/02. Site has deteriorated to point future evaluations would provide little future value. **Cancel future evaluations, but maintain file for reference.**

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. FY03 evaluated May 21, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY07**.

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 and 9/99. FY03 evaluated May 20, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY07**.

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. 1995 no evaluation, and 9/99. FY03 evaluated May 19, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY07**.

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 and 9/99. FY03 evaluated May 19, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY07**.

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. Evaluations 7/7/92.
FY03 evaluated May 19, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY07**.

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.

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.

PLANT MATERIALS

2006

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.
*** 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.
*** 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.
*** 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.
*** 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.

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. FY05 no evaluation. FY06 Rush, Topar, Tegmar, Luna and Oahe all have fair to good stands with 3 plants/ft2 and fair vigor.

UT04002 Bryce Clayton – Provo FO woody riparian buffer planting. Coyote willow, 9023733 redosier dogwood, 9023739 redosier dogwood, and 9023740 redosier dogwood cuttings were ordered March 5, 2004. Site characteristics – Birdow very fine sandy loam soil, 6-15 percent slopes, 5770 feet elevation, 18 inch precipitation zone, non-irrigated, T11S R3E NE1/4 Section 13. FY04 estimated survival 20 percent coyote willow and 60 percent dogwood.
FY05 coyote willow 21 of 175 cuttings were found alive with 12-24 inches of new growth; redosier dogwood planting map did not document where accessions were planted – 22 of 60 dogwood cuttings were found alive with 2-6 inches of new growth. Weed competition is severe in planting resulting in low plant vigor. FY06 site was heavily grazed by horses. Plants were difficult to find in weeds, coyote willow found were 4-5 feet tall with several side branches, dogwood found were not vigorous with most of last years growth dead and new stems short and weak. Due to management at site and overall poor performance of planting - **cancel.**

UT04004 Brian Shaffer – Tremonton FO riparian woody planting. 9023733, 9023739, and 9023740 redosier dogwood accessions cuttings and silver buffaloberry plants were ordered March 5, 2004. Site characteristics: Kirkham silt loam soil, 8.5 pH, soil salinity, 1-2 percent slopes, and 4300 feet elevation. Planted on April 30, 2004 into good seedbed conditions - pushed cuttings into long-term water table. FY04 high salinity levels are causing significant stress

to all plants and evaluator could not tell establishment at time of evaluation – suggest earlier evaluation period for next year. FY05 no evaluation. FY06 planting failed – **cancel**.

UT04012 Charles and Karen Sigler – Provo FO dryland pasture field planting. Hycrest crested wheatgrass, Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, and Bozoisky Russian wildrye. Seed ordered March 8th for delivery in late March to early April. Site characteristics – Vineyard fine sandy loam soil, moderately saline conditions, 0-2 percent slopes, 4520 feet elevation, 14-16 inch precipitation zone, non-irrigated, T8S R2E NW1/4 Section 33. FY04, FY05 and FY06 not planted. **cancel**

UT04013 Charles and Karen Sigler – Provo FO irrigated pasture field planting. Paiute orchardgrass, Regar meadow brome and Rush intermediate wheatgrass. Seed ordered March 8th for delivery in late March to early April. Site characteristics – Vineyard fine sandy loam soil, moderately saline conditions, 0-2 percent slopes, 4520 feet elevation, 14-16 inch precipitation zone, irrigated, T8S R2E NW1/4 Section 33. FY04, FY05 and FY06 not planted. **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.

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.

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.

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.**

UT00003 Cooperator Unknown - Beaver FO willow field planting. 50 cuttings each of 9067435 Geyer willow, 9067437 Booth willow, 5730101 Drummond willow, 9067466 Yellow willow, 9067452 Yellow willow, 9067549 Peachleaf willow. Cuttings ordered March 1, 2000 with shipment April 10, 2000. FY00 very poor establishment year due to extreme drought. FY01 grazing has been removed, but deer use is heavy in some locations. Survival-Height-Vigor: 435 Geyer 40% survival, 15 inch height and fair vigor; 437 Booth 46% survival 12 inch height and fair vigor; 101 Drummond 40% survival, 15 inch height and fair vigor; 466 Yellow 20% survival due to poor planting location, 24 inch height and fair vigor; 452 Yellow 80% survival, 26 inch height and excellent vigor; 549 Peachleaf 62% survival, 24 inch height and good vigor. FY06 planting failed. **Cancel**

UT02002 Rasmussen - Fillmore FO demonstration planting of Snake River Plains fourwing saltbush. Seed purchased through Utah Crop Improvement Association. Seed shipped from Aberdeen PMC April 12, 2002. FY03-FY04 due to poor climatic conditions, seed has not been planted. FY06 planting failed. **Cancel**

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. FY06 no evaluation.

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 and FY06 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. Site characteristics:_____. FY04 - FY06 no evaluations.

