USDA NRCS
Natural Resources Conservation Service

# Aberdeen Plant Materials Center

# 2007 Annual Technical Report

United States
Department of
Agriculture

**Natural Resources**
**Conservation Service**

Aberdeen, Idaho

March 2008

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# 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 the District Seed Increase (DSI) program.

The following table illustrates seed shipments from the Aberdeen Plant Materials Center for Fiscal year 1999 through 2007:

| Cultivar | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | TOTAL POUNDS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | POUNDS PLS | | | | | |
| Anatone bluebunch wheatgrass | - | - | - | - | - | 20 | 250 | 350 | 400 | 1020 |
| Appar blue flax | 115 | 320 | 300 | 470 | 65 | 0 | 848 | 955 | 150 | 3223 |
| Bannock thickspike wheatgrass | 610 | 275 | 250 | 550 | 25 | 0 | 1110 | 900 | 240 | 3960 |
| Delar small burnet | 0 | 451 | 150 | 75 | 0 | 1250 | 945 | 490 | 100 | 3461 |
| Ephraim crested wheatgrass | 50 | 260 | 455 | 696 | 0 | 200 | 0 | 1300 | 300 | 3261 |
| Goldar bluebunch wheatgrass | 370 | 175 | 100 | 375 | 250 | 200 | 200 | 170 | 250 | 2090 |
| Magnar basin wildrye | 901 | 517 | 1035 | 490 | 150 | 245 | 0 | 0 | 490 | 3828 |
| Maple Grove Lewis flax | - | - | - | - | - | 240 | 280 | 70 | 0 | 590 |
| Nezpar Indian ricegrass | 100 | 900 | 150 | 75 | 340 | 0 | 300 | 500 | 700 | 3065 |
| P-27 Siberian wheatgrass | 25 | 150 | 200 | 500 | 0 | 0 | 0 | 0 | 200 | 1075 |
| Penstemon "Clearwater Selection" | 0 | 1 | 10 | 1 | 10 | 4 | 8 | 0 | 0 | 34 |
| Penstemon "Richfield Selection" | 5 | 5 | 1 | 7 | 6 | 3 | 11 | 25 | 6 | 69 |
| Paiute orchardgrass | 250 | 101 | 450 | 200 | 0 | 0 | 0 | 75 | 200 | 1276 |
| Regar meadow brome | 800 | 670 | 1061 | 207 | 50 | 50 | 0 | 650 | 50 | 3538 |
| Rush intermediate wheatgrass | 1000 | 215 | 525 | 0 | 0 | 0 | 800 | 300 | 500 | 3340 |
| S.R.P. fourwing saltbush | - | - | - | 25 | 5 | 2 | 16 | 0 | 0 | 48 |
| Sodar streambank wheatgrass | 100 | 860 | 500 | 500 | 200 | 0 | 625 | 775 | 250 | 3810 |
| Tegmar dwarf intermediate wheatgrass | 0 | 100 | 0 | 0 | 0 | 200 | 0 | 0 | 0 | 300 |
| Northern Cold Desert winterfat | - | - | - | 8 | 3 | 8 | 20 | 5 | 4 | 48 |
| TOTAL POUNDS | 4,326 | 5,000 | 5,187 | 4,179 | 1,104 | 2,422 | 5,413 | 6,565 | 3,840 | 38,036 |

**March 29, 2007**

**Aberdeen Plant Materials Center**

2007 FIELD ANNUAL PLAN OF OPERATION

HOME FARM

| Field | Acres | Crop | Operation |
|---|---|---|---|
| 1 | 1.7 | Display Nursery | Establish new grass display nursery. |
| 2E | 1.3 | Anatone (2007) | Establish and manage for Certified seed production. |
| 2W | 1.0 | Mountain Brome (Grand Teton NP - 2006) | Manage for seed production. |
| 3 | 1.8 | Anatone Bluebunch (2005) | Manage for Certified seed production. |
| 4 | 1.4 | Constructed Wetland Ponds | Determine best method to eliminate volunteer plants and implement. |
| 5 | 2.4 | Green Manure | Establish annual legume for plowdown. |
| 6 | 2.4 | Anatone Bluebunch (2004) | Manage for Certified seed production. |
| 7 | 3.2 | Delar (2006) | Manage for Foundation seed production. |
| 8 | 3.2 | Green Manure | Establish annual legume for plowdown. |
| 9 | 3.2 | Maple Grove (2005) | Cooperate with U of I for herbicide testing. |
| 10 | 3.2 | Maple Grove (2006) | Manage remaining crop for Certified seed production. Fallow area plowed under. |
| 11N | 1.1 | Potatoes | U of I will plant potatoes. |
| 11S | 0.2 | 9076402 Mutton grass (2002) | Manage for increase and potential release. |
| 12 | 1.4 | USFS Forbs (2004)<br>Great Basin Forbs (2005) | Evaluate for potential release.<br>Evaluate for potential release. |
| 13N | 0.1 | Penstemon (2003) | Manage for Certified seed production. |
| 13S | 0.25 | Sandberg Bluegrass (Grand Teton NP - 2006) | Manage for seed production. |
| 14 | 1.2 | Woody Display Nursery (1995) | Maintain display of woody conservation plants. Manage Durar/Covar cover crop. |
| 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. |

**Aberdeen Plant Materials Center**

2007 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 (1985) | Maintain as needed for permanent cover. |
| 22W | 4.1 | Wildlife Food Plot | Establish and maintain wheat for wildlife use. |
| 22E | 1.3 | Willow IEP (1984) | Maintain as needed. |
| 23W | 2.4 | Bozoisky Cover crop | Establish and maintain as needed for permanent cover. |
| 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 | Wildlife Food Plot | Establish and maintain corn for wildlife use. |
| 24E | 1.5 | Durar Cover Crop | Maintain as needed for permanent cover. |
| 25 | 5.1 | Alfalfa (2003) | Manage for hay production and wildlife benefits. |
| 26W | 1.0 | Bozoisky Cover crop (2005) | Maintain as needed for permanent cover. |
| 26E | 2.7 | Willow Cutting Nursery (1994) | Maintain as needed. |
| 27W | 2.2 | Bozoisky Cover crop (2005) | Maintain as needed for permanent cover. |
| 27M | 1.2 | Bozoisky Cover crop | Establish and maintain as needed for permanent cover. |
| 27E | 1.0 | Slender Wheatgrass (Grand Teton NP - 2006) | Manage for seed production. |
| 28 | 5.3 | Alfalfa (2004) | Manage for hay production and wildlife benefits. |
| 29W | 1.3 | Willows (1994) | Evaluate and permanently mark plots. |
| 29E | 3.7 | Fallow | Fallow as needed for weed control. |

**Aberdeen Plant Materials Center**

2007 FIELD ANNUAL PLAN OF OPERATION (continued)

FISH AND GAME FARM (continued)

| Field | Acres | Crop | Operation |
|---|---|---|---|
| 30W | 0.7 | Windbreak/Guard Row | Maintain and irrigate as needed. |
| 30W | 2.5 | Wildlife Food Plot<br>USFS Grasses (2005)<br>Mutton grass (2006) | Establish and maintain corn for wildlife use.<br>Evaluate for potential release.<br>Evaluate advanced evaluation planting. |
| 30E | 2.3 | USFS Grasses (2004) | Evaluate for potential release. |
| 31 | 1.5 | Wildlife Food Plot | Establish and maintain corn for wildlife use. |
| | 3.75 | DOD Western w.g. (2005) | Maintain for seed increase. |
| 32 | 6.2 | Windbreak IEP (1982) | Maintain as needed. |

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

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

BREWINGTON FARM (U of I)

| Field | Acres | Crop | Operation |
|---|---|---|---|
| 410W | 2.0 | DOD Siberian w.g. (2005) | Maintain for seed increase. |
| 410E | 2.0 | DOD Slender w.g. (2005) | Maintain for seed increase. |
| 411 | 4.5 | Nezpar (2007) | Establish and maintain for Foundation seed production. |

PEARL FARM

| Field | Acres | Crop | Operation |
|---|---|---|---|
| S1 | 5.0 | Alfalfa (2006) | Maintain for hay production and to improve soil quality. |
| S2 | 5.0 | Alfalfa (2006) | Maintain for hay production and to improve soil quality. |
| S3 | 5.0 | Alfalfa (2006) | Maintain for hay production and to improve soil quality. |
| S4W | 1.0 | Buckwheat IEP | Manage according to project plan. |

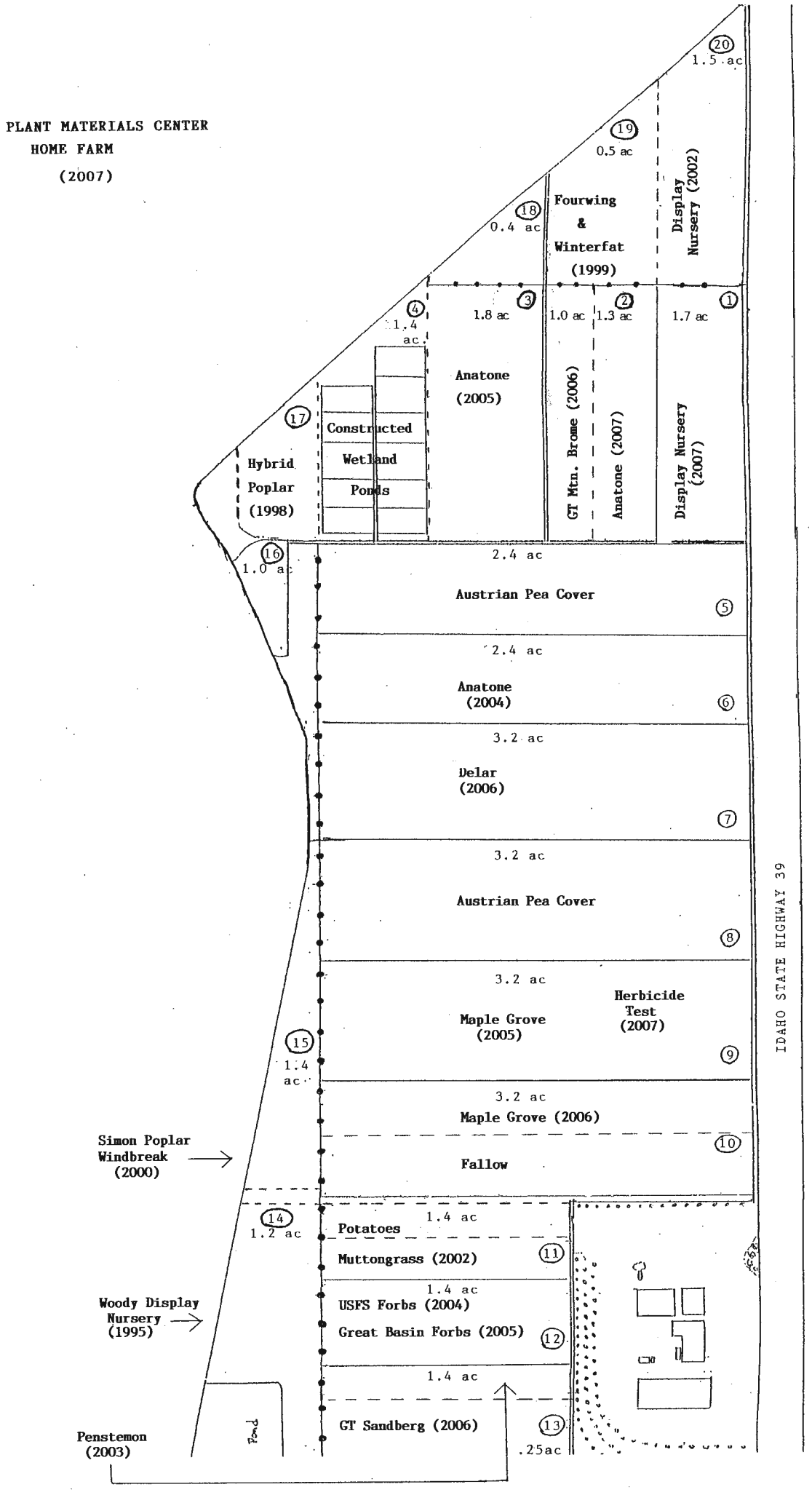
**Aberdeen Plant Materials Center**

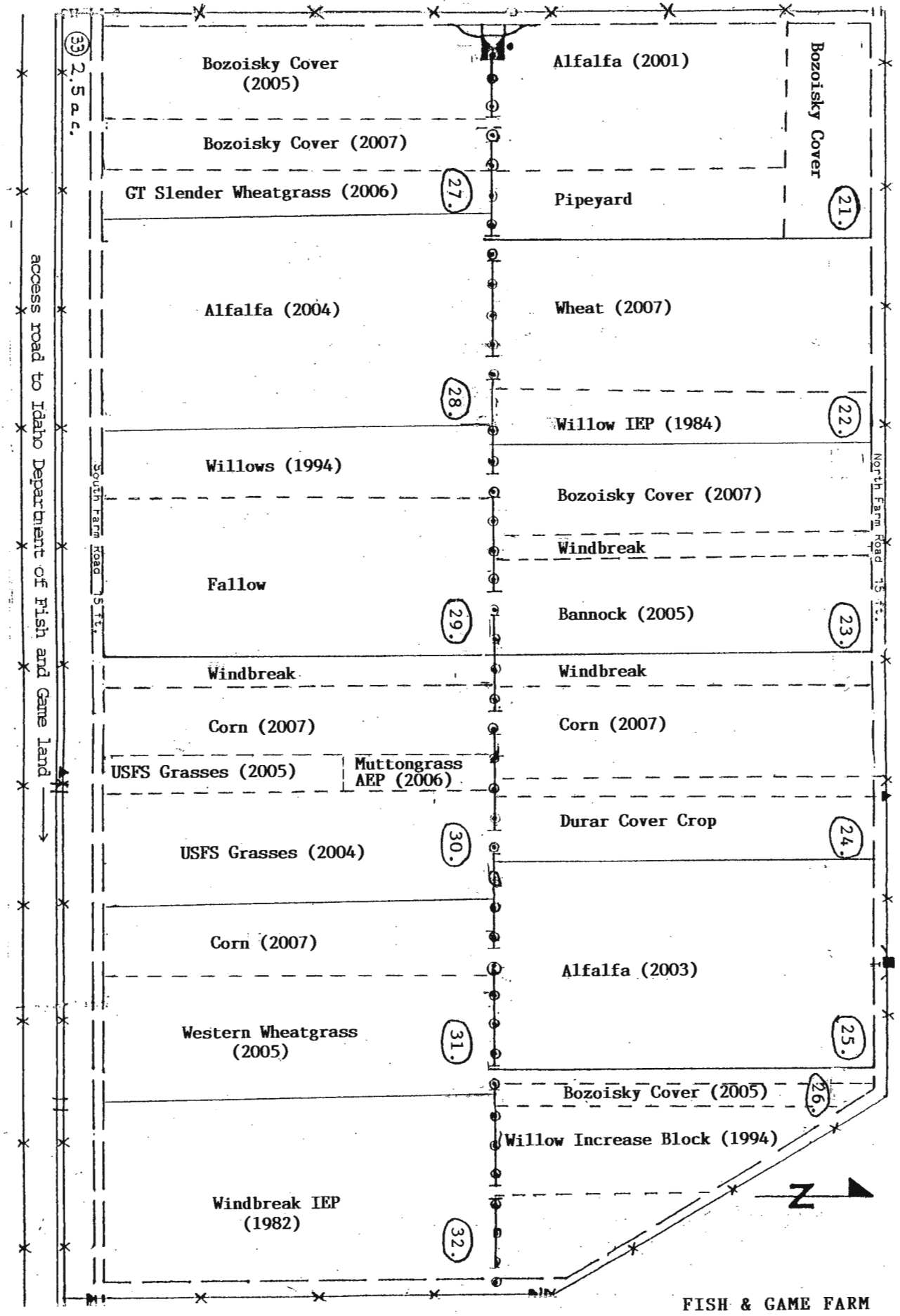
2007 FIELD ANNUAL PLAN OF OPERATION (continued)

PEARL FARM (continued)

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

Maintain two-row windbreak (Rocky Mountain Juniper and Simon Poplar established on south and west farm borders. Establish grass cover along mainline and north border slope and road.


PLANT MATERIALS CENTER
HOME FARM
(2007)
20
1.5 ac
19
0.5 ac
Display Nursery (2002)
18
0.4 ac
Fourwing & Winterfat (1999)
4
1.4 ac
3
1.8 ac
2
1.0 ac
1.3 ac
1
1.7 ac
Anatone (2005)
GT Mtn. Brome (2006)
Anatone (2007)
Display Nursery (2007)
17
Constructed Wetland Ponds
Hybrid Poplar (1998)
16
1.0 ac
2.4 ac
Austrian Pea Cover
5
2.4 ac
Anatone (2004)
6
3.2 ac
Delar (2006)
7
3.2 ac
Austrian Pea Cover
8
3.2 ac
Maple Grove (2005)
Herbicide Test (2007)
9
15
1.4 ac
3.2 ac
Maple Grove (2006)
10
Fallow
Simon Poplar Windbreak (2000)
14
1.2 ac
1.4 ac
Potatoes
11
Muttongrass (2002)
1.4 ac
USFS Forbs (2004)
Great Basin Forbs (2005)
12
Woody Display Nursery (1995)
1.4 ac
GT Sandberg (2006)
13
.25ac
Penstemon (2003)
Pond
IDAHO STATE HIGHWAY 39

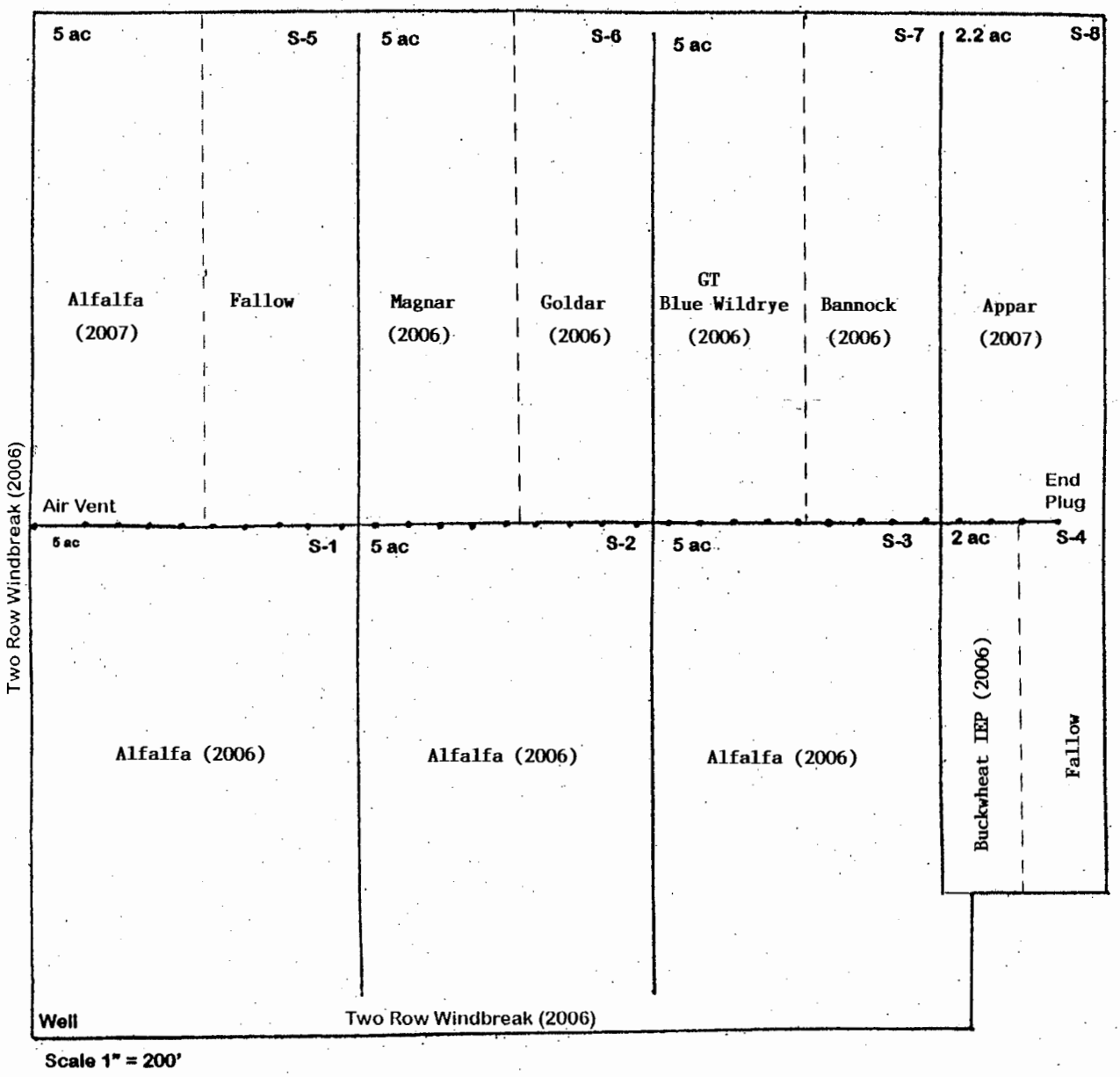



FISH & GAME FARM

(2007)