UT04005 Arlan Mayer – Beaver FO field planting. P27 Siberian wheatgrass, Hycrest crested wheatgrass, Douglas crested wheatgrass, and Bozoisky Russian wildrye. Seed ordered March 8, 2004. Site characteristics: BEK silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R10W NE ¼ Section 31 (NE corner of NE pivot). FY04 – FY06 Planting failed due to drought. **Cancel**

UT04006 Joey Leko – Beaver FO field planting. P27 Siberian wheatgrass, Hycrest crested wheatgrass, Roadcrest crested wheatgrass, Syn A Russian wildrye. Seed ordered March 8, 2004. Site characteristics: REK silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R11W NE ¼ Section 25 (field 5). FY04 – FY06 Planting failed due to drought. **Cancel**

UT04007 Mark Whitney – Beaver FO field planting. Vavilov Siberian wheatgrass, Ephraim crested wheatgrass, Douglas crested wheatgrass, and Bozoisky Russian wildrye. Seed ordered March 8, 2004. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R10W Section 8. FY04 – FY06 Planting failed due to drought. **Cancel**

UT04008 Kent Marshall – Beaver FO field planting. Vavilov Siberian wheatgrass, Ephraim crested wheatgrass, Roadcrest crested wheatgrass, Syn A Russian wildrye. Seed ordered March 8, 2004. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T29S R10W SW ¼ Section 17. FY04 – FY06 Planting failed due to drought. **Cancel**

UT04009 Scott Wiseman – Beaver FO field planting. Nezpar Indian ricegrass and Northern Cold Desert winterfat. Seed ordered March 8, 2004. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R10W SE ¼ Section 29. FY04 – FY06 Planting failed due to drought. **Cancel**

UT04010 Arlan Mayer – Beaver FO field planting. Richfield Selection firecracker penstemon and Bandera Rocky Mountain penstemon. Seed ordered March 8, 2004. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R10W NW ¼ Section 32. FY04 – FY06 Planting failed due to drought. **Cancel**

UT04011 Kent Marshall – Beaver FO field planting. Richfield Selection firecracker penstemon and Bandera Rocky Mountain penstemon. Seed ordered March 8, 2004. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T30S R10W Section 12. FY04 – FY06 Planting failed due to drought. **Cancel**

UT04014 Kent Marshall – Beaver FO field planting. Magnar basin wildrye, Trailhead basin wildrye, Nezpar Indian ricegrass, Open Range winterfat, Northern Cold Desert winterfat, and Snake River Plain fourwing saltbush. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R10W SE ¼ Section 29. FY04 – FY06 Planting failed due to drought. **Cancel**

UT04015 Soren Nielsen project – Manti FO. Riparian woody field planting – 9067538 black cottonwood. Cuttings ordered March 5, 2004. FY04 – FY06 no evaluations.

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.

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.

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 poorer 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. Fairs 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 FY08.**

UT88009 Skyline Mine - Price FO Multiple Grass on critical area planting – slopes. FY90 and FY92 planting summaries available. FY93 portion of seeding destroyed for new beltline. Rest of seeding doing very well. FY95 Appar flax is spreading, both intermediate and pubescent wheatgrass have spread, thickspike wheatgrass is doing very well, Sherman big bluegrass is doing great, mountain rye is not producing well, Paiute is doing well in plots but has not spread, Aster is improving, Covar sheep fescue is not performing well. **FY96** seeding about the same as last year, erosion from slope covered some of the seeding and it will be interesting to see how the plants can withstand this sedimentation. Rush, Sherman and Mountain ryegrass are doing the best overall. **FY99 10 Year Evaluation. Mixture 1:** Luna pubescent wheatgrass is very good on steep slopes and fair on gentle slopes. Hycrest crested wheatgrass failed. Manchar smooth brome is not present on steep slopes, but doing very well on gentle slopes. Appar blue flax is fair on steep slopes and excellent on gentle slopes. Kalo birdsfoot trefoil failed on steep slopes and fair on gentle slopes. Delar small burnet and roses are present on both steep and gentle slopes. **Mixture 2:** Topar pubescent wheatgrass is very good on steep slopes and good on gentle slopes. Ephraim crested wheatgrass and Sodar streambank wheatgrass failed. Delar small burnet is fair on steep slopes and very good on gentle slopes. Roses are present on both slopes. **Mixture 3:** Rush intermediate wheatgrass is good on both steep and gentle slopes. P27 Siberian wheatgrass failed. Critana thickspike wheatgrass is fair on both slopes. Cedar Palmer penstemon is poor on steep slopes and fair on gentle slopes. Summit Louisiana sagewort and roses are present on both slopes. **Mixture 4:** Arriba western wheatgrass is fair to good on both slopes. Mountain rye is very good on gentle slopes. Sherman big bluegrass is good steep slopes and excellent on gentle slopes. Summit Louisiana sagewort is fair on both slopes. Roses are present on both slopes. **Mixture 5:** Rosana western wheatgrass is fair on both slopes. Paiute orchardgrass is very good on both slopes. Covar sheep fescue is good on steep slopes and fair on gentle slopes. Bandera Rocky Mountain penstemon is fair on both slopes. Roses are present on both slopes. **Mixture 6:** Tegmar intermediate wheatgrass is fair on both slopes. Durar hard fescue is fair on steep slopes and high fair on gentle slopes. Bannock thickspike wheatgrass is high fair to good on both slopes. Lutana cicer milkvetch is good on both slopes. Roses are present on both slopes. **Mixture 7:** San Luis slender wheatgrass is good on both slopes. Newhy hybrid wheatgrass failed. Cascade birdsfoot trefoil is poor on steep slopes and good on gentle slope. Blueleaf aster is good to very good on both slopes. Western yarrow is good on both slopes. Roses are present on both slopes.

FY03 15 Year Evaluation: The last several years of drought has damaged these stands. Rain in August 2003 has helped plant survival and vigor. **Mixture 1 – steep slopes:** Luna fair, Manchar failed, Appar failed, Delar failed, Roses are present; **gentle slopes:** Paiute has moved in, Manchar fair, Appar fair, Lutana good. **Mixture 2 – steep slopes:** Topar good, Delar fair, Appar and Roses are present; **gentle slopes:** Delar good, Topar good, Appar good. **Mixture 3 – steep slopes:** Rush good, Critana failed, Cedar failed, Summit good, Roses are present; **gentle slopes:** Rush good, Critana fair, Cedar failed, Lutana good. **Mixture 4 – steep slopes:** Arriba good, Mountain rye fair, Sherman failed, Summit fair, Roses and Goldenrod present; **gentle slopes:** Arriba good, Mountain rye good, Sherman fair, Lutana good, Summit fair, Roses and Goldenrod present. **Mixture 5 – steep slopes:** Rosana good, Paiute fair, Covar fair, Bandera failed, Current and Roses present; **gentle slopes:** Rosana fair, Paiute good, Covar good, Bandera fair, Appar fair, Lutana good. **Mixture 6 – steep slopes:** Tegmar good, Durar failed, Bannock failed, Lutana good, Roses and Current present; **gentle slopes:** Tegmar good, Durar poor, Bannock fair, Lutana good, Paiute fair. **Mixture 7 – steep slopes:** San Luis fair, Cascade failed, Blueleaf aster good, Western yarrow fair, Roses present; **gentle slopes:** San Luis good, Blueleaf aster good, Western Yarrow fair, Lutana fair. **Final evaluation FY05 Evaluation**
Mixture 1 Luna pubescent wheatgrass - is very good on steep slopes and fair on gentle slopes; Hycrest crested wheatgrass – not present on the steep slope (failed), but on the gentle slopes, there we are few plants of crested; Manchar smooth brome - not present on steep slopes, but still a fair stand on the gentle slopes. Much of this plant was grazed; deer. Moderate utilization**;** Appar blue flax – not present in plot (failed); Kalo birdsfoot trefoil- not present in plot (failed); Delar small burnet- fair to poor stand, or minimal occurrence of small burnet. Light to moderate utilization.; Notes - Rose and heath sage are moving into the plot. There was no evidence of Paiute orchardgrass in the plot, but it is possible that is was grazed down to far for identification. Paiute was present in surrounding areas on the gentle slope; Too little plant production to measure, visual estimation of 250-300 lbs of production.
Mixture 2 Topar pubescent wheatgrass – Fair to poor stand on both the steep and gentle slopes; Ephraim crested wheatgrass – This appears to be doing well, I am surprised that it has been reported as failed. I thought I saw a fine rhizomatous wheat doing well, I will recheck next spring; Sodar streambank wheatgrass – failed; Delar small burnet - Poor on the steep slopes, and fair on the gentle slope. Light utilization; Notes: Too little plant production to measure, visual estimation of 250-300 lbs of production
Mixture 3 Rush intermediate wheatgrass - Poor stand present, possibly drought affected; P27 Siberian wheatgrass - reported as failed, but there were a few individual plants present very poor stand; Critana thickspike wheatgrass - is fair to poor on both slopes; Cedar Palmer penstemon - Not present in plot (drought could have affected this plant); Summit Louisiana sagewort – Good stands on both slopes**;** Rose – good stand on both slope; Notes – Production estimate about 150 lbs/ac. Sherman big bluegrass has moved in and is doing well on both steep and gentle slopes.
Mixture 4 Arriba western wheatgrass - is fair to poor stands on both slopes; Mountain rye - Barley holding on, a very poor stand; Sherman big bluegrass - is good to fair on steep slopes and good on gentle slopes; Summit Louisiana sagewort - is fair on both slopes; Goldenrod – present; Rose – present; Notes: orchardgrass not present
Mixture 5 Rosana western wheatgrass- fair to good stands on both steep and gentle slopes; Paiute orchardgrass – not present. Possibly missed due to grazed level; Covar sheep fescue- present on the gentle slope, fair to poor stand. Not present on the steep slopes; Bandera Rocky Mountain penstemon – not present; Roses are present on both slopes; Notes: Lots of sloughing in this plot, production is minimal, estimate only 100 lbs/ac air-dry production. Mountain sagebrush moving into plot, many young plants.
Mixture 6 Tegmar intermediate wheatgrass- Poor to very poor stand on both slopes; Durar hard fescue- Not present (failed); Bannock thickspike wheatgrass – not present (failed); Lutana cicer milkvetch – Good stand on the gentle slope, not present on the steep slope; Roses are present on both slopes; Note: Very minimal grass. Aster moving in, very strong
Mixture 7 San Luis slender wheatgrass – poor to very poor on both slopes**;** Newhy hybrid wheatgrass – failed; Cascade birdsfoot trefoil- not present; Blueleaf aster is good to very good on both slopes; Western yarrow – fair to poor on both slopes; Roses are present on both slopes; Notes: Brome (nodding) moving into plot as well as some Mountain Rye
Cancel