# PLANT MATERIALS CENTER
# PEARL FARM

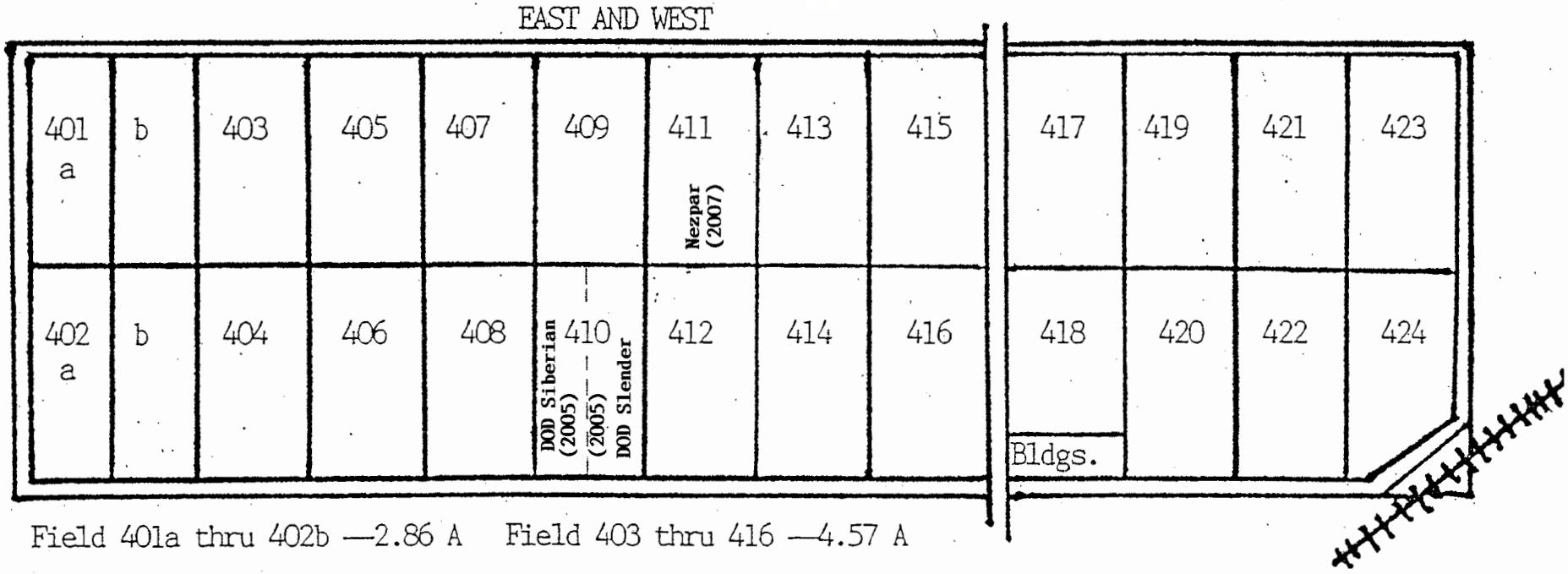
(2007)




Scale 1" = 200'

**UNIVERSITY OF IDAHO**

**BREWINGTON FARM (2007)**




Field 401a thru 402b —2.86 A  Field 403 thru 416 —4.57 A

Field 417 thru 423 —4.63 A  Field 418 —3.82 A

Field 424 —4.52 A

2007 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, 2007 before buds began to break dormancy, the trees were pruned to remove all side branches up to a height of 20 – 25 feet on the trees that were well established to encourage a single dominant trunk that is preferred for saw logs. No more than 50 percent of the branches on a single tree were removed. During the growing season sprouts and side branches below the prune line were removed periodically.

The plots were evaluated on September 13, 2007 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 18.1 m – 59.4 feet) and also had the largest D.B.H. (mean 34.6 cm – 13.6 inches). This accession continues to appear to be the best adapted to the soil and climate in the Snake River Plains of southeastern Idaho. Accession no. 9076418 (OP-367) also had the best vigor rating from the original planting in 1998. No destructive pests were observed on the plants this year.

Of the plots re-planted in 1999, Robust poplar continued to have the best survival and Siouxland had the tallest average height. Robust also had the largest mean D.B.H. (19.5 cm – 7.7 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 during dormancy in late winter 2008 to reduce side branching and will be evaluated next fall. The plots will be harvested in the fall of 2009 to evaluate wood production.

Table 1.
2007 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 | 16.2 | 18.1 | 20.1 | 34.6 | 2.3 |
| 9076419 (184-411) | 1 | 11.1 | -- | -- | 11.6 | 14.5 | 5.0 |
| 9076420 (50-197) | 0 | 0.0 | -- | -- | -- | -- | 9.0 |
| 9076421 (52-225) | 6 | 66.7 | 9.4 | 15.0 | 18.6 | 15.4 | 6.5 |
| 9076422 (15-29) | 3 | 33.3 | 7.0 | 10.2 | 16.0 | 8.9 | 7.2 |
| Canam | 2 | 22.2 | 8.2 | 11.3 | 14.3 | 14.1 | 4.5 |
| Robust | 3 | 33.3 | 16.2 | 16.3 | 16.5 | 24.2 | 2.7 |
| Siouxland | 5 | 55.5 | 13.4 | 15.5 | 16.8 | 23.9 | 2.8 |
| Imperial | 5 | 55.5 | 11.9 | 13.6 | 14.9 | 23.8 | 3.2 |

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 | -- | -- | 10.4 | 15.2 | 5.0 |
| 9076420 (50-197) | 8 | 0 | -- | -- | -- | -- | 9.0 |
| 9076421 (52-225) | 1 | 0 | -- | -- | -- | -- | 9.0 |
| 9076422 (15-29) | 4 | 0 | -- | -- | -- | -- | 9.0 |
| Canam | 7 | 57 | 9.8 | 11.2 | 13.4 | 6.9 | 7.4 |
| Robust | 6 | 83 | 11.6 | 12.1 | 16.2 | 19.5 | 4.8 |
| Siouxland | 4 | 50 | 13.4 | 13.9 | 14.3 | 9.5 | 7.5 |
| Imperial | 4 | 0 | -- | -- | -- | -- | 9.0 |

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

# Great Basin Native Plant Selection and Increase Project
# 2006 Annual Report

## Project Title:

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

**Project Location:** NRCS Aberdeen, ID Plant Materials Center

**Principal Investigators and Contact Information:**

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

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

**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** – A new seed field (3.2 acres) was planted on May 24, 2006. The seed field established in 2005 (also 3.2 acres in size) was contaminated with 'Appar' blue flax so harvested seed could not be certified. This field is now being used to conduct herbicide tolerance trials in cooperation with the University of Idaho. The new field established in 2006 was also contaminated with Appar. It appears that the stock seed to plant both fields was contaminated with Appar. Approximately 2/3 of the new field was plowed out and the remaining plants will be

rouged carefully to remove Appar plants. Shipped 70 pounds of Certified seed to commercial growers in 2006.

**Anatone Germplasm bluebunch wheatgrass** – Currently 5.2 acres are in production. Estimated seed yield from 2006 seed crop is 1,090 pounds. Shipped 350 pounds of Certified seed to commercial growers in 2006.

**Snake River Plains Germplasm fourwing saltbush** – Estimated seed yield from 2006 crop is 20 pounds. No seed was requested by commercial growers in 2006.

**Northern Cold Desert Germplasm winterfat** – Estimated seed yield from 2006 crop is 11 pounds. Shipped 5 pounds of Certified seed to commercial growers in 2006.

## Propagation Studies

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

On June 13, 2006 and October 27, 2006 the plants that were direct-seeded the preceding fall were evaluated for survival and the results are shown in the following table:

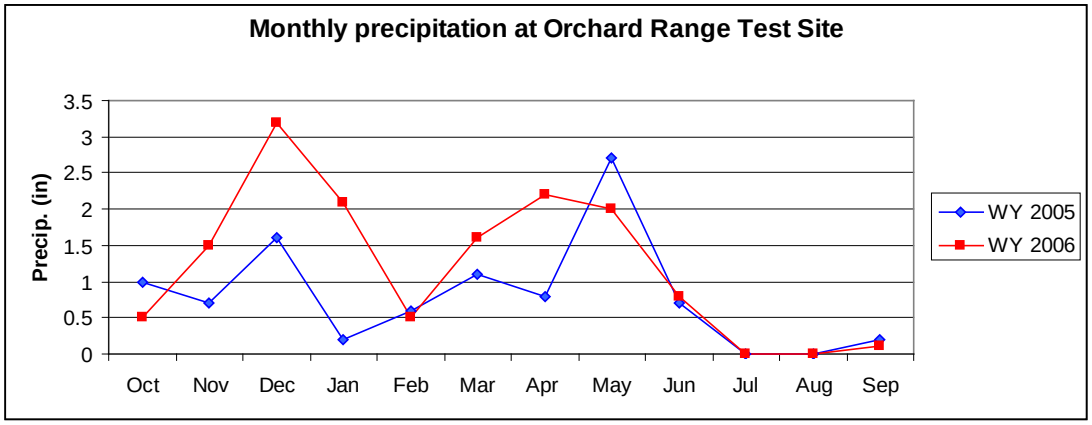
| Species | 6/13/06 Survival (percent) | 10/27/06 Survival (percent) | 10/27/06 Plant Height (cm) | Clean seed (grams) |
|---|---|---|---|---|
| ERUM | 40 | 40 | 10-15 | 31.8 |
| LODI | 25 | dormant | | |
| LOGR | 65 | dormant | | |
| LOTR | 70 | dormant | | |
| PEAC | 60 | 68 | 20-25 | 1362.0 |
| PEDE | 50 | 58 | 20-25 | 1180.0 |
| PESP | 60 | 60 | 10-20 | 0.0 |

The evaluation conducted in June was an estimate of survival and the October evaluation was an actual plant count. By early July, the *Lomatium* plants had gone completely dormant. There was no sign of green-up this fall, so survival of these plants is unknown and will be evaluated in the spring of 2007. Seed was harvested from ERUM, PEAC and PESP and cleaned.

## Orchard Display Nursery
## Evaluation Summary

### Introduction

The Orchard Display Nursery was planted on November 16, 2004 in cooperation with the Great Basin Native Plant Selection and Increase Project. The nursery 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).




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 and 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 30. 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 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 density. 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 wheatgrass accessions 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/ft² respectively. Sheep fescue stands remained poor from 2005 to 2006 with Covar slightly increasing from 0.00 to 0.07 plants/ft². 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/ft².

| | | 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 wheatgrass accessions 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/$ft^2$. The Russian wildrye accessions all increased in density with the exception of Tetracan which decreased slightly. The best stand was recorded in the Bozoisky Select plot with 0.58 plants/$ft^2$.

| | | **4/27/05** | **5/25/05** | **5/30/06** |
|---|---|---|---|---|
| **Species** | **Name or accession** | **Plants/$ft^2$** | **Plants/$ft^2$** | **Plants/$ft^2$** |
| **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/$ft^2$** | **Plants/$ft^2$** | **Plants/$ft^2$** |
| **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.

**References**

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## Develop Technology to Improve the Diversity of Introduced Grass Stands

The PMC assisted Brigham Young University (BYU) Provo, UT and the Agricultural Research Service (ARS) Burns, OR in developing technology to improve the diversity of introduced grass stands by evaluating methods to introduce native species into established introduced plant communities. In 2005, the PMC modified a Truax Roughrider range drill, mixed the seed and rice hull mixtures and completed the first year of seedings at the sites in Utah and Oregon.

In 2006, modified seed drop boots by the manufacturer were installed on the Truax drill. The Utah sites (Skull Valley and Lookout Pass) were seeded the week of October 24 and the Oregon site (Burns) was seeded the week of October 31, 2006. 12.5 acres were seeded at each site. In addition to these seedings, the PMC also seeded drill comparison trials (approximately 30 acres total) near Elko, NV during the week of November 6, 2006 on recently burned rangeland to compare the Truax drill to the Kemmerer drill, a standard range drill used by BLM. While seeding these projects, the PMC technicians met with Jim Truax (drill manufacturer) to demonstrate the modifications to the drill under field conditions.

The Truax drill is designed to both broadcast and drill seed in the same pass so species that require broadcasting or very shallow planting depth were broadcast and the deeper seeded species were drill seeded in alternating rows. 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 | 1.33 |
| 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 |

**Drill Comparison Broadcast Mix**

| Species | Pounds PLS/ac | Pounds Bulk Seed/ac |
|---|---|---|
| Wyoming big sagebrush | 0.20 | 1.33 |
| Rubber rabbitbrush | 0.25 | 0.65 |
| Eagle yarrow | 0.20 | 0.21 |
| Mtn. Home sandberg bluegrass | 0.75 | 0.91 |
| Rice Hulls | | 7.01 |

**Comparison Drill Mix**

| Species | Pounds PLS/ac | Pounds Bulk Seed/ac |
|---|---|---|
| Fourwing saltbush | 0.69 | 1.15 |
| Appar blue flax | 0.65 | 0.75 |
| Munro globemallow | 0.50 | 0.59 |
| Anatone bluebunch wheatgrass | 3.00 | 3.54 |
| Bottlebrush squirreltail | 1.90 | 2.06 |
| Nezpar Indian ricegrass | 2.00 | 2.13 |
| Rice Hulls | | 5.05 |

The drill comparison trials were seeded at rates of 75 and 125 percent of the rates listed in the table above in order to be able to compare effectiveness of the 2 different drills.

Cover crop mixes were also prepared and seeded at the drill comparison trial sites to provide perennial cover around the plots. Approximately 8 acres of cover crop were seeded at each site and are listed below:

**East Humboldt Cover Drill Mix**

| Species | Pounds PLS/ac | Pounds Bulk Seed/ac |
|---|---|---|
| Hycrest crested wheatgrass | 2.50 | 2.78 |
| Bozoisky Russian wildrye | 1.50 | 1.83 |
| Vavilov Siberian wheatgrass | 3.00 | 3.24 |
| Rice Hulls | | 6.11 |

**Gopher Fire Cover Drill Mix**

| Species | Pounds PLS/ac | Pounds Bulk Seed/ac |
|---|---|---|
| Ladak alfalfa | 0.50 | 0.54 |
| Hycrest crested wheatgrass | 1.00 | 1.11 |
| Bozoisky Russian wildrye | 1.00 | 1.22 |
| Rimrock Indian ricegrass | 1.50 | 1.55 |
| Secar Snake River wheatgrass | 2.00 | 2.51 |
| Bannock thickspike wheatgrass | 2.00 | 2.44 |
| Rice Hulls | | 5.37 |

The drill comparison trial is planned to be repeated again the fall of 2007. Location of trial to be determined based on areas that burn during the 2007 fire season in northern Nevada.

CRATERS OF THE MOON NATIONAL MONUMENT
2006 Annual Report
Prepared by
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 (CNM) to produce seed and plants of thirteen native plant species for use in revegetation of disturbed areas following construction.

## ACOMPLISHMENTS

In the fall of 2005 the PMC began propagation of limber pine and antelope bitterbrush in 40 cubic inch conetainers in the greenhouse. In late November, the PMC was notified that construction work and revegetation projects were delayed indefinitely. The PMC maintained the seedlings through September 2006. On September 11, the PMC delivered approximately 200 antelope bitterbrush and 120 limber pine seedlings to CNM for transplanting.

Limber pine seedling

Transplanted species and destinations within Craters of the Moon National Monument

| | Limber pine | Antelope Bitterbrush | |
|---|---|---|---|
| | 53 highway row | 130 waterline | |
| | 34 boneyard | 33 parking lot islands | |
| | 4 cg vault | 6 visitor center | |
| | 6 resources office | 14 campground by fee booth | |
| | 17 other | | |
| Total Planted | 114 | 183 | 297 |

Due to the mild and dry fall, planting was postponed until October. Despite the application of “liquid fence" repellent the seedlings were damaged by wildlife browsing and also experienced some desiccation during the delay in planting. Survival of the transplants will be determined in spring 2007.

# GRAND TETON NATIONAL PARK

## FY2006 Annual Report
## Prepared by

## NATURAL RESOURCES CONSERVATION SERVICE
## PLANT MATERIALS CENTER
## ABERDEEN, IDAHO

### INTRODUCTION

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

### ACCOMPLISHMENTS

GTNP personnel delivered processed seed to the PMC on February 7, 2006 as listed below:

| Species | Scientific Name | Bulk Weight (lbs) | Acreage Seeded |
|---|---|---|---|
| Slender wheatgrass | *Elymus trachycaulis* | 5.6 | 1.0 |
| Blue wildrye | *Elymus glaucus* | 14.6 | 2.7 |
| Mountain brome | *Bromus marginatus* | 7.0 | 1.0 |
| Sandberg bluegrass | *Poa secunda* | 0.8 | 0.25 |

PMC personnel inspected each seed lot for purity and estimated germination for each of the species. Based on inspection and germination, mountain brome and Sandberg bluegrass seed was processed further to improve germination and purity. Seed fields were planted the last week of May 2006. Slender wheatgrass was planted in Field 27E at the PMC Fish and Game Farm. Mountain brome and Sandberg bluegrass were planted in Fields 2W and 13N respectively at the PMC Home Farm. Blue wildrye was planted in Field 6E at the PMC Pearl Farm.

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

Seed harvest will begin from these fields in 2007.

**Grand Teton National Park Seed Increase. Blue wildrye.**
**Aberdeen Plant Materials Center, September 6, 2006.**

**Grand Teton National Park Seed Increase. Mountain brome.**
**Aberdeen Plant Materials Center, September 6, 2006.**

**Grand Teton National Park Seed Increase. Slender wheatgrass.**
**Aberdeen Plant Materials Center, September 6, 2006.**

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

NATIONAL PARK SERVICE
WETLAND ESTABLISHMENT RESEARCH STUDY

2006 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

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

**Accomplishments**: A report summarizing the wetland seeding research conducted by the Aberdeen PMC during 2005 was published in the spring 2006 edition of Native Plants Journal under the title: *Comparison of methods for seeding Nebraska sedge (Carex nebrascensis) and Baltic rush (Juncus balticus*).

**Technology Development**: In 2006, direct wetland seeding research continued in the form of a greenhouse experiment examining inert broadcast carriers and hydroseeding mulches. Our commonly used wetland species produce very small seed, several million seeds/pound in the case of Baltic rush, and are extremely difficult to seed. The trial examined eight seeding treatments. There were four dry methods: no carrier, rice hulls, shop dry (a clay material for soaking up spills), and sand; in addition, there where four wet treatments, Fertile Fibers®, straw mulch, wood mulch and straight tackifier in water. Greenhouse trays were seeded and placed in wetland tanks and subsequently flooded. Plant density data indicate that Fertile Fibers® hydromulch and the use of a straight tackifier/water mix provide significantly better establishment than the other treatments.

The following data were collected from the study.

Seedling Germination

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

In 2007 the PMC plans to evaluate the top performing seeding methods in an outdoor trial.

Treatments prior to flooding.

Juncus seedlings after 21 days.

**Hairy Vetch Adaptation Trial 2006-2007**
**Study Number: IDPMC-0613-CP**
**Derek J. Tilley, Range Conservationist (Plants)**
**NRCS Aberdeen Plant Materials Center**
**Aberdeen, Idaho**

## Introduction

In 2006 the Aberdeen Plant Materials Center (PMC) entered into agreement with Dr. Thomas Devine, ARS Beltsville, MD to investigate the winter hardiness attributes of five accessions of hairy vetch (*Vicia villosa* Roth) at multiple PMCs in the northern region of the United States. Hairy vetch is a legume used as a cover crop by organic farmers in the northern states. In these applications the plants are seeded in late summer and run over with a roller the following spring, at bloom or shortly thereafter, to crimp and thereby kill the plants leaving mulch on the soil surface. The farmer then no-tills the next crop directly into the hairy vetch mulch (sometimes crimping and planting is done in one operation). The vetch provides nitrogen, controls weeds and helps retain moisture in the soil.

## Materials and methods

The five hairy vetch accessions investigated were: AUEC, Groff, B-35, K-12 and Nebraska Common. Seed was supplied by Dr. Devine. The trial was located at the PMC home farm 2 miles north of Aberdeen, Idaho. 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 site was disked and smoothed prior to planting. Experimental design was a randomized complete block with three replications. Each plot consisted of a single row, 10 feet long. Rows were spaced 36 inches apart.

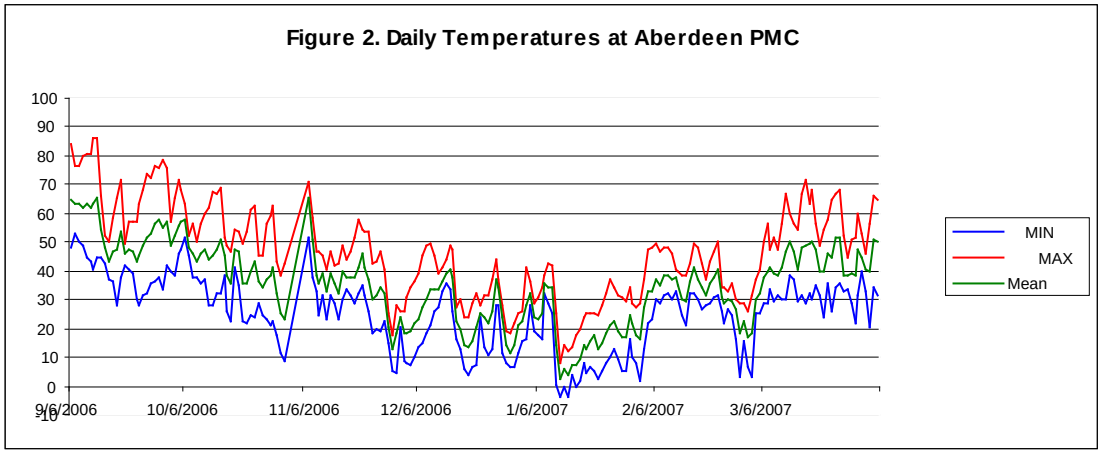
The experimental protocol provided by Dr. Devine included the application of a *Rhizobium* inoculant (Type C) to the seed prior to planting. A search was made for local suppliers of hairy vetch inoculant, but none were found. Because fall was progressing and temperatures were fast approaching the point where it would be too late to plant, it was decided by the PMC that the study could proceed without the use of inoculant. Planting occurred on September 6, 2006 with the use of a garden belt seeder. The seeder was calibrated to plant 6 seeds/ft or 60 seeds/plot. The plots received supplemental irrigation for establishment.

**Figure 1. Hairy vetch seedling at time of spring evaluation.**

The plots were evaluated for total number of living seedlings, once in the fall prior to winter dormancy on October 27, 2006 and again in the spring after plants had begun to actively grow on April 5, 2007 (figure 1). Survival was recorded as the number of living plants at the time of the second evaluation divided by the number of plants at the first evaluation. Data were analyzed with Statistix 8 analytical software and subjected to an analysis of variance (ANOVA), and significant means were separated with a Tukey's HSD Test with a significance level of $p \leq 0.05$.

## Weather information

Temperatures at the time of planting averaged into the sixties but dropped in the following days and weeks to the fifties (figure 2). The first sub-freezing temperature occurred on September 18. Night time freezing temperatures took place throughout most of the trial. The lowest temperatures were achieved in mid-January where temperatures dropped to sub-zero and reached as low as -4º F.

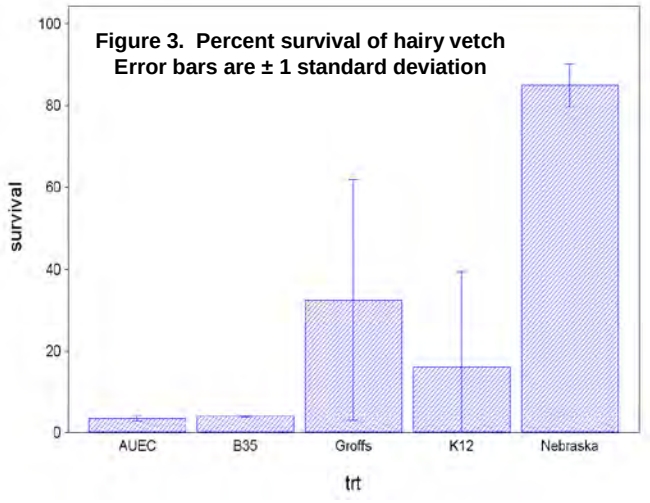



## Results and discussion

Nebraska Common had significantly greater survival than all other accessions with a mean survival of 85% (table 1). The next best performers were Groffs (32 %), K-12 (16%), B-35 (4%) and AUEC (3%). Nebraska Common also had a much smaller standard deviation than Groffs or K12 indicating a smaller range of variation between plots (figure 3). According to the Idaho portion of the study, Nebraska Common would appear to be the most cold-tolerant variety and may be suitable for use in the Intermountain West region and other northern states. However, additional plantings would need to be conducted to verify these findings. Data from the other PMCs are also needed to corroborate these results. Raw data and a copy of this report will be sent to Dr. Devine for compilation with results from other investigators.

**Table 1. Over-winter survival of hairy vetch cultivars at the USDA-NRCS Plant Materials Center, Aberdeen, ID, 2007.**

| Accession | | % Survival |
|---|---|---|
| | | |
| Nebraska | | 85 a |
| Groffs | | 32 b |
| K-12 | | 16 b |
| B-35 | | 4 b |
| AUEC | | 3 b |
| | | |



# CARIBOU-TARGHEE AND BRIDGER-TETON NATIONAL FOREST
# NATIVE GRASS INITIAL EVALUATION
# 2007 PROGRESS REPORT

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

## INTRODUCTION

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

During the summer of 2004, CTNF and BTNF collected 11 accessions of slender wheatgrass (*Elymus trachycaulus* [Link] ssp. *trachycaulus*) and 10 accessions of mountain brome (*Bromus marginatus* Nees ex Steudel). The collections were cleaned by the USDA-NRCS Aberdeen Plant Materials Center (PMC) for evaluation. Appendix 1 lists the accessions collected, the size of each collection and collection location. This progress report summarizes evaluations that took place in 2005 (establishment year) through 2007.

## 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.

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

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 and 2007 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.

During the 2006 growing season 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.

Forage yields were generally greater in 2007 versus 2006. The Departmetn of Defense accession had the highest yield with over 11,000 lbs/ac, significantly better than all others

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

Table 1. Slender wheatgrass.

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

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

| Accession No. | Forage 2006 | Seed 2006 | Height (in) 2006 | Forage 2007 | Seed 2007 | Height (in) 2007 |
|---|---|---|---|---|---|---|
| 9076493 | 3326 d | 308 e-f | 40.3 d-f | 4537 c-d | 572 b-g | 38 a-d |
| 9076494 | 5165 b-d | 493 d-f | 44.0 a-d | 6050 b-d | 681 b-f | 44 a-b |
| 9076495 | 4093 d | 401 e-f | 43.8 a-d | 5546 b-d | 726 a-e | 43 a-d |
| 9076496 | 2496 d | 209 f | 37.0 e-f | 2874 d | 163 e-g | 36 de |
| 9076497 | 3939 d | 435 e-f | 39.7 d-f | 4991 b-d | 577 b-g | 38 b-d |
| 9076498 | 5133 b-d | 550 d-f | 41.7 c-e | 5495 b-d | 967 a-c | 42 a-d |
| 9076499 | 3786 d | 376 e-f | 35.5 e-f | 5243 b-d | 535 b-g | 43 a-c |
| 9076500 | 4766 c-d | 702 c-e | 42.1 b-e | 4890 b-d | 997 a-c | 43 a-c |
| 9076501 | 4092 d | 340 e-f | 39.0 d-f | 5042 b-d | 446 c-g | 41 a-d |
| 9076502 | 2713 d | 200 f | 37.8 d-f | 3933 c-d | 284 d-g | 37 b-d |
| 9076503 | 4092 d | 349 e-f | 39.0 d-f | 6504 b-d | 814 a-d | 44 a-c |
| AEC Hillcrest | 1823 d | 303 e-f | 34.1 f | 3126 d | 141 f-g | 29 e |
| Pryor | 8384 a-b | 544 d-f | 49.5 a | 7512 b-c | 1059 a-b | 44 a-b |
| Revenue | 8997 a | 1050 b-c | 49.2 a-b | 7563 b-c | 39 g | 37 c-d |
| San Luis | 9304 a | 1501 a | 50.5 a | 8520 a-b | 851 a-c | 45 a |
| D.O.D. | 7464 a-c | 846 b-d | 47.8 a-c | 11243 a | 1282 a | 42 a-d |
| Adanac | 9457 a | 1226 a-b | 47.3 a-c | 5848 b-d | 285 d-g | 38 a-d |
| Critical value (0.05) | varies* | varies | varies | 3656 | 564 | 7 |

*indicates missing data values in one or more plots.

Mountain Brome

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

At the first evaluation, 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.

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

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

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

**Mountain brome infested with head smut. Photo taken July 2006**

Table 2. Mountain brome.

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

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

Table 2 (continued).

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

SUMMARY
The PMC will continue to evaluate plots through 2008, the final year of the study. At the conclusion of the 2008 evaluation a summary report prepared. At that time the conclusion the PMC will make recommendations for further evaluation or moving forward on a selected class release if promising accessions are found.

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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
# FINAL PROGRESS REPORT
# JANUARY 2008

**DEREK J. TILLEY, RANGE CONSERVATIONIST (PLANTS)**
**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 wildfires 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 was 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 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, 2006 and 2007.

## 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 was 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. The species used for standards of comparison are listed in the discussion section for each species. 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.

In 2007, irrigation was reduced to approximate low water conditions in the species' natural habitat to observe accession responses to lower precipitation regimes. In early June no additional irrigation was provided in order to place stress on the plots. This will allowed the evaluation of the effects of simulated drought to help identify accessions that may be more tolerant of drier conditions. Natural precipitation at the test site was supplemented by sprinkler irrigation to total approximately 12 to 14 inches annual precipitation.

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 at 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. 2007 evaluations occurred from June 27 to July 9. 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 and 2007 analyses were 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 through 2007 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

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**

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) 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.

**2007**

Forage yields averaged approximately 50% less than the previous year. This could be either a response to the decreased irrigation, or due to blue wildrye's short stand longevity, or both. No significant differences were detected between accessions for forage yields. The highest forage yield came from Arlington (3152 lb/ac) followed by Mariposa (2478 lb/ac). The highest yield from the FS collections came from 9076445 (2471 lb/ac). Seed yields increased and decreased unpredictably among accessions. Plants all flowered well, but many flowers failed to fill with seed. Accession 9076466 had a three fold increase over 2006 with 182 lb/ac, the best yield of the FS collections. Mariposa decreased from 478 to 386 lb/ac but was still the best seed producer in the trial. Plant heights all decreased when compared to 2006 measurements either as a result of the lower irrigation regime or from stand age and between plant competition. Mariposa had the tallest plant average with 41.8 inches. All others were consistently in the 30 to 40 inch range with the exception of Elkton which averaged 27.8 inches.

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 |
|---|---|---|---|---|---|---|---|---|
| 9076439 | 79 | 71.1 | 92.8[4/] | 38.1 a-b[5/] | 2.3[4/] | 98.6[4/] | 1.5 c | 117.3 c |
| 9076445 | 77 | 69.3 | 91.5 | 30.1 a-c | 2.8 | 100.0 | 0.0 c | 132.5 b-c |
| 9076446 | 80 | 72.0 | 91.5 | 22.8 b-c | 1.8 | 98.6 | 18.8 c | 288.5 b-c |
| 9076447 | 72 | 64.8 | 93.0 | 39.0 a | 1.8 | 100.0 | 3.5 c | 132.5 b-c |
| 9076448 | 66 | 59.4 | 72.3 | 22.6 b-c | 3.3 | 76.38 | 1.8 c | 225.0 b-c |
| 9076449 | 69 | 62.1 | 95.8 | 36.6 a-b | 2.0 | 100.0 | 3.0 c | 193.3 b-c |
| 9076472 | 82 | 73.8 | 87.5 | 26.0 a-c | 3.0 | 97.2 | 80.0 a | 256.8 b-c |
| Mariposa | * | 94.0 | 95.8 | 28.4 a-c | 1.8 | 95.8 | 93.8 a | 768.0 a |
| Arlington | * | 93.0 | 91.5 | 31.5 a-c | 3.8 | 100.0 | 55.0 b | 353.5 b |
| Elkton | * | 92.0 | 95.5 | 16.4 c | 3.5 | 94.4 | 92.5 a | 299.0 b-c |
| Critical Value (0.05) | | | 22.1 | 13.7 | 1.8 | NA | 20.1 | 195.3 |

[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

Table 1 (continued).

| Accession No. | Forage (lb/ac) 2005 | Plant height (in) 2005 | Seed (lb/ac) 2005 | Forage (lb/ac) 2006 | Plant height (in) 2006 | Seed (lb/ac) 2006 | Forage (lb/ac) 2007 | Plant height (in) 2007 | Seed (lb/ac) 2007 |
|---|---|---|---|---|---|---|---|---|---|
| 9076439 | 5445[4/] | 49.25 a-c | 348 b | 3940[4/] | 41.75 a | 117.25 b | 1715 | 33.8a-b | 96 b-c |
| 9076445 | 5566 | 52.00 a | 254 b | 4055 | 44.25 a | 69.25 b | 2471 | 36.8ab | 97 b-c |
| 9076446 | 4683 | 48.75 a-c | 282 b | 3940 | 43.75 a | 56.75 b | 2244 | 38.5 a | 182 b |
| 9076447 | 4889 | 49.50 a-b | 256 b | 3825 | 43.75 a | 93.50 b | 2320 | 38.3 a | 71c |
| 9076448 | 5663 | 51.25 a-b | 323 b | 3250 | 45.00 a | 54.00 b | 2018 | 38.0 a-b | 85 c |
| 9076449 | 5167 | 50.75 a-b | 236 b | 3710 | 44.00 a | 51.25 b | 1867 | 34.3 a-b | 85 b-c |
| 9076472 | 4441 | 48.50 b-c | 218 b | 3365 | 42.50 a | 41.25 b | 1488 | 37.8 a-b | 65 c |
| Mariposa | 4489 | 49.75 a-b | 505 a | 4400 | 42.50 a | 478.50 a | 2478 | 41.8 a | 386 a |
| Arlington | 5143 | 48.25 b-c | 303 b | 3250 | 42.00 a | 73.00 b | 3152 | 35.3 a-b | 144 b-c |
| Elkton | 4646 | 46.00 c | 266 b | 2445 | 36.25 b | 68.50 b | 1715 | 27.8 b | 67 c |
| Critical Value (0.05) | NA | 2.95 | 124 | NA | 3.9 | 109.15 | NA | 10.3 | 108 |

## 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

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

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.

**2007**

In 2007, rodents had clipped so many of the flowering stems of Sandberg bluegrass plants that a statistical analysis was not possible. Forage yields for Sherman and Mountain Home decreased in comparison to 2006, while others increased. The greatest yield however was still obtained by Sherman big bluegrass at just over 3700 lb/ac. Among the true Sandberg bluegrasses the best forage producer was Mountain Home (602 lb/ac). Accession 9076465 had a 50% increase over 2006, up to 146 lb/ac. Plant heights were similar to those of previous years with Sherman being tallest (28.5 in) and the rest being closely grouped between 14 and 17 inches in height.

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 |
|---|---|---|---|---|---|---|---|---|
| 9076465 | 40 | 36.0 | 26.5 b[4/] | 2.4 b | 8.3 | 25.0 d | 0.75 c | 8.8 b |
| Sherman | * | 75.8 | 84.8 a | 29.1 a | 2.5 | 95.8 a | 11.88 a | 262.4 a |
| High Plains | 84 | 75.6 | 80.8 a | 24.6 a | 4.0 | 76.4 b | 9.25 a-b | 5.7 b |
| Hanford | * | 85.0 | 91.5 a | 27.5 a | 6.0 | 47.2 c | 6.13 b | 0.9 b |
| Mtn. Home | * | 74.3 | 95.5 a | 36.8 a | 5.0 | 65.3 b | 8.75 a-b | 4.5 b |
| Critical value (0.05) | | | 16.8 | 12.3 | 1.2 | 17.4 | 4.41 | 42.2 |

[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

Table 2 (continued).

| Accession No. | Forage (lb/ac) 2005 | Plant height (in) 2005 | Seed (lb/ac) 2005 | Forage (lb/ac) 2006 | Plant height (in) 2006 | Seed (lb/ac) 2006 | Forage (lb/ac) 2007 | Plant height (in) 2007 |
|---|---|---|---|---|---|---|---|---|
| 9076465 | 423 b-c | 21.00 b | 2 b | 90.3 b | 16.75 b-c | 146 c | 207 b | 14.5 b |
| Sherman | 4816 a | 26.25 a | 163 a | 4039 a | 23.75 a | 857 a | 3705 a | 28.5 a |
| High Plains | 859 b | 21.75 a-b | 26 b | 935 b | 20.50 a-b | 602 a-b | 541 b | 16.5 b |
| Hanford | 206 c | 15.50 c | 10 b | 155 b | 14.75 c | 98 c | 374 b | 15.3 b |
| Mtn. Home | 605 b-c | 17.50 b-c | 36 b | 787 b | 17.50 b-c | 198 b-c | 602 b | 14.3 b |
| Critical value (0.05) | 563 | 4.64 | 45 | 849 | varies | 440 | 849 | 6.6 |

## IDAHO FESCUE

**2004**

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**

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**

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.

**2007**

There were no significant differences detected between forage yields in 2007, but accession 9076469 and Winchester both had high yields of over 1500 lb/ac. All other accessions had yields ranging from 400 to 800 lb/ac. All yields however were approximately 50% less than those obtained in 2006. Seed yields decreased dramatically compared to previous years. Accession 9076469 and Winchester both had seed yields near 250 lb/ac, while all others had yields of under 200 lb/ac. Heights were slightly less than previous years, typically ranging from 17 to 20 inches. Winchester was taller than all others with an average height of 26.75 inches.