UT90017 Snowball - Price FO Multiple species irrigated demo plots for saline soils. FY92 and FY94 detailed reports available. Irrigation has pushed salinity down below root zone to a large degree. FY95 and FY96 Cicer milkvetch best producer (5279 lbs/ac) followed by San Luis (2587), Revenue (2326), Alsike (1986), Newhy (1673), Hoffman (1646), Festorina/Forager/Tall wheatgrass (1460), Shoshone/Fawn/Altai (1350), Magnar (1125), Garrison (1050), and Kura/Matua/ Trefoil 850) FY99 No yield data gathered. Excellent stands include Shoshone beardless wildrye, Fawn tall fescue, Newhy hybrid wheatgrass, Festorina tall fescue, Forager tall fescue, RS Hoffman, Kura clover, and SP90 Kura clover. Good stands include: Prairieland altai wildrye, Revenue slender wheatgrass, San Luis slender wheatgrass, Jose

tall wheatgrass, Garrison creeping foxtail, Johnstone tall fescue X perennial rye, Lutana/Monarch cicer milkvetch, Regar meadow brome, and orchardgrass. Poor stands include Magnar basin wildrye, some plots of cicer milkvetch, Cascade birdsfoot trefoil, and Dakota/Forestburg switchgrass. Mowing significantly reduces vigor of basin wildrye and switchgrass. Festorina and Forager are preferred over Fawn by sheep. Alsike clover and Matua brome failed/died. The fescue x perennial ryegrass appears to show some signs of winterkill. FY03 No water was applied to plots in 2003. Prairieland Altai wildrye good stand with fair vigor and poor production. Magnar basin wildrye very poor stand with fair vigor and very poor production. Shoshone beardless wildrye fair stand with fair vigor and poor production. Revenue slender wheatgrass failed (short-lived species). San Luis slender wheatgrass failed (short-lived species. Jose tall wheatgrass fair stand with poor vigor and poor production. Monarch cicer milkvetch fair to very poor stand with fair vigor and very poor production. Garrison creeping foxtail fair stand with poor vigor and poor production. Fawn tall fescue good stand with poor vigor and poor production. Newhy hybrid wheatgrass good stand with fair vigor and fair production. Cascade Birdsfoot trefoil failed. Festorina tall fescue good stand with poor vigor and poor production. Forager tall fescue good stand with poor vigor and poor production. Tall fescue – perennial rye cross fair stand with poor vigor and poor production. Orchardgrass poor stand with very poor vigor and very poor production. RS Hoffman grass good stand with fair to good vigor and fair production. Kura clover poor stand with very poor vigor and very poor production. 18SP90 Kura clover poor stand with very poor vigor and very poor production. The few remaining Magnar basin wildrye plant and Altai wildrye plants produced seedheads. RS Hoffman appears to be doing better under drought conditions than Newhy. Final evaluation FY05 – see final report dated 2006. **Cancel**

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 FY08.**

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. **Next evaluation FY08.**

UT99007 Curtis Rozmon - Price FO field planting on irrigated pasture. Trial includes 905438 switchgrass, 905439 switchgrass, Cave-In-Rock switchgrass, Blackwell switchgrass, Kanlow switchgrass, Latar orchardgrass, perennial ryegrass, and white clover. Site is MLRA D35, loamy fine sand soil, 0-1 percent slope, southwest exposure, 4000 feet elevation, 6-8 inch precipitation, irrigated, T23S R16E SE1/4 Section 25. Seed ordered March 22, 1999. FY99 not planted this year. FY00-FY04 didn't plant due to extreme drought. FY05 cooperator no longer interested. **Cancel**

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. FY06 no evaluation

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 and FY06 no evaluation.

UT03002 David James – Monticello FO demonstration planting. Northern Cold Desert winterfat seed ordered February 18, 2003. Site information: MLRA D35; Limeridge shallow sandy loam soil series; 4 percent slope; south aspect; 4800 feet elevation; 6-8 inch precipitation zone; non-irrigated; T40S R20E Sections 6 and 36. FY05 planting could not be found - **Cancel**

UT03003 Mike Wilcox - Monticello FO field planting. UT98004 planted fall (seeding germinated) 1998, but failed due to drought with little to no winter-spring precipitation. This is a dormant fall replanting of Rush intermediate wheatgrass. Luna pubescent wheatgrass is the standard of comparison. Barnam loam soil, 3 percent slopes, south aspect, 6000 feet elevation, 14 inch precipitation, non-irrigated, T31N R26E Section 8. FY00 very little germination this spring (<10%) due to very dry spring. FY01 no evaluation. UT00002 FY02 planting failed due to drought. Seed (Topar pubescent wheatgrass) for UT03003 ordered 2-21-03. FY03-FY04 not planted due to drought. FY05 no evaluation. FY06 planting failed – **cancel.**

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 no evaluation.

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 planting planned as a dormant fall planting in 2006.

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 not planted. Planting is planned for fall 2006.

UT06002 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 mid to late summer and irrigated for establishment.

UT07001 Kyle 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.

SNOWBALL SALINITY TRIAL, EMERY COUNTY, UT
FINAL REPORT
2006

Dana Truman, Range Specialist, NRCS, Price, UT
Dan Ogle, Plant Materials Specialist, NRCS, Boise, ID
Tony Beals, Agronomy Specialist, NRCS, Price, UT

This trial was designed to test the drought and salt tolerance of several varieties of irrigated forage plants. The replicated plots were established in 1991 and 1992 with the cooperation of several agencies and the landowner.

This salinity tolerance trial tested 18 varieties or accessions.

Prairieland Altai Wildrye	Magnar Basin Wildrye
Shoshone Beardless Wildrye	Revenue Slender Wheatgrass
San Luis Slender Wheatgrass	Tall Wheatgrass
Monarch Cicer Milkvetch	Garrison Creeping Foxtail
Fawn Tall Fescue	Birdsfoot Trefoil
NewHy Hybrid Wheatgrass (Quackgrass X Bluebunch Wheatgrass	
Festorina Tall Fescue	Forager Tall Fescue
Alsike Clover	Matua Rescuegrass or Brome
RS Hoffman (Natural Quackgrass X Bluebunch Wheatgrass	
Kura Clover	SP90 Kura Clover.

The trial was located near Elmo, Utah on the Richard Snowball farm. This location was chosen because the landowner was very interested in improving his pasture productivity, access to irrigation, and marginal soils. The soil are moderately to highly saline with pH ranges from 8.5 to 8.9 and electrical conductivity (EC) from 5.7 to 20 plus. The area prior to planting was bare ground or covered with salt grass. The test area was 300 x 50 feet and ran east to west. Figure 1 details the plot layout. Within the fenced trial area, three replications of 100 x 40 feet plots were delineated. In each of the replications, species 1 through 10 were seeded in randomly replicated 10 x 40 feet wide strips in the fall of 1991. The entire plot was surrounded by a 5 feet border of NewHy hybrid wheatgrass. In the spring of 1992, species 11-18 were added at the east end

with no replications except for the fescues which were replicated. Most grasses were planted with a drill. A few species were planted with plugs. The seedbed was well prepared, but possibly a little soft. The soil surface was kept damp until all the species germinated. Species in all three replications germinated well. Garrison creeping foxtail and Monarch cicer milkvetch were the last species to come up. Fertilizer, soil amendments, irrigation, and palatability tests were conducted over the seasons and both NRCS and the Emery County Extension have copies of the data.

Results

Information about relative palatability and salt tolerance and actual yield (clipped weights) were collected for 4 years after establishment. Table 1 summarizes the results by ranking the plants.

Table 1: Relative Salt Tolerance, Yield and Palatability by species

Species/Variety	Salt Tolerance	Yield	Palatability
1. Tall Wheatgrass	**1**	**2**	**16**
2. Shoshone Beardless Wildrye	**2**	**12**	**9**
3. Prairieland Altai Wildrye	**3**	**13**	**17**
4. Magnar Basin Wildrye	**4**	**14**	**15**
5. Revenue Slender Wheatgrass	**5**	**9**	**13**
6. San Luis Slender Wheatgrass	**6**	**11**	**14**
7. NewHy Hybrid Wheatgrass (quackgrassX bluebunch wheatgrass)	**7**	**7**	**7**
8. RS Hoffman (Natural quackgrass X bluebunch wheatgrass)	**8**	**8**	**8**
9. Fawn Tall Fescue	**9**	**6**	**12**
10. Festorina Tall Fescue	**10**	**4**	**10**
11. Forager Tall Fescue	**11**	**5**	**11**
12. Birdsfoot Trefoil	**12**	**18**	**5**
13. Monarch Cicer milkvetch	**13**	**1**	**1**
14. Garrison Creeping Foxtail	**14**	**10**	**6**
15. Alsike Clover	**15**	**3**	**2**
16. Kura Clover	**16**	**15**	**3**
17. SP90 Kura Clover	**17**	**16**	**4**
18. Matua Rescuegrass	**18**	**17**	**18**

Observations

Best Production

Grasses – Tall Fescues, Tall Wheatgrass, NewHy, Slender Wheatgrasses (Note: Slender wheatgrasses were short lived 3-5 years). The area between the drill rows were almost totally weed free.
Legumes – Cicer Milkvetch, Alsike Clover

Best Mid-Summer Regrowth

Grasses- Tall Fescues
Legumes – Alsike Clover

Palatability

Highest – All Clovers and Cicer Milkvetch
High - NewHy, RS Hoffman, Garrison Creeping Foxtail
Medium – Tall Fescues, Shoshone, Slender Wheatgrass
Lowest – Tall Wheatgrass and Wildrye accessions

(Palatability depends on many factors including the time of year, growth stage, moisture content, etc. The above observations were based on use of a small band of sheep during mid season in 1993.)

Best Irrigated Grasses

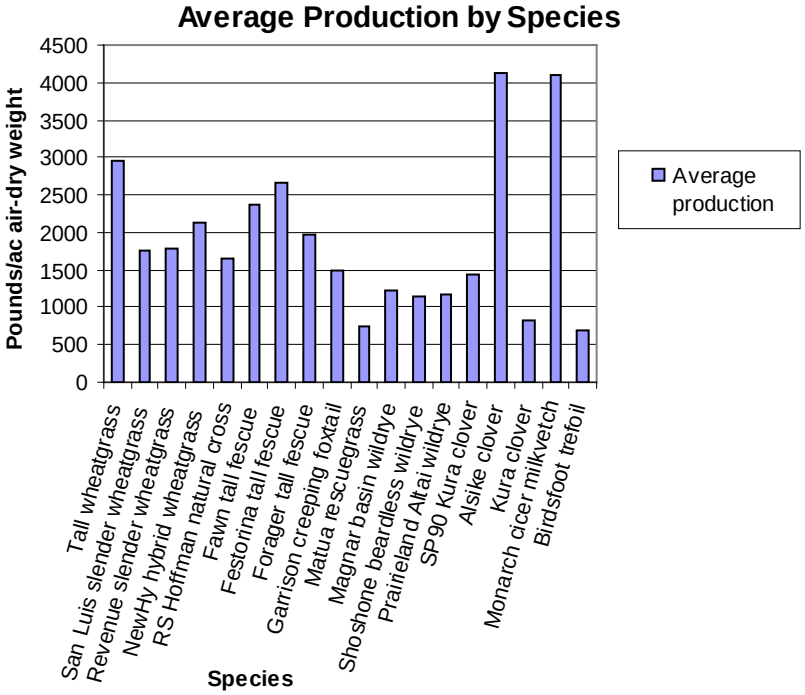
NewHy – Well suited for good to fair soils, easy to establish, and spreads to a heavy stand. Somewhat drought (14 inch + MAP) and very salt tolerant. Good early and late season production and fair regrowth in mid season. Very palatable even in later growth stages

Forager Tall Fescue – Good yields, easy to establish with good salt and drought tolerance. Good midseason regrowth. Better palatability that older varieties of tall fescue.