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 |
|---|---|---|---|---|---|---|---|---|
| 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 |
| 9076431 | 61 | 54.9 | 39.0 d-e | 3.0 d-e | 6.3 | 55.6 a-b | 2.4 c-e | 11.8b |
| 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 |
| 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 |
| 9076438 | 80 | 72.0 | 75.0 a | 9.0 a-c | 5.3 | 58.4 a-b | 5.0 a-b | 1.5 c |
| 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 |
| 9076444 | 13 | 11.7 | 16.8 f | 1.8 e | 7.8 | 16.7 d | 1.3 e | 2.6 b-c |
| 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 |
| 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 |
| 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 |
| 9076469 | 68 | 61.2 | 80.5 a | 12.0 a | 3.0 | 72.2 a | 6.8 a | 11.8 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 |
| 9076473 | 45 | 40.5 | 69.5 a | 11.3 a | 3.0 | 59.7 a-b | 5.1 a-b | 22.3 a |
| Joseph | * | * | 50.0 b-d | 4.5 b-e | 5.0 | 54.2 a-c | 3.0 b-e | 9.5 b-c |
| Winchester | * | * | 73.8 a | 9.9 a-b | 2.8 | 75.0 a | 4.8 a-b | 28.1 a |
| Nezpurs | * | * | 37.3 d-e | 1.9 e | 7.0 | 44.5 b-c | 1.5 e | 5.7 b-c |
| Critical value (0.05) | | | 17.8 | 4.7 | 0.5 | 20.8 | 2.0 | 8.1 |

[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

Table 3 (continued).

| Accession No. | Forage (lb/ac) 2005 | Plant height (in) 2005 | Seed (lb/ac) 2005 | Forage (lb/ac) 2006 | Seed (lb/ac) 2006 | Plant ht (in) 2006 | Forage (lb/ac) 2007 | Seed (lb/ac) 2007 | Plant ht (in) 2007 |
|---|---|---|---|---|---|---|---|---|---|
| 9076427 | 841 d-e | 24.50 b-e | 33 b | 1190 b | 578 a-c | 22.75 a-b | 730 | 117 a-b | 19.75 b |
| 9076431 | 2154 a-b | 29.50 a-b | 231 a | 1248 b | 417 a-c | 20.25 b | 898 | 175 a-b | 20.00 b |
| 9076432 | 672 d-e | 23.25 c-e | 61 a-b | 1740 a-b | 371 a-c | 21.75 a-b | 734 | 47 a-b | 17.25 b-c |
| 9076437 | 986 c-e | 24.25 b-e | 60 a-b | 1051 b | 302 a-c | 22.75 a-b | 431 | 32 a-b | 18.25 b |
| 9076438 | 756 d-e | 22.75 d-e | 38 b | 533 b | 566 a-c | 20.25 b | 340 | 33 a-b | 19.00 b |
| 9076443 | 811 d-e | 24.75 b-e | 64 a-b | 1510 a-b | 458 a-c | 19.50 b | 709 | 28 a-b | 19.50 b |
| 9076444 | 351 e | 21.00 e | 24 b | 590 b | 182 b-c | 20.75 b | 410 | 8 b | 17.25 b-c |
| 9076453 | 799 d-e | 25.75 b-e | 69 a-b | 1740 a-b | 287 a-c | 23.00 a-b | 452 | 43 a-b | 18.75 b |
| 9076462 | 557 e | 25.50 b-e | 73 a-b | 533 b | 154 c | 20.50 b | 666 | 76 a-b | 12.25 c |
| 9076467 | 1004 c-e | 24.00 c-e | 115 a-b | 1223 b | 615 a-c | 18.75 b | 570 | 116 a-b | 18.50 b |
| 9076469 | 1349 c-d | 28.25 a-c | 186 a-b | 2717 a-b | 744 a | 23.00 a-b | 1585 | 248 a | 19.75 b |
| 9076471 | 551 e | 24.00 c-e | 69 a-b | 1453 a-b | 458 a-c | 22.00 a-b | 730 | 56 a-b | 18.50 b |
| 9076473 | 1622 b-c | 27.75 a-d | 83 a-b | 2257 a-b | 676 a-b | 22.25 a-b | 645 | 171 a-b | 20.25 b |
| Joseph | 1337 c-d | 25.50 b-e | 129 a-b | 2028 a-b | 672 a-b | 22.50 a-b | 679 | 159 a-b | 21.25 a-b |
| Winchester | 2287 a | 32.50 a | 189 a-b | 3579 a | 584 a-c | 28.75 a | 1617 | 260 a | 26.75 a |
| Nezpurs | 908 d-e | 26.00 b-e | 48 a-b | 1305 b | 526 a-c | 22.50 a-b | 762 | 79 a-b | 19.50 b |
| Critical value (0.05) | 631 | 1.58 | 155 | 2252 | 509 | 7.78 | NA | varies | 5.85 |

## BLUEBUNCH WHEATGRASS

### 2004

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

productionthe first growing season: Goldar, 9076450, 9076466, 9076436, 9076441, 9076463, 9076442, 9076433 and 9076434 ranged from 22.5% to 2.5% flower production.

**2005**

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**

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.

**2007**

2007 forage yields increased substantially over those from 2006 and 2005. Yields rose from an average of approximately 2500 lb/ac up to over 4000 lb/ac. The greatest forage yield in 2007 came from P-7 with over 6500 lb/ac. Goldar and Anatone also had high yields of close to 5000 lb/ac. Other accession had yields of around 3000 to 4600 lb/ac. Seed yields likewise were much higher than those of 2006 and 2005. The best yield came from accession 9076433 (734 lb/ac), an accession that only produced 92 lb/ac in 2006. Goldar had the second best yield (714 lb/ac), up from 677 lb/ac in 2006. Accession 9076433 also increased, going from 239 lb/ac up to 649 lb/ac, the third best yield. Heights decreased an average of 5 to 8 inches in all accessions.

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 |
|---|---|---|---|---|---|---|---|
| 9076426 | 76 | 68.4 | 70.8 a-c[4/] | 9.9 a-b | 3.0 | 75.0 a-c | 4.5 a-c |
| 9076428 | 56 | 50.4 | 49.8 c | 5.8 b-c | 5.0 | 54.2 b-d | 3.3c |
| 9076433 | 75 | 67.5 | 77.8 a-b | 14.4 a | 2.5 | 72.2 a-c | 5.8 a |
| 9076434 | 69 | 62.1 | 61.3 a-c | 7.9 b-c | 4.0 | 73.6 a-c | 4.1 a-c |
| 9076436 | 69 | 62.1 | 81.8 a | 8.1 b-c | 3.3 | 81.9 a | 4.1 a-c |
| 9076441 | 56 | 50.4 | 69.5 a-c | 6.8 b-c | 4.0 | 66.7 a-c | 3.8 a-c |
| 9076442 | 86 | 77.4 | 70.8 a-c | 7.3 b-c | 3.0 | 77.8 a-b | 3.8 a-c |
| 9076450 | 73 | 65.7 | 57.0 b-c | 6.8 b-c | 3.8 | 50.0 c-d | 3.0 c-d |
| 9076463 | 58 | 52.2 | 27.8 d | 2.5 c | 7.0 | 33.3 d | 1.3 d |
| 9076464 | 65 | 58.5 | 64.0 a-c | 10.8 a-b | 3.0 | 77.8 a-b | 4.0 a-c |
| 9076466 | 64 | 57.6 | 66.5 a-c | 11.4 a-b | 2.8 | 83.3 a | 5.5 a-b |
| Goldar | * | 81.5 | 66.8 a-c | 8.0 b-c | 2.5 | 72.2 a-c | 3.9 a-c |
| Anatone | * | * | 51.5 c | 5.8 b-c | 3.5 | 68.1 a-c | 3.5 b-c |
| P-7 | * | * | 66.8 a-c | 5.5 b-c | 3.0 | 75.0 a-c | 3.5 b-c |
| Critical value (0.05) | | | 20.6 | 5.3 | 1.9 | 21.7 | 1.8 |

[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

Table 4 (continued).

| Accession No. | Forage (lb/ac) 2005 | Plant height (in) 2005 | Seed (lb/ac) 2005 | Forage (lb/ac) 2006 | Seed (lb/ac) 2006 | Plant ht (in) 2006 | Forage (lb/ac) 2007 | Seed (lb/ac) 2007 | Plant ht (in) 2007 |
|---|---|---|---|---|---|---|---|---|---|
| 9076426 | 2432 a-c | 32.25 a | 51 c-d | 3825 a-c | 269 c-e | 38.00 a | 4660 a-b | 576 | 27.75 a-b |
| 9076428 | 2045 c | 31.50 a | 44 c-d | 2560 b-c | 361 c-e | 36.75 a-b | 2770 a-b | 489 | 27.00 a-b |
| 9076433 | 1658 c | 30.00 a | 69 c-d | 1986 c | 92 e | 34.00 b | 3910 a-b | 734 | 28.50 a-b |
| 9076434 | 1670 c | 28.00 a | 50 c-d | 2330 b-c | 239 c-e | 34.00 b | 3820 a-b | 649 | 28.25 a-b |
| 9076436 | 2348 b-c | 30.25 a | 48 c-d | 3020 a-c | 399 b-e | 35.25 a-b | 3910 a-b | 584 | 26.25 b |
| 9076441 | 2081 c | 32.75 a | 49 c-d | 2790 b-c | 102 e | 37.75 a-b | 3840 a-b | 544 | 29.50 a-b |
| 9076442 | 1428 c | 32.00 a | 46 c-d | 3135 a-c | 124 d-e | 35.50 a-b | 4440 a-b | 497 | 28.25 a-b |
| 9076450 | 1682 c | 33.50 a | 83 c-d | 2330 b-c | 290 c-e | 37.75 a-b | 3380 a-b | 422 | 30.25 a-b |
| 9076463 | 1525 c | 18.00 b | 13 d | 4011 a-c | 199 c-e | 37.85 a-b | 2330 b | 361 | 27.00 a-b |
| 9076464 | 1670 c | 32.50 a | 69 c-d | 3480 a-c | 288 c-e | 37.75 a-b | 3610 a-b | 527 | 28.75 a-b |
| 9076466 | 1972 c | 32.50 a | 66 c-d | 3135 a-c | 418 b-d | 36.75 a-b | 3150 a-b | 583 | 27.00 a-b |
| Goldar | 2916 a-c | 35.75 a | 157 b | 5089 a-b | 677 a-b | 37.75 a-b | 5190 a-b | 714 | 29.25 a-b |
| Anatone | 3630 a-b | 33.75 a | 102 b-c | 4974 a-b | 518 b-c | 34.75 a-b | 4890 a-b | 467 | 28.75 a-b |
| P-7 | 3812 a | 36.25 a | 227 a | 5664 a | 827 a | 37.00 a-b | 6560 a | 608 | 31.25 a |
| Critical value (0.05) | 1277 | 8.45 | 62 | varies | varies | varies | varies | varies | varies |

**TUFTED HAIRGRASS**

**2004**

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**

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 northern Idaho and western Montana.

**2006**

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.

**2007**

Forage yields for all accessions decreased by a couple hundred pounds from 2006 to 2007. Willamette had the best yield with 1300 lb/ac

followed by Tillamook with 800 lb/ac and accession 9076430 with over 700 lb/ac. Seed yields remained low, with some accessions increasing and others decreasing slightly. Heights also remained similar to those of 2006 ranging from 25 to 35 inches.

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 |
|---|---|---|---|---|---|---|---|---|
| 9076429 | 49 | 44.1 | 68.0 b[5/] | 19.0[1/] | 4.8 | 79.2 a-b | 5.6a-b | 31.0[4/] |
| 9076430 | 52 | 46.8 | 62.8 b-c | 17.8 | 6.5 | 72.2 b-c | 5.5 a-b | 48.7 |
| 9076435 | 55 | 49.5 | 53.0 c | 6.1 | 7.8 | 57.0 c | 4.1 b | 16.6 |
| Willamette | * | 81.0 | 86.0 a | 23.0 | 5.3 | 93.1 a | 6.3 a | 68.7 |
| Tillamook | * | 81.0 | 69.8 b | 21.8 | 5.5 | 84.7 a-b | 5.4 a-b | 60.2 |
| Critical value (0.05) | | | 11.6 | 11.6 | 1.5 | 16.4 | 1.8 | 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

Table 5 (continued).

| Accession No. | Forage (lb/ac) 2005 | Plant ht (in) 2005 | Seed (lb/ac) 2005 | Forage (lb/ac) 2006 | Plant ht (in) 2006 | Seed (lb/ac) 2006 | Forage (lb/ac) 2007 | Plant ht (in) 2007 | Seed (lb/ac) 2007 |
|---|---|---|---|---|---|---|---|---|---|
| 9076429 | 2323 b | 42.75 b | 96 c | 823[4/] | 28.50[1/] | 18 b | 595 b | 25.75 b | 20 b |
| 9076430 | 1894 b | 40.75 b | 118 c | 1145 | 28.00 | 42 b | 737 ab | 28.25 a-b | 65 a-b |
| 9076435 | 1912 b | 34.25 c | 36 d | 1851 | 27.75 | 27 b | 385 b | 26.75 a-b | 14 b |
| Willamette | 3660 a | 46.75 a | 267 b | 1595 | 31.50 | 68 a-b | 1336 a | 33.00 a-b | 97 a |
| Tillamook | 4187 a | 46.00 a | 320 a | 1051 | 30.00 | 135 a | 805 ab | 35.50 a | 115 a |
| Critical value (0.05) | 1076 | 3.16 | 51 | NA | NA | 89 | Varies | Varies | 9.53 |

## WESTERN YARROW

### 2004

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**

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**

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.

**2007**

Seed yields increased and decreased among accessions with no apparent pattern. Yields ranged from 160 (accession 9076457) to 316 (accession 9076474.

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 |
|---|---|---|---|---|---|---|---|---|---|
| 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 |
| 9076456 | 73 | 65.7 | 32.0 | 1.5 | 6.0 | 29.1 b | 1.9 | 342.0 b | 16.3 a-c |
| 9076457 | 86 | 77.4 | 32.0 | 0.3 | 5.5 | 31.9 a-b | 0.3 | 679.0 a | 22.5 a-c |
| 9076458 | 80 | 72.0 | 59.7 | 2.8 | 3.8 | 63.9 a-b | 3.0 | 595.8a-b | 32.5 a-b |
| 9076459 | 91 | 81.9 | 47.2 | 1.3 | 4.0 | 45.9 a-b | 1.3 | 513.3 a-b | 37.5 a |
| 9076460 | 67 | 60.3 | 75.0 | 3.1 | 3.5 | 73.6 a | 2.9 | 481.3 a-b | 37.5 a |
| 9076474 | 37 | 33.3 | 45.9 | 2.9 | 5.8 | 50.0 a-b | 1.8 | 323.0 b | 6.3 c |
| 9076475 | 71 | 63.9 | 45.9 | 3.0 | 4.5 | 48.6 a-b | 2.6 | 507.0 a-b | 12.5 b-c |
| Great Northern | 93 | 71.6 | 45.9 | 2.3 | 2.8 | 45.9 a-b | 1.8 | 753.8 a | 38.8 a |
| Eagle | * | * | 33.3 | 0.5 | 5.5 | 37.5 a-b | 0.5 | 691.5 a | 15.0 a-c |
| Critical value (0.05) | | | NA | NA | NA | 36.8 | NA | 283.6 | 21.4 |

[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

Table 6 (continued).

| Accession No. | Seed (lb/ac) 2005 | Plant height (in) 2006 | Seed (lb/ac) 2006 | Seed (lb/ac) 2007 |
|---|---|---|---|---|
| 9076454 | 160[4/] | 21.50[4/] | 269[4/] | 232[4/] |
| 9076456 | 248 | 24.75 | 240 | 180 |
| 9076457 | 150 | 14.25 | 79 | 162 |
| 9076458 | 391 | 19.25 | 331 | 192 |
| 9076459 | 397 | 22.75 | 332 | 246 |
| 9076460 | 369 | 25.50 | 208 | 126 |
| 9076474 | 280 | 19.00 | 106 | 316 |
| 9076475 | 148 | 22.00 | 179 | 292 |
| Great Northern | 396 | 21.50 | 301 | 267 |
| Eagle | 339 | 27.25 | 327 | 248 |
| Critical value (0.05) | NA | NA | NA | NA |

## SUMMARY

Following the 2006 evaluation, the PMC made recommendations of the accessions that showed the potential for further evaluation and release. These included accessions 9076439 blue wildrye, 9076469 Idaho fescue, and possibly 9076459 western yarrow. Following 2007 evaluation, it may be wise to reconsider blue wildrye accession 9076439 due to exceptionally poor performance in forage and seed production during the third year of production when compared with other collections and the standards. Other accessions showed less dramatic reductions in yield despite the lower water schedule.

Because there are currently no blue wildrye releases from the Rocky Mountain or Intermountain West regions, the PMC suggested considering one of the top performing blue wildrye collections for a selected class germplasm. At the time of the 2006 evaluation, all accessions had shown excellent establishment characteristics and growth. Seed yields of FS R1 collections were all lower than the standards, but forage yields have been comparable between the best of the collected accessions and Mariposa, clearly the top performer of the released materials. Accession 9076439 stood out as having consistently high forage and seed yields for 2005 and 2006. However forage yields of 9076439 dropped significantly in 2007 when compared to the other accessions.

Idaho fescue accession 9076469 continues to show excellent promise for potential selected class release. 9076469 had the best establishment in the first year. For all years forage yields of 9076469 have been close, but somewhat lower than, those of Winchester. Seed yields were nearly identical for 2005 and 2007 between 9076469 and Winchester, and 9076469 had the greatest seed yield for 2006 (744 lb/ac) versus 584 lb/ac from Winchester. Geographically, Winchester originated from a  in the Idaho panhandle from a location south of Lewiston, ID. Accession 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, the PMC recommends that 9076469 should be considered for a selected class germplasm.

Although all FS R1 collections of tufted hairgrass were outperformed by the Oregon materials, the FS R1 accessions had dense, healthy stands, and may still be worth considering for use in eastern-northern Idaho and western Montana as a more local source of this species.

The PMC will maintain seed of the original collections in storage in the event that the forest service would like to increase any of the collections or if the forest service decides to pursue formal release of any of the collections.

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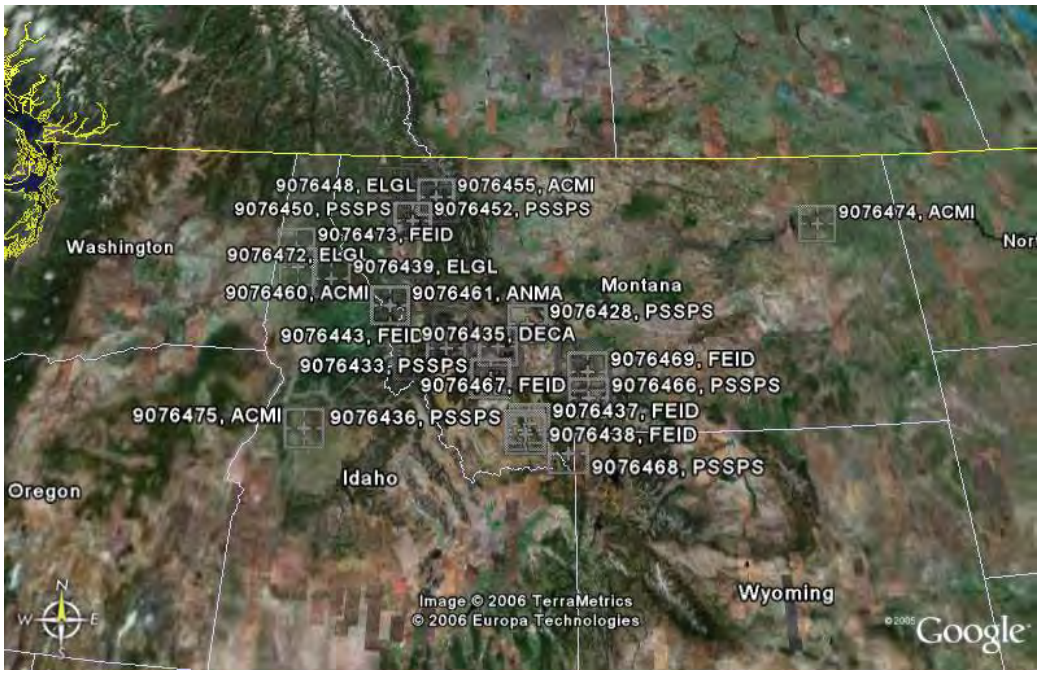
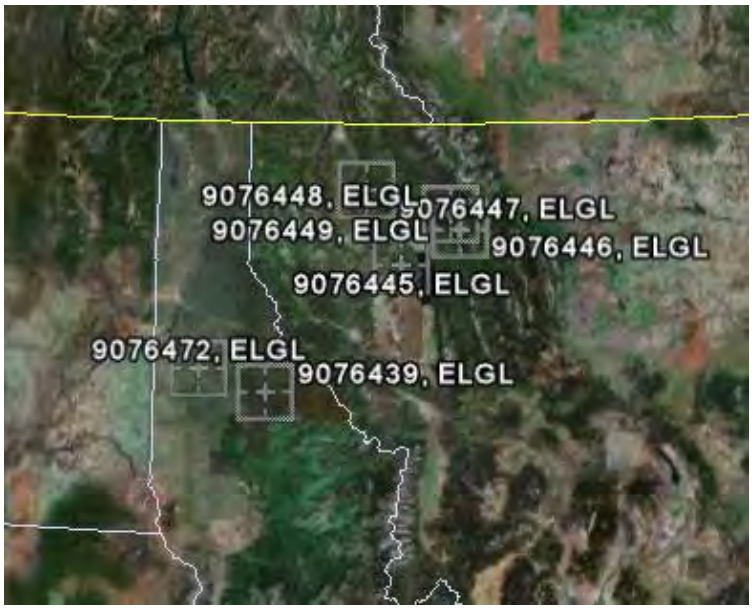
Appendix 1. Collection data and maps

| 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

# BASIN WILDRYE ADVANCED EVALUATION
# FINAL REPORT - JANUARY 14, 2008
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

This trial was 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 at 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; in 2007 from July 18 to July 25. 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 three standards of comparison. 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.