Garrison – For best production plenty of water and good fertility is required. It will tolerate dry periods from mid to late growing season. It will not tolerate EC levels much above 10. It is very palatable and likes significantly more water that it received in this study.

Discussion

Most accessions germinated readily in all of the replications; however, the slender wheatgrass accessions, tall fescue, and NewHy were outstanding with very thick stands established. Tall wheatgrass had the highest tolerance to salinity, the highest production for a grass, but was near the lowest in palatability of the species tested. Much of the data indicate that varieties that were the most salt tolerant were also the lowest in palatability. However, NewHy and RS Hoffman grasses preformed well; being tolerant of salts with moderate production and moderate palatability. Cicer milkvetch and Alsike clover had very high yields and were very palatable, but their low tolerance of saline conditions makes them difficult to recommend for use under extremely saline soils conditions.



In the less saline soils (replication 1) weed competition negatively affected establishment. Negative impact from the weeds was reduced through mowing and the irrigation regime. The plots were mowed twice at 3-4

inch height. Unfortunately the mowing treatments severely reduced the wildrye plots productivity. The most prevalent weed was kochia with salt grass, sunflower, bindweed, nightshade, and Russian thistle present.

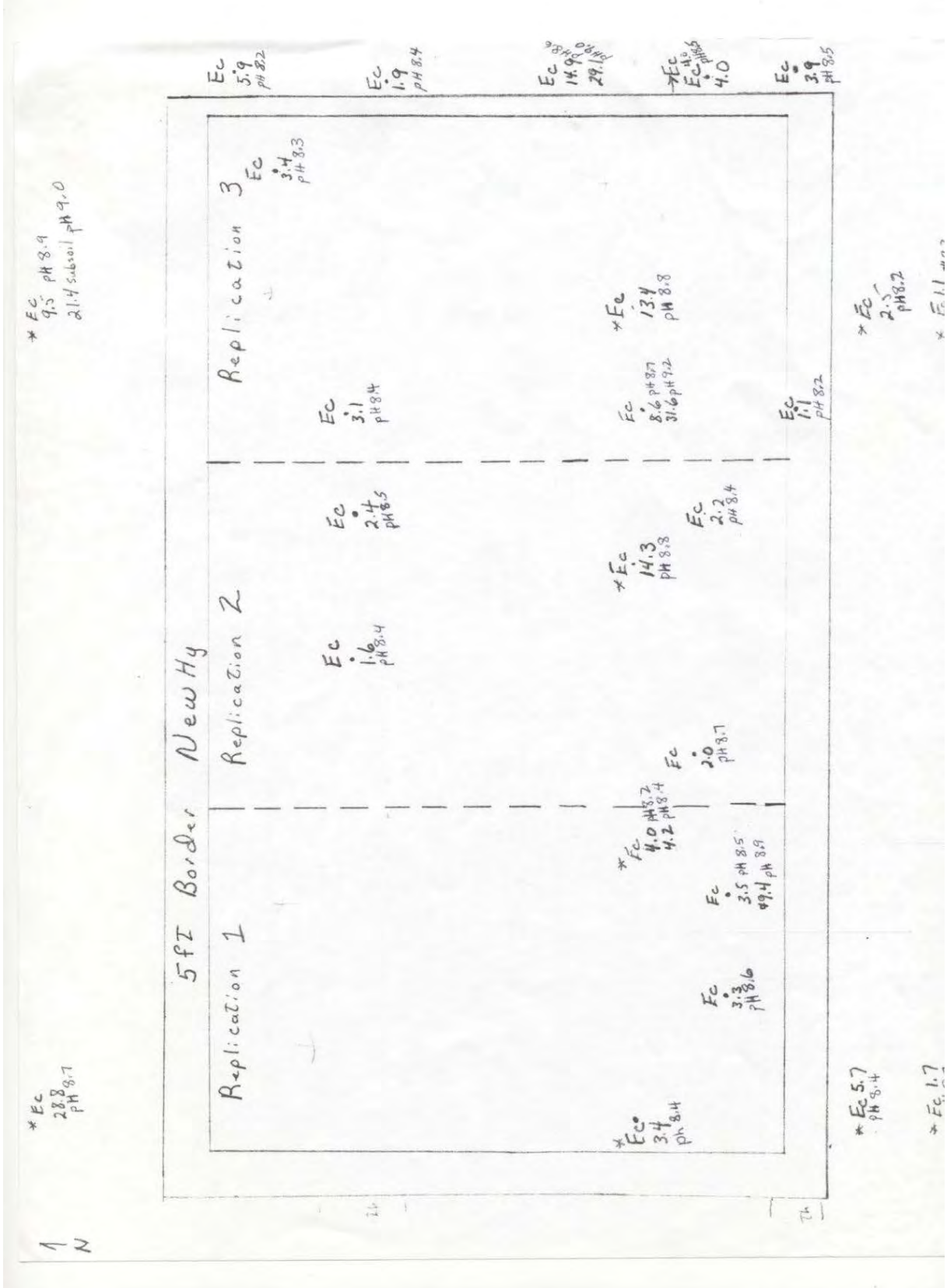
Most years the plots received 30 inches or more of applied irrigation. However in 1994, there was a drought, with only 55% of normal irrigation water available. Including the natural precipitation and the irrigation water, only 23.3 inches of water were applied. The data shows that both slender wheatgrass accessions produced very well under drought conditions (Table 2) indicating good drought tolerance. Also, observations were made that the sprinkler irrigation helped to improve the pH levels in the root zone. Fertilizers were used; Live Earth product was also applied the first year and in the fall of 1992 nitrogen was applied. There was a very evident beneficial effect where the powdered Live Earth product was used. The data showed a 14% increase in yield for slender wheatgrass to a 47% increase in yield for Fawn tall fescue where the Live Earth product was applied.