In 2007 Gund had significantly lower forage production than all other accessions, producing 2300 lb/ac as compared to 8500 (Magnar) 7600 (Trailhead) and 5800 lb/ac (Washoe). Gund again had consistently lower seed production than the standards, 196 lb/ac versus 867 for Magnar, 667 for Trailhead and 533 for Washoe. Gund however did not show significant difference in height from the other accessions. All were between 63 and 73 inches tall.

Table 1. Basin wildrye evaluation

| Accession | % PLS[3/] | % stand 6/15/05 | Density[1/] 6/15/05 | Vigor[2/] 6/15/05 | % stand 9/16/05 | Width (in) 9/16/05 |
|---|---|---|---|---|---|---|
| Gund | 89.2 | 13.1 c[4/] | 0.3 b | 7.0 a | 16.7 b | 2.3 b |
| Magnar | 87.5 | 52.6 ab | 7.9 a | 1.7 b | 62.2 a | 4.2 a |
| Trailhead | 89.6 | 57.9 a | 7.6 a | 1.3 b | 57.8 a | 4.0 a |
| Washoe | 72.0 | 40.4 b | 5.8 a | 2.7 b | 65.0 a | 4.3 a |
| Critical value (0.05) | | | | NA | 11.9 | 0.7 |

[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

Table 1 (continued).

| Accession | Biomass (lb/ac) 2006 | Seed (lb/ac) 2006 | Height (in) 2006 | Biomass (lb/ac) 2007 | Seed (lb/ac) 2007 | Height (in) 2007 |
|---|---|---|---|---|---|---|
| Gund | 87 b | 0 b | 23 c | 2345 b | 196 b | 68 ab |
| Magnar | 8231 a | 150 a | 62 a | 8496 a | 867 a | 73 a |
| Trailhead | 4323 ab | 39 ab | 58 a | 7639 a | 667 a | 72 a |
| Washoe | 3972 ab | 125 ab | 43 b | 5824 a | 533 a | 64 b |
| Critical value (0.05) | 4931 | 138 | 10 | 3327 | 336 | 5 |

## DISCUSSION

The three industry releases of basin wildrye (Magnar, Trailhead and Washoe) performed significantly better than the Gund collection in essentially all aspects evaluated. Gund established poorly, and the established plants were 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 environmental conditions.

## REFERENCES

Ogle, D. G., L. St. John, L. Holzworth, S. R. Winslow and T. A. Jones. 2002. Basin Wildrye. NRCS Plant Guide. USDA, NRCS, Idaho State Office & the National Plant Data Center. 6p.

**Peachleaf Willow and Black Cottonwood IEP (1994 Planting)**
**Final Evaluation (2007)**
**Derek J. Tilley, Range Conservationist (Plants)**
**Loren St. John, Team Leader**
**May 15, 2007**

## INTRODUCTION

In June 1994, the Aberdeen PMC planted an initial evaluation planting of black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and peachleaf willow (*Salix amygdaloides*) to evaluate accessions for potential release. Since the time of planting this evaluation, data from riparian field plantings indicate that locally collected materials of willow and cottonwood species have established and persisted better than the accessions that were included in this evaluation. Based on the evaluations of the off-center field plantings, it was decided to abandon the release objective of this study and to use the planting strictly as a cutting nursery to provide hardwood cutting stock for use as standards of comparisons in field plantings.

In 2007 the plots were evaluated for survival. These data will guide decisions on which accessions will be maintained for cutting production.

## MATERIALS AND METHODS

The trial was conducted at the PMC Fish and Game farm, 5 mi Northeast of Aberdeen. Soil at the site is a Delco silt loam with pH of 7.4 to 8.4. Mean annual precipitation is 9.39 inches. Experimental design was a completely randomized layout with four rows of 25 plots; each plot contained four trees. For each accession there were four, five or six replications (see table). Weed barrier fabric was installed after planting for weed control. Space between the plant rows were cleaned tilled to control weeds until a cover crop of 'Hycrest' and 'Ephraim crested wheatgrass was planted in 1996. The planting was irrigated with solid-set handlines until 1997 when drip irrigation was installed. The drip system was functional for a few years but by 2001 it was removed due to pinching of the drip irrigation line by basal stems from the willows. Since that time, the planting has survived on natural precipitation and sub surface soil moisture.

Since about 2000 the planting has been managed as a cutting nursery to provide cutting stock for riparian field plantings in the PMC service area. Trees are cut to approximately 3 ft stumps and allowed to grow new stems which are harvested for cuttings in subsequent years. Some trees have been cut numerous times while others have grown without being cut for the duration of the trial.

On May 9, 2007 all plots were evaluated for percent survival. Data were analyzed as a completely randomized design with varying numbers of replications using an analysis of variance ($\alpha$=0.05). Means were separated with a Tukey's all-pairwise comparison.

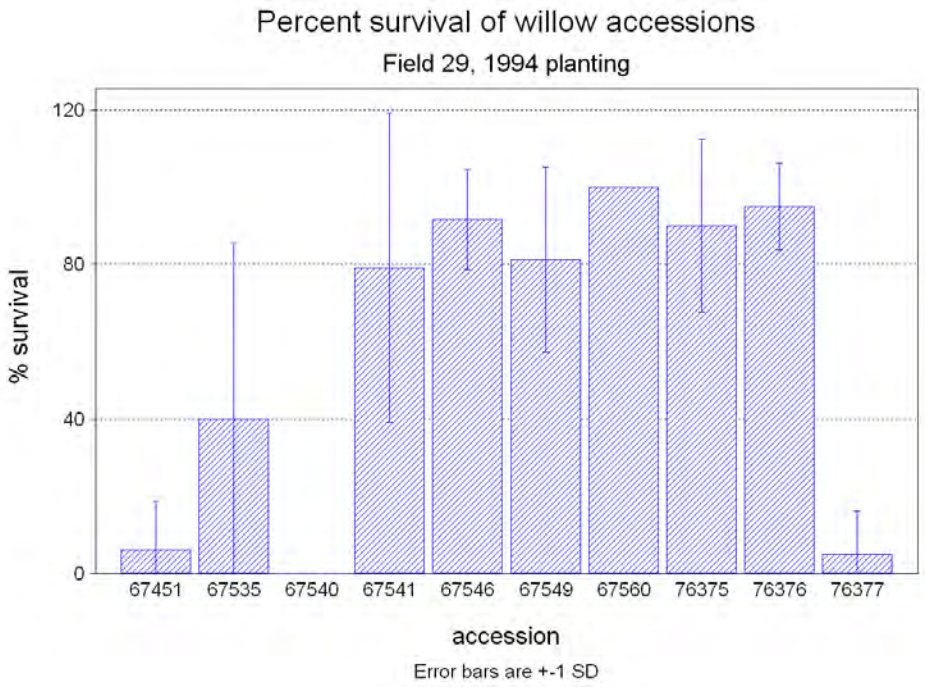
**RESULTS**

*Peachleaf willow*

Peachleaf willow survival means were more readily separated statistically (p=0.0000) (table 1). Four accessions had notably poor performance, 9067451 (6%), 9067535 (40%), 9067540 (0%), and 9076377 (5%). The remaining accessions all had reasonably good survival ranging from 79 to 100% survival.

Table 1. Percent survival of peachleaf willow

| Accession | Source Location | Number of replications | % Survival |
|---|---|---|---|
| 9067451 | Baker City, OR | 4 | 6 c |
| 9067535 | Hagerman, ID | 5 | 40 bc |
| 9067540 | Aberdeen, ID | 5 | 0 c |
| 9067541 | Baker City, OR | 6 | 79 ab |
| 9067546 | Burns, OR | 6 | 92 a |
| 9067549 | Prairie City, OR | 4 | 81 ab |
| 9067560 | Deer Creek State Park,UT | 5 | 100 a |
| 9076375 | Mink Creek, ID | 5 | 90 a |
| 9076376 | Pocatello, ID | 5 | 95 a |
| 9076377 | McTucker Island, ID | 5 | 5 c |
| | | | |
| | | | *P*=0.0000 |

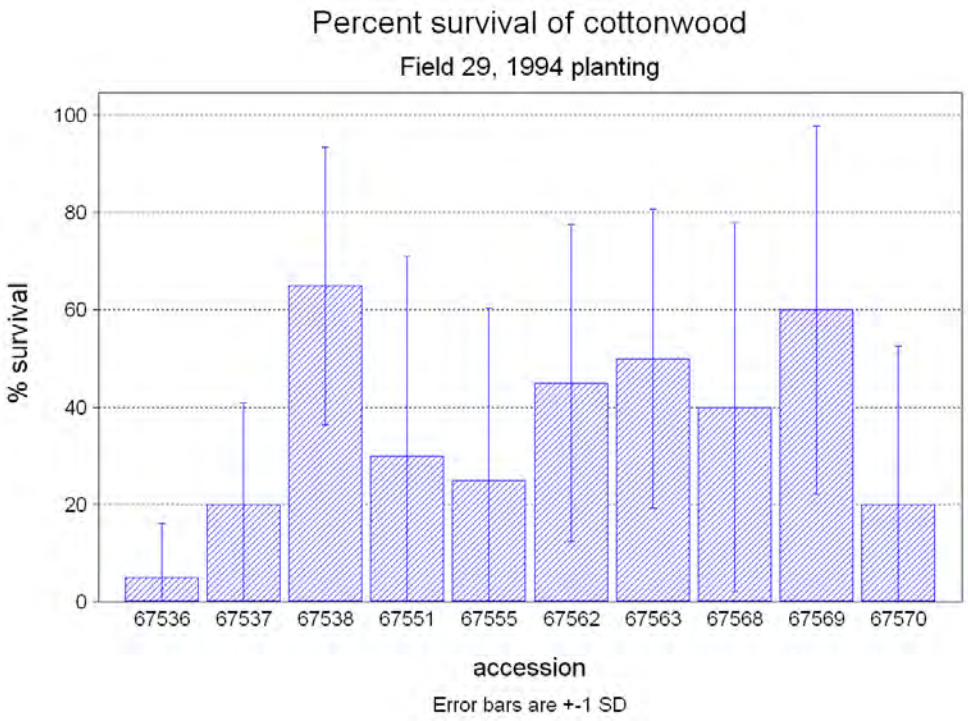


*Black cottonwood*

No significant differences were detected between survival means ($p$=0.0965) (table 2). Means ranged from 5% to 65%. The top performers in the trial were accessions 9067538 (65% survival) and 9067569 (60% survival).

Table 1. Percent survival of black cottonwood

| Accession | Source Location | Number of replications | % Survival |
|---|---|---|---|
| 9067536 | Idaho City, ID | 5 | 5 |
| 9067537 | Boise River, ID | 5 | 20 |
| 9067538 | Caribou NF, ID | 5 | 65 |
| 9067551 | Lakeview, OR | 5 | 30 |
| 9067555 | Sawtooth NF, ID | 5 | 25 |
| 9067562 | Humbolt NF, NV | 5 | 45 |
| 9067563 | Reno, NV | 5 | 50 |
| 9067568 | Challis NF, ID | 5 | 40 |
| 9067569 | Mackay, ID | 5 | 60 |
| 9067570 | Mackay Res., ID | 5 | 20 |
| | | | |
| | | | $P$=0.0965 |



**DISCUSSION**

PMC shipping records from 2002 through 2006 (minus 2003) and reports on peachleaf willow plantings from the IDPMC 2006 Annual Technical Report (ATR) show that in the past five years, only cuttings from accessions 9067541, 9067546, 9076549, 9067560, 9076375, and 9076376 have been used in field plantings. These correspond with the top six survival ratings in this trial. Shipping records of black cottonwood show cuttings from accessions 9067562, 9076568, and 9067569 are being utilized by field offices. Data from this study indicate that use of accessions 9067538 and 9067563 should also be recommended.

From the data collected in this trial and the usage data from the ATR, willow accessions 9067541, 9067546, 9067549, 9067560, 9076375, and 9076376 and cottonwood accessions 9067538, 9067562, 9067563, 9067568, 9067569 cottonwoods will continue to be maintained. An inventory of cutting quality material within the plots was completed to provide better estimates of cuttings that can be made available for field plantings. Based on an analysis of the data and arrangement of the plots, the PMC will concentrate on managing the plots in the 2 west rows. Plots will be permanently marked, and plants will be managed for production of cuttings to provide for field planting purposes. The 2 east rows will be managed for wildlife cover to help meet the objectives of the landowner.

Field 29, peachleaf willow and black cottonwood IEP (1994) Planting, 2007 map revision

| | | | | |
|---|---|---|---|---|
| 25 | | 9067451 | 9067546 | |
| 24 | | | 9067538 | |
| 23 | | | 9067563 | 9067549 |
| 22 | 9067555 | 9067569 | 9067546 | 9067538 |
| 21 | 9076376 | | 9076375 | 9067551 |
| 20 | 9067546 | 9067546 | 9067560 | 9067568 |
| 19 | 9067551 | 9067560 | 9067568 | |
| 18 | | | 9067570 | 9067569 |
| 17 | 9067538 | | 9067562 | |
| 16 | | | | |
| 15 | | 9067541 | | |
| 14 | 9067560 | 9076377 | 9076375 | 9067538 |
| 13 | 9067569 | | 9067560 | |
| 12 | 9067537 | 9067551 | | 9067541 |
| 11 | 9067562 | 9067538 | 9067546 | 9067562 |
| 10 | 9067541 | 9067541 | | 9076375 |
| 9 | 9067568 | | 9067569 | 9067563 |
| 8 | 9067549 | 9067555 | 9067568 | 9067549 |
| 7 | 9067563 | | 9067563 | 9067555 |
| 6 | 9076375 | 9067536 | 9076376 | 9067535 |
| 5 | 9076375 | 9067569 | | |
| 4 | 9067562 | | 9067537 | 9076376 |
| 3 | 9067535 | 9076376 | 9067562 | 9067560 |
| 2 | 9076376 | 9067535 | 9067541 | 9067546 |
| 1 | 9067549 | 9067537 | | |

PL

BC

Main Line (North end)

**Indian Valley Sedge Propagation**
**Progress Report**
**Derek J. Tilley, Range Conservationist (Plants)**
**November 26, 2007**

## Introduction

In 2006 the Aberdeen Plant Materials Center (PMC) accepted a request to propagate 300 plants of Indian Valley sedge (*Carex aboriginum* M.E. Jones) as part of a project to reestablish populations in its native habitat at the "Jewel Wetland" in southwestern Idaho. This unique species was first collected in the Weiser valley by Marcus E. Jones on July 12, 1899, at Indian Valley, ID and wasn't seen again for 100 years. The species was thought to be extinct, until 1999, when a population was discovered south of Council, in Adams County, ID. As a result, Indian Valley sedge was moved from the Idaho Native Plant Society's Taxa Believed to be Globally Extinct category to the Global Priority 1 category.

This project was coordinated by the NRCS Payette Field Office on a Wetland Reserve Program (WRP) site in cooperation with land owners Jon and Mary Trail, with support from the Land Trust of the Treasure Valley. The project involved several interested parties, including the U.S.D.A. Forest Service Rocky Mountain Research Station and Idaho Department of Fish and Game.

In May, 2007 the PMC delivered approximately 250 plants to Mike Raymond of the Payette Field Office who coordinated the planting at the site. Volunteers were used to transplant greenhouse grown materials (figure 1).

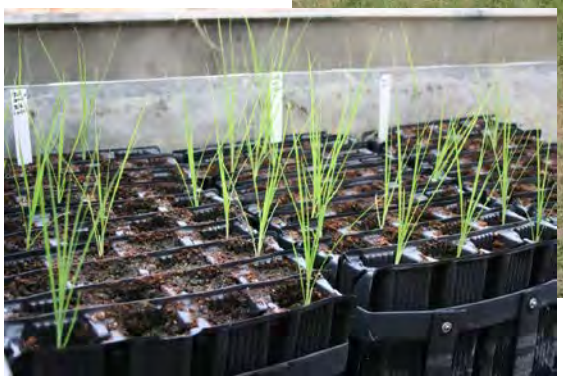


**Figure 1**. (Right) Volunteers planting Indian Valley sedge at Jewel wetland in western Idaho. (Below) flats of greenhouse grown sedges.

**Stratification Trial**

Because information regarding propagation of Indian Valley sedge was limited, the PMC initiated a seed germination trial investigating different methods of stratifying seed to develop a propagation protocol.

Seven treatments were compared (table 1). Prior to planting or treatment, peryginia were mechanically removed from all seed. Cold moist stratification in sphagnum moss was conducted at 4º C. Seed was placed into small cloth bags and inserted into 8 fl oz (237 ml) plastic ointment jars filled with 8.0 g green sphagnum moss and water. Cooler and outside treatments were seeded directly into flats with a 1:1:1 mixture of peat, vermiculite and sand. One set of flats was placed in the greenhouse cooler at 4º C, while the other set was placed outdoors from November through February for "natural" stratification as recommended by researchers in the Boise area. Outside temperatures at the PMC ranged from a high of over 70º F in November 2006 to -4 º F in January 2007. Following treatment, flats were moved into the PMC greenhouse where temperatures were maintained from 70 to 90 ºF and soil was kept moist for best germination conditions.

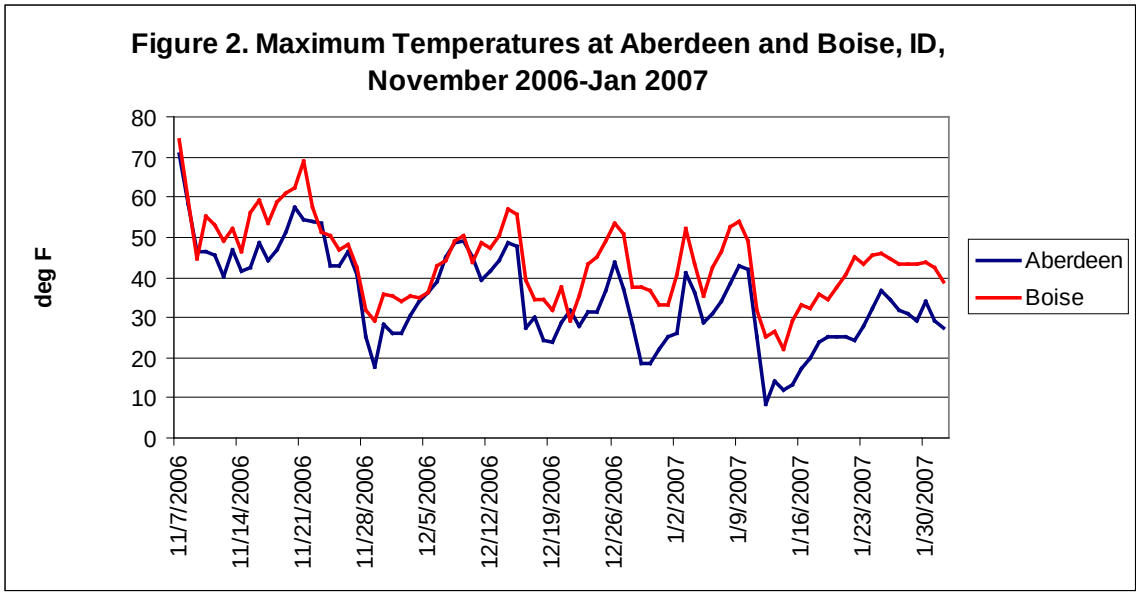
The trial was designed as a randomized complete block with four replications. Each rep consisted of a single flat of 20 cells, each cell planted with 1 seed. Data were analyzed with a one-way ANOVA and means separated with a Tukey's test.

**Table 1**. Treatments

| | |
|---|---|
| Treatment | |
| 1. | Seeded into flats and placed in cooler for 60 days |
| 2. | 30 day cold/moist stratification in moss |
| 3. | 60 day cold/moist stratification in moss |
| 4. | 30 days in moss followed by 30 days in cooler |
| 5. | 60 days in moss followed by 30 days in cooler |
| 6. | Seeded into flats and left outside from Nov to Feb |
| 7. | No treatment |

*Results*

Although cooperators in the Boise, ID area have reported good germination rates from planting flats outside from November to February, outside stratification did not work in Aberdeen. This is most likely due to differences in temperatures between the two locations. Seed left outside in Boise would likely encounter temperatures above and below freezing on a regular basis subjecting the seed to freeze-thaw cycles, especially during the month of January (figure 2). With the cooler temperatures in Aberdeen, our seed was likely frozen for the duration of the trial and did not thaw until being brought into the greenhouse.




Best germination results (32.5 %) were obtained from the 60 day stratification in the PMC cooler (table 2). This treatment is likely the closest approximation to the conditions found in the sedge's natural habitat. The 30 day moss plus 30 day cooler treatment also had good results (25.0 %), but longer stratification in moss (60 d moss and 60 d + 30 d cool) decreased germination (0.0 and 5.0 % respectively). The non-stratified control treatment did not produce any germinants. From the results obtained here it seems that cold moist stratification is the best method for germinating seeds of Indian Valley sedge at Aberdeen.

**Table 2**. Mean germination from stratification treatments.

| | | |
|---|---|---|
| **Treatment** | | **% germ** |
| 60 day cool | | 32.5 a |
| 30 d moss | | 5.0 bc |
| 60 d moss | | 0.0 c |
| 30 d moss + 30 d cool | | 25.0 ab |
| 60 d moss + 30 d cool | | 5.0 bc |
| Outside | | 0.0 c |
| No treatment | | 0.0 c |
| | | |
| Critical value (0.05) | | 23.5 |

*Vegetative propagation*

Despite poor germination numbers, the PMC was able to produce several more plants by vegetative division. Plants quickly produce offshoots via short rhizomes. These can be easily separated from the parent plant and transplanted to new cells. Separating plants is most easily done using Root Trainer cells that can be opened exposing the plant roots. Best results came from carefully splitting the plants so that roots remained on both the parent and the new plant. In many cases we were able to split numerous young plants from parents over time greatly increasing the total number of produced plants.

**Forb Herbicide Tolerance Trial, 2005-2007**
**Study Number: IDPMC-T-0601-RA**
**Derek Tilley, Range Conservationist (Plants)**
**Natural Resources Conservation Service**
**Plant Materials Center**
**Aberdeen, Idaho**

## Introduction

Weed control is an important part of seed production. Competition from weeds decreases plant growth, health, and seed production. Many herbicide choices are available to control broadleaf weeds in grass fields and to control grasses among broadleaf plants; however, there are no known herbicides for controlling broadleaf weeds among our broadleaf forb releases. There is high demand for selective herbicides registered for use on seed production fields of rangeland forbs and half shrubs. A large amount of Plant Materials Center (PMC) resources are allocated annually to weed control in forb seed production fields by hand rouging and mechanical tillage. Selective weed control products for rangeland forbs and half shrubs are highly desirable and would reduce labor costs and potentially increase seed production. This study was designed as an initial screening of several herbicides with potential for weed control in forb and half shrub seed production fields. The goal of this project is to find herbicides that control broadleaf and grass weeds while not significantly reducing seed yields of forbs grown for seed production. *Trade names are used solely to provide information. Mention of trade names does not constitute a guarantee of the product by USDA-NRCS nor does it imply endorsement over comparable products that are not named.*

## 2005 Initial Herbicide Screening

## Materials and methods

Appar blue flax (*Linum perenne*) and Maple Grove Lewis flax (*L. lewisii*) seeds were planted into flats of 10 cubic inch conetainers at the PMC greenhouse on December 9, 2005. Delar small burnet (*Sanguisorba minor*) was planted on January 5, 2006. When plants reached approximately 3 to 5 inches in height, they were delivered to UI Weed Scientist, Pam Hutchinson, for treatment with potential herbicides. Ten treatments including a non-treated check were evaluated (table 1). Herbicide treatments took place on February 2, 2006. Experimental design consisted of eight replications; each replicate consisted of one plant. All replicates were treated in a single spraying in a spray chamber. The herbicide application occurred 55 days after planting (DAP) for flax species and 28 DAP for small burnet. Plants were returned to the greenhouse following treatment and evaluated for phytotoxicity after 20 days.

Treatments included standard rates of the following herbicides: Buctril, Prowl $H_20$, MCPA, Chateau, Stinger, Poast, Plateau, Basagran, Sencor and a non-treated control. For a summary of the herbicides used in these trials, see the appendix at the end of the discussion.

## Results

From the initial screening, Poast showed little damage to any of the three species and looks good for grass control. Plateau and Prowl both had very little phytotoxicity on the three species tested, and all appear to have good potential for broadleaf weed control on these forb crops. Basagran and Sencor had light phytotoxicity on Maple Grove plants (16.88 and 18.75% respectively).

Chateau also had light to moderate phytotoxicity on Appar and Delar (17.50 and 26.25% respectively).

Table 1. Initial herbicide tolerance screening.

| Treatment | Trade Name | Appar | Maple Grove | Delar |
|---|---|---|---|---|
| | | Phytotoxicity | | |
| | | ----------%---------- | | |
| Check | No trtmnt | 0.00 e | 0.00 d | 0.00 d |
| Sethoxydim+COC | Poast | 0.00 e | 0.00 d | 8.75 cd |
| MCPA amine | MCPA | 32.50 cd | 72.50 a | 73.75 ab |
| Clopyralid | Stinger | 36.25 bc | 60.00 a | 60.00 b |
| Bromoxynil | Buctril | 52.50 ab | 36.25 bc | 85.63 a |
| Bentazon+COC | Basagran | 48.75 abc | 16.88 cd | 93.13 a |
| Metribuzin | Sencor | 60.00 a | 18.75 cd | 90.00 a |
| Imazapic | Plateau | 0.00 e | 0.00 d | 1.25 d |
| Pendimethalin | Prowl | 0.00 e | 0.00 d | 5.00 d |
| Flumioxazin | Chateau | 17.50 d | 55.00 ab | 26.25 c |
| cv (0.05) | | 16.46 | 20.93 | 21.02 |

## 2006 Maple Grove Field Trial

### Materials and Methods

In 2005 a 3.2 acre seed production field of Maple Grove was established at the PMC home farm in Aberdeen. In 2006 it was discovered that the field had a significant contamination with Appar blue flax. It was decided to initiate an herbicide tolerance trial on this established field using a similar selection of herbicides as used in the initial screening trial.

The field was marked off into 24 X 75' plots. The plots were arranged in 3 blocks with 14 treatments per block. The only fall treatment (Plateau) was applied on December 8, 2006. The remaining spring treatments took place on May 20, 2007. All treatments were applied as a foliar broadcast using a backpack sprayer calibrated at 35 pounds per square inch (psi) and delivering 15 gallons/acre. Treatments were conducted by Pam Hutchinson, University of Idaho. On June 5, 2007 all plots were evaluated visually for percent phytotoxicity.

Because of weed presence in some plots and the risk of weed seed spreading to adjacent seed production fields, it was decided to mow the entire field except for a single row running through the center of the plots to be left for the seed production evaluation. Mowing occurred on June 21, 2007. Seed was harvested on 3 foot of row by hand from each plot on July 10, 2007. Weed control was not evaluated statistically; however a general idea of weed control was obtained from the plots at the time of evaluation.

All data were analyzed with a one-way ANOVA and means separated with a Tukey's test using Statistix 8 analytical software.

### Results

The most prevalent broadleaf weeds in the plots were meadow salsify (*Tragopogon dubius*) and prickly lettuce (*Lactuca serriola*). At the time of evaluation Maple Grove appeared to have

excellent tolerance to the spring application of Plateau (10.0%), the Plateau and Prowl treatment (13.3%) and the Basagran treatment (16.7%) (table 2). Moderate phytotoxicity came from the Targa+Stinger, MCPA, Targa, Stinger, and Prowl treatments. Treatments of Buctril, Bronate and fall applied Plateau caused severe damage to Maple Grove plants and essentially eliminated seed production. The Targa+Stinger treatment used a lower application rate of Stinger than the Stinger alone treatment (2 lb v. 3 lb/gal). Consequently the Stinger plots had a higher phytotoxicity and weed control rating and lower seed yields than the Targa+Stinger treatment.

Table 2. Phytotoxicity and seed production.

| Treatment | Trade name | Rate | Unit | Phytotoxicity (6/5) | Seed/ac (7/10) | Weed control |
|---|---|---|---|---|---|---|
| | | | | -----%----- | -----lb----- | |
| Bromoxynil | Buctril | 2 | Lb/gal | 96.7 a | 3 b | Moderate |
| Bromoxynil+MCPA | Bronate | 4 | Lb/gal | 91.7 a | 3 b | Excellent |
| Imazapic | Plateau (fall) | 2 | Lb/gal | 86.7 a | 31 b | Poor |
| Metribuzin | Sencor | 75 | 5aw/w | 56.7 b | 168 ab | Moderate |
| Flumioxazin | Chateau | 51 | % | 53.3 bc | 111 ab | Good |
| Pendimethalin | Prowl | 3.8 | Lb/gal | 36.7 cd | 326 a | Moderate |
| Clopyralid | Stinger | 3 | Lb/gal | 36.7 cd | 197 ab | Excellent |
| Quizalafop | Targa | .88 | Lb/gal | 30.0 de | 280 ab | Moderate |
| MCPA | MCPA | 4 | Lb/gal | 26.7 def | 289 ab | Good |
| Quiz + Clop | Targa + Stinger | .88+2 | Lb/gal | 23.3 def | 294 ab | Good |
| Bentazon | Basagran | 4 | Lb/gal | 16.7 efg | 229 ab | Moderate |
| Imaz + Pendi | Plateau + Prowl | 2+3.8 | Lb/gal | 13.3 efg | 3 b | Poor |
| Imazapic | Plateau (spring) | 2 | Lb/gal | 10.0 fg | 3 b | Moderate |
| Check | No treatment | na | Na | 0.00 g | 245 ab | Poor |
| cv (0.05) | | | | 18.5 | 319 | |

Best seed production came from the Prowl treatment (326 lb/ac) despite having a moderately high phytotoxicity rating (36.7%) and a poor weed control rating (figure 1). Targa+Stinger, MCPA, Targa, the non-treated check and the Basagran treatments also had high seed yields (294, 289, 280, 245 and 229 lb/ac respectively). Contrary to the initial trial, MCPA treatments showed only moderate phytotoxicity and had excellent seed production.

Despite its low phytotoxicity rating, the spring applications involving Plateau had essentially no seed production. At the time of the evaluation, Maple Grove and salsify plants in the Plateau plots had produced very few flowers, and the flowers that formed had not opened (figure 2). The fall application of Plateau did severe damage to the plants in the plot, and many plants remained stunted throughout the following season (figure 3). Others however did flower, but seed production was minimal.

Targa used with the low rate of Stinger had high seed yields and relatively good herbicide tolerance with good weed control. Targa would have provided grass control, while Stinger is produced specifically to control weeds in the Asteraceae family which includes salsify and lettuce (figure 4). Using a low rate of Stinger appeared to provide sufficient broadleaf control with minimal damage to the Maple Grove plants.

Figure 1. Plot showing Prowl treatment. Prowl provided excellent seed yields despite poor weed control.

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Figure 2. Plot of spring applied Plateau (6/5). Plants appeared healthy, yet flowers never opened for pollination resulting in low seed production.

Figure 3. Fall applied Plateau. Many plants are stunted and never flowered. Flowering plants in the plot may have been the result of wind-skip at time of application.

Figure 4. Plots of Targa+Stinger had good seed yields and high weed control.

**Appendix: Summary of tested herbicides** (PNW Weed Management Handbook, 2003)

**Basagran**: A selective herbicide to control many broadleaf weeds and yellow nutsedge. Rain within 24 hours after application may reduce effectiveness. Basagran is a postemergence contact spray, so thorough coverage is essential.

**Buctril**: A selective, postemergence, contact herbicide. Controls some weeds resistant to 2,4-D. Can be safely applied to seedling grains and grasses. Has little soil activity.

**Chateau**: A long lasting residual broad spectrum herbicide that controls annual broadleaf and grass weeds.

**MCPA**: A postemergence, selective, translocated phenoxy herbicide. Material is less phytotoxic to some crops.

**Plateau**: A selective postemergence herbicide effective controlling broadleaf weeds and some grasses.

**Poast**: A selective, postemergence grass herbicide. It controls most annual and perennial grasses. Using a crop oil concentrate enhances activity.

**Prowl**: Depending on the crop, this is a selective, preplant, preemergence, and early postemergence herbicide that is used to control annual broadleaf and grass weeds.

**Sencor**: A selective pre-and postemergence herbicide to control grass and broadleaf weeds.

**Stinger**: A highly translocated, selective herbicide active primarily through foliage of broadleaf herbaceous weeds (mostly the Asteraceae, Fabaceae, and Polygonaceae families). This herbicide is known to accumulate and persist in crop residue and compost.

**Targa**: Same chemical as Poast, a grass herbicide.

**JUNCUS DIRECT SEEDING METHOD EVALUATION, 2006-2008**
**STUDY NUMBER: IDPMC-T-0604-WE**
**2007 PROGRESS REPORT**
**Derek J. Tilley, Range Conservationist (Plants)**
**December 19, 2007**

## Introduction

Direct seeding of wetland species for wetland creation and restoration has certain inherent difficulties. Traditional broadcasting and drill seeding attempts are mostly unsuccessful. Small scale direct seeding experiments evaluating other techniques have indicated however, that there may be methods available that could produce much better establishment of wetland species.

Because seed from many wetland species are buoyant and also require light for germination, broadcast seeding has provided poor results because seed tends to wash away from the seeded area after flooding. Test results have shown that following a broadcast seeding with a packer or imprinter can improve the number of seeds held in place and allow for better onsite germination. However, it can be problematic trying to use small seeded species in conventional seeding equipment. Although seed from some wetland species are extremely small, over 90 million seeds/pound in the case of Baltic rush, inert carriers such as rice hulls can be used to increase the volume of seeded material and facilitate uniform distribution of seed from a drill or broadcast spreader (St. John and others 2005).

Hydroseed mulches can similarly 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. Greenhouse test results have shown that the tackifier used in hydroseeding can effectively glue the seed to the soil surface and prevents seed from washing off site (Tilley and Hoag 2006).

Another relatively new option for seeding wetlands is Submerseed™ from Aquablok Industries (Toledo, Ohio). This technology involves binding seeds with clay or clay-sized material and organic polymers to a dense aggregate core. These aggregates sink, preventing seed from floating to the surface and the clay absorbs water providing a suitable germination medium for the seed (Aquablok 2007).

Trade names are used solely to provide information. Mention of a trade name does not constitute a guarantee of the product by the U.S. Department of Agriculture nor does it imply endorsement by the Department or the Natural Resources Conservation Service over comparable products that are not named.

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 Aberdeen PMC greenhouse during the summer of 2006. Trial 1 compared seedling establishment from four hydroseed mulches and four dry, inert carriers. The second trial took place in 2007 with the most promising performers from trial 1 and compared each against Submerseed pellets in a controlled outdoor seeding in 4’ X 8’ tanks. Each of these studies is a precursor to field testing the best methods of direct seeding into the PMC wetland ponds. Due to volunteer wetland seed contamination, the ponds were chemically treated in 2006 and in 2007 to ensure a clean, weed-free seed bed for use in seeding evaluations that will take place in 2008.

The goal of this project is to find the techniques that are most efficient, cost effective and successful for seeding common wetland species. Baltic rush (*Juncus balticus*) was chosen for this study because the seed exemplifies the problems faced in direct seeding wetlands, i.e. very small seed that float and seed that requires surface planting to allow adequate light for seed germination. The results obtained from theses studies will be used to develop seeding rates for use with those methods that will provide adequate establishment for wetland revegetation.

**Trial 1: GH evaluation of hydroseed mulches and inert broadcast carriers**

*Materials and Methods*

Because tackifier is designed to be used to hold grass, forb and shrub seed to dry soils and critical 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 slowly 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). Because a larger amount of tackifier was easier to work with, a 5x rate of tackifier was used for trial 1.

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), Fertil Fibers™ Nutrimulch, straw mulch and wood mulch. Fertil Fibers is a seedmeal-based, protein-rich organic fiber nutrient source designed to deliver a long-term biological release of 6-4-1 N-P-K.

Three replications of each treatment were seeded in 12" X 18" (1.5 ft²) greenhouse trays filled with a 1:1:1 mixture of peat, sand and perlite. Trays were placed randomly in a 4' X 8' X 1' artificial wetland tank in the PMC greenhouse (figure 1). 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

Figure 1. Treatments in greenhouse trays prior to flooding.

with a spoon. Hydroseed treatments were applied on April 17 and allowed to dry overnight to allow the tackifier to set.

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 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 establish 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 flooding (figure 2). 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 were significant differences in establishment between treatments (table 1) There appeared to be a lot of seed washing out from the dry broadcast treatments, significantly more than from Fertil Fibers 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 be as effective as Fertil 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. Fertil 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 a lower seeding rate as opposed to 500 PLS/ft. This would more closely be comparable seeding rate to be used with Submerseed pellets and is a more realistic rate for field applications.

Figure 2. Seedling emergence at time of evaluation.

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 |
| Fertil 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 Fertil 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.

**Trial 2- Outdoor trial of best performers (2007)**

Trial 2 was 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. Conducting this trial outdoors also allowed natural drying and temperature conditions to occur, which may influence germination and survival. This experiment compares establishment abilities of the best hydroseed cariers (Fertil Fibers™ nutrimulch+ tackifier and Tackifier alone) and broadcast carriers (rice hulls) from trial 1 and Submerseed™ technology, which was evaluated in earlier trials at the PMC (Tilley and Hoag 2006).

*Materials and Methods*

Four treatments were planted in five 4’ X 8’ wetland tanks placed outside at the PMC farm. Each tank was divided into four 2’ X 4’ plots, one plot per treatment (figure 3). Each tank thus represented one of five blocks or replications. Because the plot size is small, seeding with a broadcaster or hydroseeder was unfeasible; therefore seeding was completed by hand in a manner similar to that described for trial 1. However, seeding rates were adjusted to rates much closer to those recommended for large area plantings, in this case 350 PLS/ft². Germination rates should, therefore, more accurately reflect those that might be observed in field plantings (table 2). Hydroseed mulch (Fertil Fibers) was applied at 2,000 lb/ac, with 600 gallons of water/60 lb mulch. Tackifier was applied at 5x the recommended rate (recommended=3lb/ac). An 8 ft soaker hose was placed on the long edge of each tank for irrigation. The wetland tanks were oriented to have a slight downward slope opposite the soaker hose to allow directional

Figure 3. Wetland tank divided into 2X4’ plots for treatments.

water flow. All plots were planted on July 9, 2007. After planting, plots were allowed to dry for 2 hours for tackifier glues to set before flooding. Tanks were then flooded and allowed to spill over the shallow side for 15 minutes letting loose seed, rice hulls and other debris to wash over the edge and out of the tank. Excess water was then siphoned off to drop water levels to just cover the seed and soil. The tanks were irrigated regularly (approximately once per week) to maintain moist soil conditions for germination and establishment.