Table 2 – Yield data by species in Air-dry lbs/ac.

Plants	1991	1992	1993	1994	Average production
Tall Wheatgrass	2,430	6,515	1,444	1,464	2,963
Fawn Tall Fescue	2,335	3,873	1,842	1,385	2,359
San Luis Slender Wheatgrass	871	2,159	1,380	2,587	1,749
Revenue Slender Wheatgrass	1,238	2,609	924	2,326	1,774
NewHy Hybrid Wheatgrass	1,374	4,124	1,312	1,673	2,121
RS Hoffman Wheatgrass	na			1,646	1,646
Festorina Tall Fescue	na	2,307	4,170	1,490	2,656
Forager Tall Fescue	na	1,640	2,802	1,437	1,960
Garrison Creeping Foxtail	894	2,543	1,440	1,045	1,481
Matua Rescuegrass	na	708	winterkill	784	746
Magnar Basin Wildrye	882	1,090	1,800	1,124	1,224
Shoshone Beardless Wildrye	773	1,709	726	1,359	1,142
Prairieland Altai Wildrye	637	1,479	1,230	1,333	1,170
Berseem Clover (annual)	na	1,450	na	na	1,450
Alsike Clover	na	940	6,462	4,986	4,129
Kura Clover	na			836	836
Monarch Cicer Milkvetch	526	1,203	9,381	5,279	4,097
Birdsfoot Trefoil	na			679	679

Tony Beals (NRCS), Dennis Worwood (Emery Co. Ext. Agent) and the landowner initiated the project. Howard Horton with ARS coordinated efforts and completed the planting. If there is further interest in this project, please contact Tony Beals at the Price NRCS Field Office.

Figure 1: Plot Layout



Photos

Close-up of slender wheatgrass and its weed control attributes

Weather station donated by BOR gathered local data for use in evaluating the salinity trials

HASLEM SALINITY TRIAL – DUCHESNE COUNTY, UT
FINAL REPORT
2006

Dana Truman, Range Specialist, Price, UT
Dan Ogle, Plant Materials Specialist, Boise, ID
Brett Prevedel, District Conservationist, Roosevelt, UT

The Haslem Salinity Trial was designed to evaluate the performance of 13 accessions, some traditionally used as well as several new varieties, when grown in saline soils of Duchesne County, Utah. Many farms in the area have had a history of irrigation related problems that have resulted in severe salinity, erosion, and other agronomic limitations. Due to the soil limitations of the area, there has always been some interest in finding species or management techniques that would improve yields.

This salinity tolerance trial tested 13 different varieties or accessions:

- Greenar intermediate wheatgrass
- RS Hoffman (natural quackgrass X bluebunch wheatgrass)
- NewHy hybrid wheatgrass (quackgrass X bluebunch wheatgrass
- Magnar basin wildrye
- SYN-A Russian wildrye
- M5 giant wildrye X basin wildrye
- Garrison creeping foxtail
- Alkar tall wheatgrass
- Bozoisky Russian wildrye
- Fawn tall fescue
- Hycrest II crested wheatgrass
- Tetraploid Russian wildrye
- Vinall Russian wildrye

The location for the plots was chosen because of the soils (a very heavy clay loam), variable levels of salinity, and access to irrigation. Before the trial, this area was an old alfalfa field with weed and salinity problems. The salinity ranged from 1.7 to 21.7 mmhos. The pH was 7.5 to 8.5; the lower values may have been a result of the buffering capabilities of gypsum. The total water holding capacity was two inches per foot. Whitetop and foxtail barley were prevalent invaders.

Plots of each species were approximately 8 feet wide and 24 feet long. All 13 accessions were planted in the same area and replicated 4 times along the saline gradient resulting in 52 total plots. For irrigation purposes, the plots were designed to fit into one set of a wheel line. The area was seeded in 1993 without fertilizer. Because the test area was an old alfalfa field with weed problems, a post emergent herbicide was used to control the volunteer alfalfa.