Table 2. Rates

| | Rate/ft | Rate/ac |
|---|---|---|
| Submerseed | 20 pellets (100-200 PLS) | 2,000 lb |
| Fertil Fibers Mulch | 20.8 g | 2,000 lb |
| Tackifier | 1.25 g | 15 lb |
| Seed | 350 PLS (0.0075g) | 15,246,000 PLS (0.72lb) |
| Water (hydroseeding) | 2.3 L | 3,3000 gal |
| Rice hulls | 1.35 g | 130 lb |

Plots were evaluated on Aug 20 (42 days after planting). Plant counts were made using a 100 cm X 25 cm" wire grid which was divided into five 25 cm X 20 cm cells. Plants were counted in the first, third and fifth cells and added together for a total number of plants per 1500 $cm^2$ and then converted to plants per $ft^2$. Because the broadcast and hydroseed treatments were seeded at a higher rate than Submerseed (350 PLS/ft versus 100 to 200 PLS/ft) data were also transformed to compare establishment based on a standard seeding rate (100 PLS/ft). Results were also compared to those data obtained from the 2006 greenhouse seeding study as well as the Submerseed establishment data from Tilley and Hoag (2006). Data were analyzed using Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$. Means were separated using a Tukey HSD all pairwise comparison.

*Results*

At planting, globs of tackifier were visible in the tackifier alone and Fertil Fibers plots, presumably due to inadequate mixing prior to planting. When the plots were flooded, rice hulls, Fertil Fiber mulch and some seed were observed washing off of the plots and out of the tank (figure 4).

Figure 4. Loose Fertil Fibers (l) and rice hulls (r) washing off of the plots.

Table 3. Establishment in 2007 outdoor trial.

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

Fertil Fibers had significantly better emergence than tackifier alone and Submerseed at the seeded rate (p=0.001). At the adjusted seeding rate of 100 PLS/ft, Fertil Fibers had significantly better establishment than the Submerseed treatment (p=0.027).

Figure 5. Establishment in 2007 outdoor trial.

Much lower emergence was achieved in outdoor conditions versus the greenhouse trial when compared at 100 PLS/ft² (table 3). Submerseed had 10 times better germination under greenhouse conditions than outdoors. Submerseed pellets appear to perform better in high moisture environments and may be better suited for use in broadcasting into shallow water instead of submitting it to numerous wet-dry cycles.

**Discussion**

Using data from these trials and industry costs, a price breakdown was created comparing five available methods of wetland planting: broadcast seeding with rice hulls as an inert dry carrier, hydroseeding with Fertil Fibers, hydroseeding using only tackifier, Submerseed pellets, and using greenhouse grown plugs (table 4). All costs are based on seeding 100 PLS/ft² (0.2 lb PLS/ac) or planting plugs at 18" spacing. A seeding rate of 0.2 to 1.0 lb PLS/ac would provide 100 to 430 PLS/ft². For broadcasting with rice hulls as an inert carrier, 9 lbs rice hulls per acre should be used with the drill or broadcaster set to 1 bushel of barley. Estimated seed costs ($150/lb) are an average price obtained from three regional seed suppliers: Ernst Conservation Seed, Pawnee Buttes Seed, and Western Native Seed (all 2006); man-hour costs for collecting seed from a local source could increase costs significantly. Tackifier costs are based on the manufacturer's recommended rate (3lb/ac). Hydroseeding equipment cost is based on a one day hydroseeder rental rate.

Broadcasting seed followed by an imprinter is by far the cheapest method and perhaps the least reliable. However, the trials discussed here show that some seed will stay in place if it is pressed firmly into the soil, but not covered. Broadcasting could be a low-cost option, however risky. Poor establishment of desired species could result in increased weeds or erosion.

Hydroseeding appears to be a viable option for a relatively small cost if the proper hydroseeding equipment is available. Hiring a contractor to perform the hydroseed application could dramatically increase costs. Hydroseeding using only tackifier provided fair establishment, but using mulch with nutrient amendments like Fertil Fibers nearly doubled establishment rates in our tests.

Submerseed pellets worked very well in greenhouse tests, but did not perform well in this outdoor trial. Better results may be obtained under wetter conditions such as broadcasting into standing shallow water. This factor may, ultimately, be extremely beneficial in situations where the hydrology of the wetland cannot be controlled, or where wetlands can not be sufficiently drained for large equipment use. Cost for Submerseed, however, is much higher than broadcasting or hydroseeding which may limit its use in more controlled environments.

Greenhouse grown plugs should be planted at 18" spacing or every 2.25 ft² using approximately 25 PLS per conetainer (Hoag 1995). For one acre that amounts to a minimum of 19,360 plants total from approximately 500,000 seeds. Estimated cost for greenhouse plug production including delivery and installation is $2.00 per plant or $38,720/ac (Hoag 2007). Using greenhouse grown plugs has several advantages over direct seeding methods; however contracting a greenhouse to produce plugs may be cost prohibitive. Nearly any species can be grown, including species where seeds require pre-stratification and expected establishment is much greater.

Table 4. Cost/ac @ 0.2lb/ac (100PLS/ft)

| COST | Broadcast | Hydroseed (FF) | Hydroseed (tack alone) | SS | GH plugs (18" spacing) |
|---|---|---|---|---|---|
| Seed ($150/lb) | $30 | $30 | $30 | $30 | $10 |
| shipping | na | $440 | na | included | included |
| Carrier | Rice hulls $ negligible | Fertil fibers $670 | na | SS | na |
| Tackifier | na | $60 | $60 | na | na |
| Equipment needed | Spreader Imprinter | Hydroseeder $200 | Hydroseeder $200 | Spreader, ATV | na |
| Man-hours@$20/hr | 8=$160 | 8=$160 | 8=$160 | 8=$160 | included |
| **Total** | **$200** | **$1,560** | **$520** | **$1,000-8,000**[a] | **$40,000** (includes installation)[b] |

[a] Info from Aquablok 2007.
[b] Estimated cost from private companies.

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**Effects of pre-plant soaking treatments on hardwood cuttings of peachleaf willow**

**Derek J. Tilley, Range Conservationist (Plants)**
**J. Chris Hoag, Wetland Plant Ecologist**

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**Study Number: IDPMC-T-0706-RI**

**Natural Resources Conservation Service**
**Plant Materials Center**
**Aberdeen, Idaho**

## INTRODUCTION

Dormant hardwood cuttings of willow (*Salix*) and cottonwood (*Populus*) species are commonly used for riparian restoration and bioengineering efforts (Hoag 2007; Schaff et al. 2002). The greatest factors for successful restoration plantings are cutting placement in the soil profile, soil texture and moisture availability (Bentrup and Hoag 1998; Pezeshki and Shields 2006). Other factors, such as herbivory and competition for light, water and nutrients by other plants, are also important to the long-term survival of cuttings. Studies have indicated that one practice that can help increase initial survival rates is the soaking of dormant cuttings in water prior to planting. Several studies performed on black willow (*Salix nigra* Marsh.) showed that pre-soaked posts had increased root, shoot and leaf biomass as well as improved overall survival when compared with non-soaked posts (Schaff et al. 2002; Pezeshki et al. 2005; Pezeshki and Shields 2006). Other studies show similar results for nursery grown cottonwood and poplar clones (Krinard and Randall 1979; Phipps et al. 1983; Desrochers and Thomas 2003). Edwards and Kissock (1975) found increased root and shoot development resulting from soaking 2.75 m (9 ft) willow and poplar poles at water depths of 5 cm (2 in), 80 cm (31 in) or fully submerged versus unsoaked. They also noted different total water weight gain as well as different rates of water uptake for the different treatments.

It has been suggested that the increased survival and root and shoot production gained from pre-soaking is a result of improved stem water content coupled with early root and shoot initiation during soaking (Phipps et al. 1983; Schaff et al. 2002). In many cases cuttings used in riparian restoration efforts encounter water stress before developing a sufficient root system (Edwards and Kissock 1975). The increased water content provided from pre-soaking is believed to allow cuttings to more readily cope with the often stressful conditions associated with planting by delaying desiccation and loss of cell turgor (Schaff et al. 2002). Quicker initiation of roots and shoots also aid the cuttings in droughty environments and can help cuttings compete with other vegetation found at the site. Phipps et al. (1983) summarized that pre-soaking in water is beneficial under hot, dry conditions that induce high moisture stress, but may also be beneficial under ideal conditions.

Within the common practice of pre-soaking dormant cuttings, there is a great deal of variation on how exactly this is done. Many soaking practitioners allow cuttings to soak in the stream where the restoration is taking place. Others soak cuttings in buckets, troughs and garbage cans. These different methods add other factors. Shallow, still waters generally have higher temperatures than deeper, flowing streams. Additionally, some cuttings may be fully submerged under the water's surface, while some have portions exposed to the air. Recommended soaking durations range from 24 hrs (Hoag 1991), to as long as 14 days (Briggs and Munda 1992). Cutting diameter is also believed to be an important factor in increasing cutting survival. In streambank restoration

and bioengineering practices, cuttings less than 1.0 cm (0.38 in) are generally not recommended for use because of limited energy reserves in the stem (Hoag 2007). Nursery protocols differ with some using 0.48 cm (0.19 in) diameter cuttings for bareroot stock propagation (Zeidler and Justin 2003), and others using 1.5 to 2.5 cm cuttings (Mathers 2003).

In this study we addressed the following questions: 1) is pre-soaking beneficial, and if so, 2) what temperatures are optimum for soaking, 3) to what depths should cuttings be soaked, fully or partially submerged, 4) how long should cuttings be soaked, and 5) what is the best diameter cutting to plant? To this end we looked at multiple pre-soaking depths, temperatures and durations to determine the most effective strategy for successful cutting establishment. We also examined cutting water weight gain in response to the different soaking treatments, and we looked at cutting survival as a factor of cutting size regardless of pre-treatment to determine the ideal size cutting for planting. For this study, we chose to use peachleaf willow, a tree-type willow, native to riparian zones in low to mid-elevation plant communities in the United States. The species is commonly utilized in riparian restoration and streambank bioengineering projects throughout its native range and is known to have good to excellent rooting capabilities.

## MATERIALS AND METHODS

The trial was designed as a randomized complete block with 4 replications. Each replicate consisted of five cuttings. Cuttings were harvested from multiple accessions on March 5 and 6, 2007 at the Aberdeen Plant Materials Center (PMC) from trees established in 1994. The base of the cuttings ranged in diameter from 0.8 to 2.2 cm (0.3 to 0.9 in) and measured 45 cm (18 in) long. All secondary branches were trimmed off in the field.

Cuttings were then subjected to increasing durations of four soaking treatments plus a non-treated control (no treatment, partially submerged in warm or cold water, and fully submerged in warm or cold water). The partial soak treatments were placed vertically in five gallon buckets with a maintained water depth of 29 to 35 cm (11.5 to 14 in). Full soak treatments were placed horizontally in styrofoam coolers and weighted down with metal frames so that the water was between 5 and 10 cm (2 to 4 in) over the top of the cuttings. Cold soaking treatments occurred in dark conditions in the PMC storage cooler, while the warm treatments occurred under natural light schedules in the PMC greenhouse. Temperatures for the cold treatments were maintained around 1.7º C (35º F) and warm soaking treatments ranged from 16 to 20º C (60 to 68º F). Soaking initiation was staggered so all cuttings would be ready for planting on the same date. Cuttings not soaking were kept in cold dry storage at 1.7º C (35 º F) to maintain dormancy. Cuttings were allowed to soak for 1, 2, 6, 14 or 21 days and were then planted into 40 cubic inch "contetainers" filled with a mixture of 80% vermiculite and 20% perlite and placed on a greenhouse mist table. All roots and shoots that had formed prior to planting were removed by hand to approximate root and shoot damage occurring at field plantings. All cuttings received approximately 2 cm (0.8 in) of water every 7 days from overhead misters. This low water rate, compared to 2.5 to 5 cm of water every 7 to 10 days used by nurseries (Mathers 2003), caused water stress and allowed only the most vigorous cuttings to survive. Greenhouse temperatures were maintained between 20 and 30º C (68 to 86 º F). 28 days after planting, cutting survival, and air dried root and shoot biomass production were evaluated. Because the survival data did not meet assumption of normality, data were analyzed using the Friedman non-parametric two-way analysis of variance.

Cuttings survival was also evaluated against cutting diameter without regard to pre-soaking treatment. This was done by analyzing survival of all cuttings as a completely randomized design and plotting a linear regression for the data. To be sure there was a totally random assignment of cuttings of different diameters to each of the 21 treatments, an analysis of variance was conducted on cutting diameter per treatment. No significant differences were detected (P=0.1738).

A second set of cuttings was used to evaluate water weight gain caused by different soaking treatments, and to determine at what duration maximum weight gain from water occurred. Six cuttings were pre-weighed prior to soaking either partially or fully submerged in cold or warm water. Weights were then taken at 1, 7, 14, 21, 28 and 35 days after initiation. Development of any epidermal lesions (ruptures in the bark where roots will emerge), roots or shoots was documented. Roots and shoots were trimmed before weighing to measure only water weight gain within the cutting. In those cases where root and shoot growth had occurred, growth was evaluated by measuring the length of the longest root or shoot. The same cuttings were evaluated repeatedly for the cold treatments where there was no root or shoot growth; however, different batches of cuttings were used for each soaking duration in the warm treatments where root and shoot removal may have affected later measurements.

To test if long-term soaking treatments had an effect of the overall health of cuttings, the cuttings used in the weight gain test were planted into five gallon buckets filled with water following the 35 day evaluation. The cuttings thus had ample water and ideal conditions in which to grow. Cuttings survival and root and shoot growth were evaluated after 28 days and these data compared to data obtained from the survival study to ascertain if long-term soaking treatments had any detrimental effects. These results were strictly observational and were not analyzed statistically.

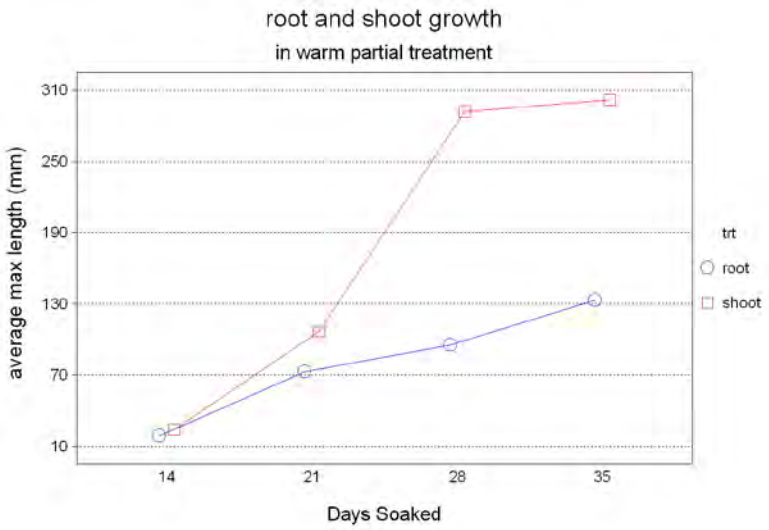



Figure 1. Root and shoot growth in average maximum length while soaking partially submerged in warm water.

## RESULTS

*Survival and growth*

When portions of the cuttings were exposed to air (partial soak treatments), root lesions and buds began to form after about 7 days of soaking in warm water. Root and shoot elongation was first visible between 7 and 14 days. Cuttings fully submerged in warm water showed epidermal lesions after 14 days, and by 35 days all cuttings in the warm full treatment had epidermal lesions present. However no fully soaked cuttings ever initiated root or shoot growth, even after 35 days. Additionally, no cuttings in either of the cold treatments ever showed any indications of breaking dormancy.

Significant differences were detected in survival response to pre-plant soaking treatments ($P<0.0001$). Survival generally increased with longer durations of soaking (figure 2). One hundred percent survival was achieved by pre-soaking partially submerged cuttings in cold water for 14 days. Other pre-soaking treatments had varying levels of success. Nearly all pre-soaking treatments had better survival rates than the non-soaked control treatment. Only the 1 day cold water partial soak had zero percent survival. Survival of the cold partial treatments increased until reaching 100% at 14 days and then dropped to 80% after 21 days. The highest survival for the fully submerged cold treatment came at 21 days (80%); however the trend for the cold full treatment was still increasing. Longer soaking periods under fully submerged cold conditions may produce even better survival rates.

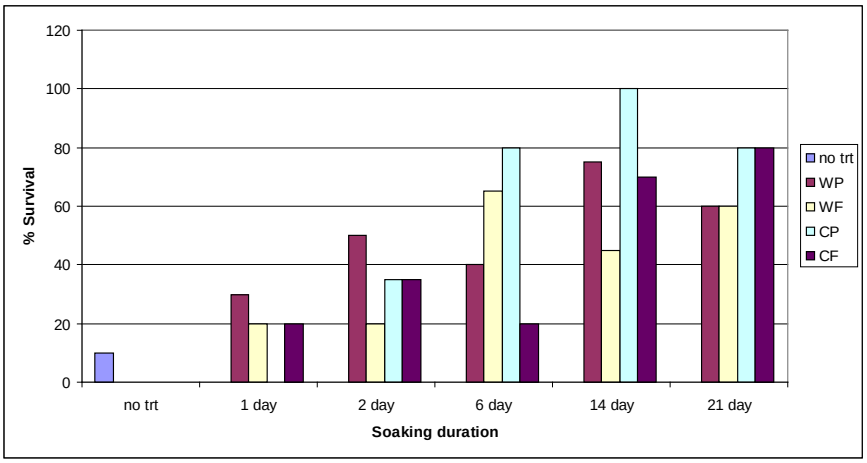



Figure 2. Survival of dormant hardwood peachleaf willows following different presoaking treatments. WP=warm partially submerged, WF=warm fully submerged, CP=cold partial, CF=cold full. Survival cutting increased as soaking duration lengthened. $P<0.0001$.

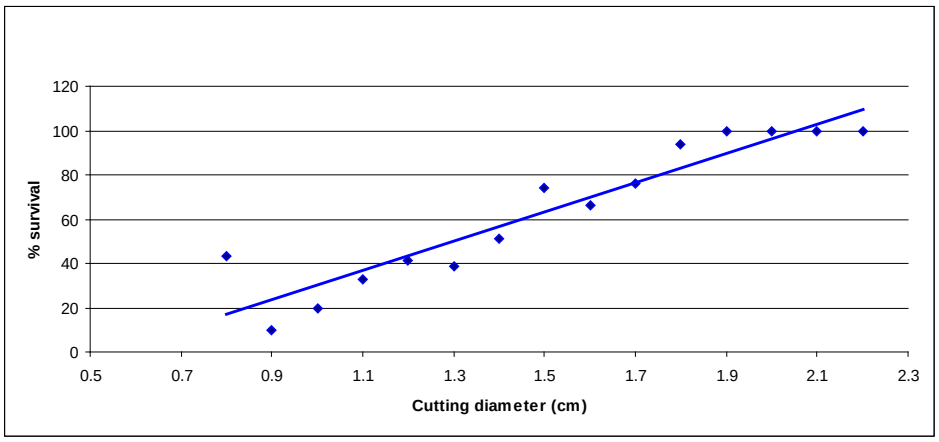
Plants that did survive produced varying amounts of roots and shoots which were not readily separable statistically ($P=0.38$ and $P=0.21$ respectively). Shoot growth averaged from 0.75g per cutting to 0.008 g per cutting. Root growth ranged from 0.31 g to 0.003 g per cutting. The 14 day and 21 day warm partial treatments both had root and shoot growth prior to planting. Removal of the roots and shoots appeared to set back new root and shoot initiation and, in the case of the 21 day warm partial treatment, kill the above ground portion of the cutting (figure 3). Sites where roots and shoots had been removed never recovered and resprouted; all growth came from new growing points.

Figure 3. Cuttings 28 days after planting that had been pre-soaked for 21 days, partially submerged in warm water. Roots and shoots that had been removed prior to planting failed to recover. Above ground portions of the cuttings were dead, and all growth initiated below the soil surface.