Results

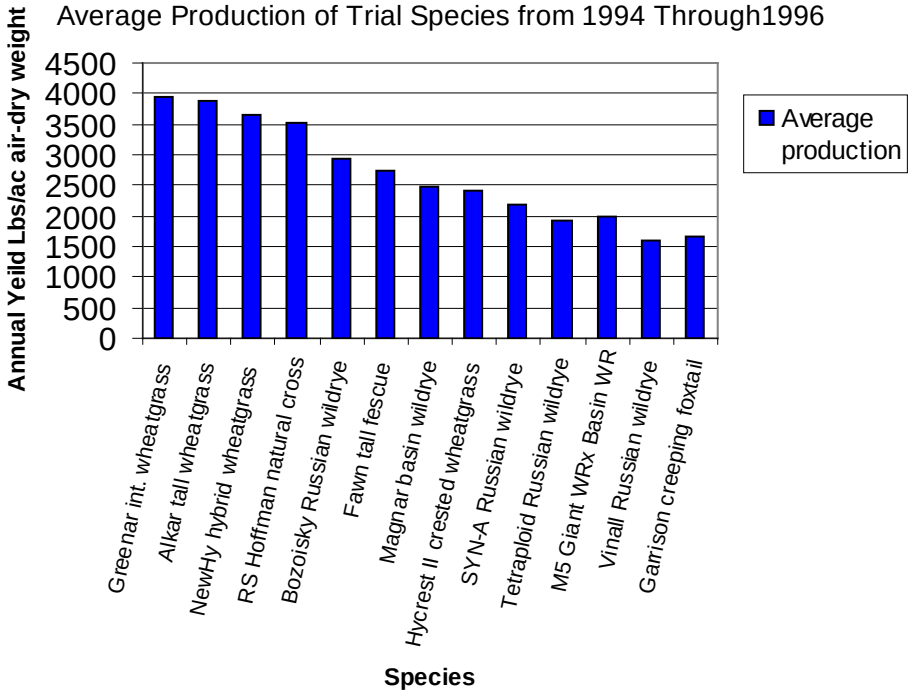
The intermediate wheatgrass and tall wheatgrass had the highest yields and salt tolerance, but the lowest palatability. NewHy and RS Hoffman preformed well, with high yields at lower salinity levels. Bozoisky Russian wildrye had the best performance of the wildrye varieties.

Observations

Plants	
Greenar intermediate wheatgrass	Good salt tolerance and productive, but low palatability.
Alkar tall wheatgrass	Tall wheatgrass had very high salt tolerance and high productivity, but low palatability. It provides good standing cover in winter.
RS Hoffman	Similar to NewHy in behavior, but appears to utilize nitrogen better and does not display the chlorosis traits that NewHy does.
NewHy hybrid wheatgrass	This plant showed high levels of salt tolerance. It had low to moderate germination rates, good seedling vigor, good palatability and proved to be productive at low to moderate salinity levels. At high salinity levels, survival was good, but production dropped off dramatically. It also tended to have chlorosis at all salinity levels.
Bozoisky Russian wildrye	This variety seeded well, and was moderately salt and drought tolerant. It greened up well in the fall for good fall forage.
Fawn tall fescue	Very high drought tolerance and salt tolerance. Low palatability and poor overall production. The plant did not respond well to irrigation during the growing season.
Magnar basin wildrye	Productive if a good stand is achieved. It has good traits for cover habitat and standing winter forage crop. However, the plant had sparse establishment and was coarse with low palatability
Hycrest II crested wheatgrass	This variety had good early spring and late fall green up. Salt tolerance was low, greater than 7 mmhos the plant was negatively affected. The plant had poor regrowth response to irrigation during the growing season.
SYN-A Russian wildrye	Performed similar to Bozoisky Russian wildrye.
Tetraploid Russian wildrye	Less productive and vigorous than Bozoisky Russian wildrye.
M5 giant wildrye X basin wildrye	This plant had poor establishment and low seedling vigor. However, after 4 years the stand appeared vigorous and it was spreading.
Vinall Russian wildrye	This variety did not perform well and had no advantage over Bozoisky Russian wildrye. It had poor establishment and low production.
Garrison creeping foxtail	This variety was negatively affected by drought and did not perform well perhaps due to less irrigation than it required. In this trial it did not appeared salt tolerant beyond 6 mmhos.

Table 1 – Yield data by species in air-dry pounds per acre

Plants	1994	1995	1996	Average production
Greenar intermediate wheatgrass	3,600	5,200	3,000	3,933
Alkar tall wheatgrass	3,000	5,800	2,800	3,867
RS Hoffman – natural cross	4,000	4,000	2,600	3,533
NewHy hybrid wheatgrass	3,600	5,200	2,200	3,667
Bozoisky Russian wildrye	2,800	4,000	2,000	2,933
Fawn tall fescue	3,400	3,200	1,600	2,733
Magnar basin wildrye	2,000	3,400	1,000	2,133
Hycrest II crested wheatgrass	2,800	3,200	1,200	2,400
SYN-A Russian wildrye	2,000	2,600	1,000	1,867
Tetraploid Russian wildrye	2,000	2,400	1,400	1,933
M5 giant wildrye X basin wildrye	1,800	2,800	1,400	2,000
Vinall Russian wildrye	1,400	2,400	1,000	1,600
Garrison creeping foxtail	1,600	2,400	1,000	1,667



Discussion

With good management nearly all species evaluated do well up to 8 mmhos (similar to the tolerance of barley). On more extreme sites, the options are still limited, but NewHy, RS Hoffman, intermediate wheatgrass and Russian wildrye have potential to be used as alternatives to tall wheatgrass.

Benefits from this project are estimated to be 55 tons per year salt load reduction to the river system, 17 acre feet deep percolation reduction, and a substantial increase in crop production. Brett Prevedel and the landowner initiated the project. Howard Horton with ARS coordinated efforts and completed the planting. If there is further interest in this project, please contact Brett Prevedel at the Roosevelt, UT, NRCS Field Office.

Photos