*Cutting size*

We discovered a very clear positive relationship between cutting diameter and survival (figure 4). Cuttings having diameters of 1.9 cm (0.75 in) or greater all had 100% survival regardless of what pre-plant soaking treatment they were in. According to the regression trend, the recommended size cutting for bareroot nursery stock (0.48 cm) would have had essentially zero percent survival ($y= -4.4$) under high water stress conditions.

Figure 4. Linear regression graph of cutting diameter versus percent survival. y=66.25x-36.242. $R^2$=0.8843.




*Weight gain*

Soaking completely submerged cuttings in warm and cold water resulted in steady weight gain. Both treatments had reached approximately 45 percent weight gain at 35 days and the trend was still increasing, so no optimum duration for peak weight gain was discovered (figure 5). Soaking cuttings partially submerged in cold water also had steady gains but leveled at below 20%. Cuttings soaked partially submerged in warm water produced small weight gains after seven days but lost weight after root and shoot initiation as water stored in the cutting was translocated to new shoots and roots. After about 28 days the cuttings resumed gaining weight, presumably as cells began actively growing and dividing in the vascular cambium. When compared to the survival data, it becomes apparent that higher levels of water in the stem cannot wholly account for improved survival. The highest survival rate was achieved by the 14 day cold partially submerged treatment which would have had approximately 16 percent weight gain. All of the fully submerged soaking treatments from cold and warm water had higher weight gains, yet lower rates of survival.

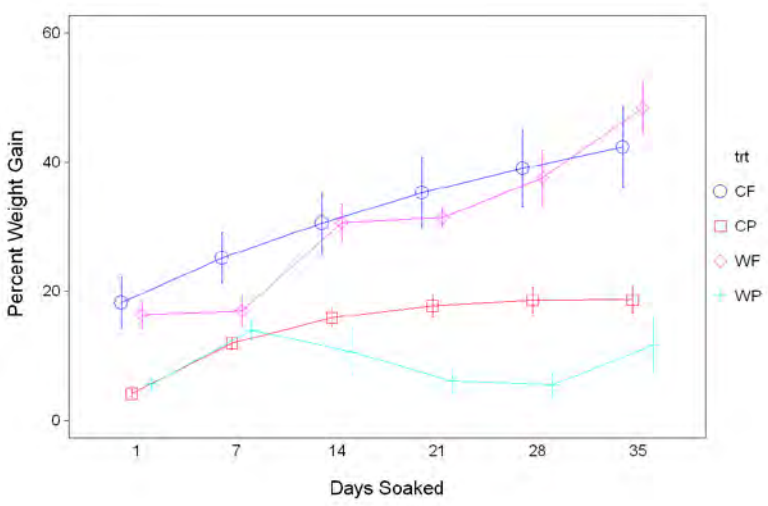



Figure 5. Cutting weight gain as a result of soaking. Fully submerged treatments had far greater weight gain than those of partially submerged treatments.

*Cutting health after long-term soaking*

No apparent damage occurred to cuttings in the cold soaking treatments after 35 days. Water in the warm full soaking treatment turned cloudy after several days, while the water used for other treatments remained clear. After soaking for 35 days, all cuttings were planted into five gallon buckets filled with water. Survival was, 100% for the cold full soak, 100% for the cold partial soak, and 33% for warm full soak treatment. All cuttings from the cold soaking treatments had

excellent vigor and root and shoot growth. Cuttings from the warm full soak treatment were covered in a slimy film and were slow to produce roots and shoots. Only two of six cuttings from the warm full soak treatment produced roots or shoots, and these were much smaller and less vigorous than those from the other treatments. Root and shoot growth after 28 days averaged 3.18g (shoot) and 0.36g (root) for the cold partial treatment and 2.06 g (shoot) and 0.25 g (root) for the cold full treatment. Growth from cuttings in the warm full treatment averaged much lower, 0.39 g (shoot) and 0.06 g (root). It is unclear what affected the cuttings in the warm full soak treatment. Possibilities include, but are not limited to, fungal or bacterial infection, or the cuttings simply drowned without oxygen being supplied to the cells once dormancy was broken due to warm temperatures.

## SUMMARY

Pre-plant soaking of dormant peachleaf willow cuttings can increase cutting survival under stressful conditions. All soaking treatments tested had better survival than the non-soaked control treatment, with the exception of a single day soaking partially submerged in cold water. Cuttings soaked for 14 days partially submerged in cold water had 100 percent survival. The survival of cuttings in the fully submerged cold soaked treatments was greatest (80%) with a 21 day soak, the longest duration tested. It is unknown whether or not longer soaking periods of this treatment would have resulted in even better survival. Soaking for extended durations in warm water with portions of the cuttings exposed to oxygen can initiate root and shoot growth which can be easily damaged and affect the vigor of the cutting.

Water weight gain does not appear to be the only factor determining increased survival from pre-soaking. Fully submerged cuttings in cold and warm water had much greater weight gain than those from partially submerged cuttings of the same duration, but there appeared to be no corresponding increases in survival.

Increasing cutting diameters resulted in higher rates of survival. Cuttings 1.9 cm in diameter and larger had 100 percent survival. Using cuttings of this diameter may not be feasible for nursery stock propagation, and the increased vigor may not be necessary under the ideal moisture conditions provided in typical greenhouse situations; however, these data suggest that for streambank restoration and other “natural” site applications, use of larger diameter cuttings would be beneficial.

From the data gathered in this study, we recommend soaking peachleaf willows for one to three weeks in cold water. This should be achievable in most cases by using streams, ponds or backwaters at or near the planting or collection site, especially in early spring when streams are full with snowmelt water. Temperatures should be watched carefully. As daily air temperatures increase, the cuttings should be monitored for any signs of growth, especially if the cuttings are not kept fully submerged. Best results will come from planting cuttings before buds form and epidermal lesions appear on the cutting. By doing this, water content should be high, and the roots and shoots are ready to emerge but are not yet susceptible to damage of the primary meristems.

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# OFF-CENTER ACTIVITIES

# FINAL TECHNICAL REPORT

# INTEGRATED RESTORATION STRATEGIES TOWARDS WEED CONTROL ON WESTERN RANGELANDS

## Chapter 2 – Plant materials selections and seeding equipment modifications

Dan Ogle, USDA-NRCS, Boise, Idaho
Loren St. John, USDA-NRCS, Plant Materials Center, Aberdeen, Idaho
Tom Jones, USDA-ARS, Forage and Range Research Laboratory, Logan, Utah

## SPECIES SELECTION AND SEED PROCUREMENT

The cooperators of the IFAFS "Integrated Restoration Strategies Towards Weed Control on Western Rangelands" Project selected test species for studies based on seed availability of the most common species found in Wyoming big sagebrush plant communities throughout the Great Basin and Snake River Regions.

**Experiment 1 – Plant Screening Trials** involved replicated plot plantings using the Truax Rough Rider Rangeland Drill in fall of 2003 and 2004 at two locations in each of the states of Idaho, Nevada, Oregon and Utah (**Table 2.1**) to evaluate different releases for their competitive ability with cheatgrass. This experiment involved eight separate plantings each of the two years this experiment was planted. Seed for Experiment 1 was purchased from seed companies or supplied by NRCS, ARS, or the FS. At each location, 3 of 6 replications were treated with Roundup in late spring prior to planting and the other 3 replications were left untreated. Plots were 10 feet wide (one drill width) x 20 feet long. Species and accessions utilized in Experiment 1 are listed in **Table 2.2**. Additional details on the plot treatments and experimental design can be found in Chapter 5.

**Table 2.1.** Seeding dates for Experiment 1 at each study site.

| State | Study site | 2003 seeding dates | 2004 seeding dates |
|---|---|---|---|
| Idaho | Canyon Creek | October 20-21 | October 20-21 |
| | Cinder Cone Butte | October 21-22 | October 21-22 |
| Nevada | Eden Valley | November 10-11 | October 27-28 |
| | Izzenhood Ranch | November 12-13 | October 29-30 |
| Oregon | Lincoln Bench | October 27-28 | October 24-25 |
| | Succor Creek | October 29-30 | October 25-26 |
| Utah | Simpson Springs | November 3-4 | October 18-19 |
| | Vernon Hills | November 5-6 | October 17-18 |

**Table 2.2.** Species and accessions of plant materials used in Experiment 1 seedings.

| Plant type | Latin name | Common name | Accession name | Sites seeded | Seed source | Seeding rate | |
|---|---|---|---|---|---|---|---|
| | | | | | | number PLS $ft^{-1}$ | lbs PLS $acre^{-1}$ |
| **(1) Native perennial species** | *Achillea millefolium* | Western yarrow | Eagle | All except: (1) NV-Izzenhood Ranch; (2) all ID & OR sites in 2004 | Geertson Seed | 50 | 0.5 |
| | *Achillea millefolium* | Western yarrow | Great Northern | All except NV-Izzenhood Ranch | Bridger, MT PMC | 50 | 0.5 |
| | *Achnatherum hymenoides* | Indian ricegrass | Rimrock | Only NV-Izzenhood Ranch | Commercial | 25 | 4.6 |
| | *Atriplex canescens* | Fourwing saltbush | N/A | Only NV-Izzenhood Ranch | Local collection | 25 | 21.0 |
| | *Atriplex confertifolia* | Shadscale | N/A | Only NV-Izzenhood Ranch | Local collection | 25 | 18.0 |
| | *Elymus multisetus* | Big squirreltail | Sand Hollow | All | L&H Seed | 25 | 5.7 |
| | *Elymus elymoides brevifolius* | Bottlebrush squirreltail | Shaniko Plateau | All | L&H Seed | 25 | 5.7 |
| | *Elymus lanceolatus lanceolatus* | Thickspike wheatgrass | Bannock | All | Aberdeen, ID PMC | 25 | 8.1 |
| | *Elymus lanceolatus lanceolatus* | Thickspike wheatgrass | Critana | All | Bridger, MT PMC | 25 | 8.1 |
| | *Elymus wawawaiensis* | Snake River wheatgrass | Secar | All | L&H Seed | 25 | 7.8 |
| | *Elymus wawawaiensis* | Snake River wheatgrass | SERDP (KBJ) | All | ARS, Logan, UT | 25 | 7.8 |
| | *Krascheninnikovia lanata* | Winterfat | N/A | Only NV-Izzenhood Ranch | Local collection | 25 | 8.9 |

| Plant type | Latin name | Common name | Accession name | Sites seeded | Seed source | Seeding rate | |
|---|---|---|---|---|---|---|---|
| | | | | | | number PLS $ft^{-1}$ | lbs PLS $acre^{-1}$ |
| | *Leymus cinereus* | Basin wildrye | Magnar | All except NV-Izzenhood Ranch | Aberdeen, ID PMC | 25 | 8.4 |
| | *Leymus cinereus* | Basin wildrye | Trailhead | All except NV-Izzenhood Ranch | Bridger, MT PMC | 25 | 8.4 |
| | *Poa secunda secunda* | Sandberg bluegrass | Hanford | All | L&H Seed | 50 | 2.4 |
| | *Poa secunda secunda* | Sandberg bluegrass | High Plains | All | Bridger, MT PMC | 50 | 2.4 |
| | *Poa secunda secunda* | Sandberg bluegrass | Mountain Home | All | Rainier Seed | 50 | 2.4 |
| | *Poa secunda ampla* | Sandberg bluegrass | Sherman | All | Pullman, WA PMC | 50 | 2.4 |
| | *Pseudoroegneria spicata* | Bluebunch wheatgrass | Anatone | All | SW Seed | 25 | 7.8 |
| | *Pseudoroegneria spicata* | Bluebunch wheatgrass | Columbia | All | Logan, UT ARS | 25 | 7.8 |
| | *Pseudoroegneria spicata* | Bluebunch wheatgrass | Goldar | All | Aberdeen, ID PMC | 25 | 7.8 |
| | *Pseudoroegneria spicata* | Bluebunch wheatgrass | P-7 | All | Landmark Seed | 25 | 7.8 |
| | *Sphaeralcea coccinea* | Scarlet globemallow | UTDWR Source | All | UTDWR, Ephraim, UT | 25 | 2.9 |
| | *Achnatherum thurberianum* | Thurber's needlegrass | Orchard | Only Idaho and Oregon sites in 2004 | USFS Shrub Lab, Boise, ID | 25 | 4.8 |
| **(2) Comparison Standards** | *Agropyron cristatum X desertorum* | Crested wheatgrass | CD-II | All | Aberdeen, ID PMC | 25 | 6.6 |
| | *Agropyron fragile* | Siberian wheatgrass | Vavilov | All | Aberdeen, ID PMC | 25 | 6.8 |

| Plant type | Latin name | Common name | Accession name | Sites seeded | Seed source | Seeding rate | |
|---|---|---|---|---|---|---|---|
| | | | | | | number PLS $ft^{-1}$ | lbs PLS $acre^{-1}$ |
| **(3) Hybrid Small Grains** | *Triticum X Elytrigia* | Hybrid wheat | Regreen | All | Rainier Seed | 25 | 91 |
| | *Triticum X Secale* | Triticale | Pioneer | All | Granite Seed | 25 | 91 |
| | | Triticale | Stani | All | Granite Seed | 25 | 91 |
| | *Secale montanum* | Mountain rye | Common | All | Stevenson Seed | 25 | 60.5 |

**Experiment 2 – Competitive Interactions Trials** involved small replicated plots (1.5 x 2.5 meter) which were broadcast-seeded by hand in the fall of 2003 and of 2004 (**Table 2.3**). Seed for this Experiment was purchased from seed companies or supplied by NRCS, ARS, or the FS. Species and accessions utilized in Experiment 2 are listed in **Table 2.4**. Additional details on plot treatments, experimental design, seeding rates, and seed mixtures for Experiment 2 are discussed in Chapters 6 and 7.

**Table 2.3.** Seeding dates for Experiment 2 at each study site.

| State | Study site | 2003 seeding dates | 2004 seeding dates |
|---|---|---|---|
| Idaho | Canyon Creek | November 18-20 | November 17-19 |
| | Cinder Cone Butte | November 18-20 | November 17-19 |
| Nevada | Eden Valley | October 26-27 | November 1-2 |
| | Izzenhood Ranch | October 28-29 | November 3-4 |
| Oregon | Lincoln Bench | November 20-22 | November 15-17 |
| | Succor Creek | November 20-22 | November 15-17 |
| Utah | Simpson Springs | November 1-15 | November 1-15 |
| | Vernon Hills | November 1-15 | November 1-15 |

**Table 2.4.** Species and accessions of plant materials used in Experiment 2 seedings.

| Plant type | Latin name | Common name | Accession name | Seed source | Site seeded |
|---|---|---|---|---|---|
| Native perennial species | *Achillea millefolium* | Western yarrow | Great Northern | Bridger, MT PMC | All |
| | *Artemesia tridentata* ssp. *wyomingensis* | Wyoming big sagebrush | N/A | Local collections for each site | All |
| | *Elymus multisetus* | Big squirreltail | Sand Hollow | L&H Seed | All |
| | *Poa secunda secunda* | Sandberg bluegrass | High Plains | Bridger, MT PMC | All |
| | *Pseudoroegneria spicata* | Bluebunch wheatgrass | Anatone | SW Seed | All |
| | *Sphaeralcea coccinea* | Scarlet globemallow | UTDWR Source | UTDWR, Ephraim, UT | All |
| | *Agropyron fragile* | Siberian wheatgrass | Vavilov | Aberdeen, ID PMC | All |
| Primary weed | *Bromus tectorum* | Cheatgrass | N/A | Local collections for each site | All |
| Secondary weed | *Centaurea virgata* | Squarrose knapweed | N/A | Local collections for each site | UT-Simpson Spring |
| | *Lygodesmia juncea* | Skeletonweed | N/A | Local collections for each site | ID-Cinder Cone Butte |
| | *Taeniatherum caput-medusae* | Medusahead | N/A | Local collections for each site | ID-Canyon Creek OR-Lincoln |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Bench |

**Experiment 3 – Restoration Strategies Trials** involved the seeding of mixtures on large scale plots (approximately 10 acres each). Because of limited available funding, this experiment was conducted at only one site: Bedell Flats, located northeast of Reno NV. The site receives 8-10 inches mean annual precipitation and has sandy loam to loamy sand soils, 100-110 frost free days, and elevation of 4,500 – 5,500 feet. Approximately 150 acres were seeded. It was intended that the species that were most successful in Experiment 1 would be selected for use in Experiment 3. Three plots were seeded with a cover crop of winter triticale on October 30-31, 2004. The perennial seed mixes were planted November 3-8, 2005. Seed for this experiment were purchased from seed companies except as noted. Indian ricegrass was added to the mixture because Indian ricegrass was a natural species on the area being planted. Two seeding mixes were planted. Species and accessions for each mix utilized in Experiment 3 are listed in **Table 2.5**.

**Table 2.5.** Species and accessions of plant materials used in Experiment 3 seedings.

| Seed mix | Latin name | Common name | Accession name | Seed source | Seeding rate (lbs PLS acre$^{-1}$) |
|---|---|---|---|---|---|
| 1 | *Achnatherum hymenoides* | Indian ricegrass | Nezpar | Aberdeen, ID PMC | 1.5 |
| | *Elymus elymoides brevifolius* | Bottlebrush squirreltail | Shaniko Plateau | L&H Seed | 0.6 |
| | *Elymus lanceolatus lanceolatus* | Thickspike wheatgrass | Bannock | Cedera Seed | 1.26 |
| | *Leymus cinereus* | Basin wildrye | Magnar | Wind River Seed | 1.05 |
| | *Poa secunda* ssp. *ampla* | Sandberg bluegrass | Sherman | Wind River Seed | 0.4 |
| | *Pseudoroegneria spicata* | Bluebunch wheatgrass | Anatone | Wind River Seed | 1.4 |
| 2 | * *Achillea millefolium* | Western yarrow | Eagle | Geertson Seed | 0.02 |
| | * *Artemesia tridentata* ssp *wyomingensis* | Wyoming big sagebrush | N/A | Local collection | 0.02 |
| | *Elymus multisetus* | Big squirreltail | Sand Hollow | Cedera Seed | 1.2 |
| | *Poa secunda secunda* | Sandberg bluegrass | High Plains | Bridger, MT PMC | 0.4 |
| | *Pseudoroegneria spicata* | Bluebunch wheatgrass | Anatone | Wind River Seed | 3.5 |
| | *Sphaeralcea coccinea* | Scarlet globemallow | UTDWR Source | UTDWR, Ephraim, UT | 0.1 |

NOTE: * Yarrow and sagebrush were broadcast seeded in alternate rows with Seed Mix #2

## TRUAX DRILL MODIFICATIONS

The cooperators of the IFAFS "Integrating Weed Control and Restoration on Great Basin Rangelands" Project chose to use the Truax Rough Rider Rangeland Drill to seed Experiment 1 and Experiment 3 because the drill was considered the best available technology for rangeland seedings.

Personnel from the USDA-NRCS Aberdeen 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 modifications to the drill could be completed. Due to safety issues identified by the 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:

- Replaced accordion style drop tubes with smooth, clear tubes to facilitate seed flow from the seed box (**Photo 2.1**)
- 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

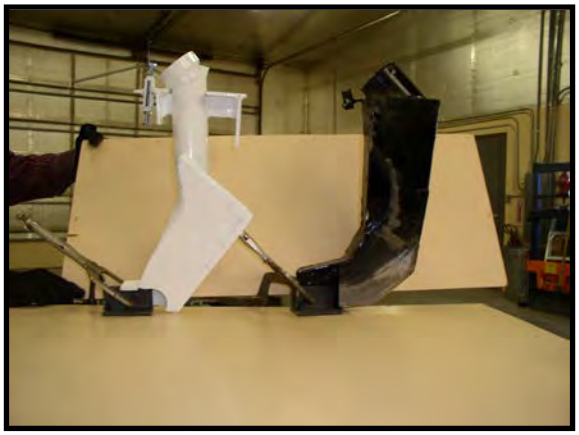


**Photo 2.1.** Re-designed seed drop tubes and boots (white boot) for a smoother flow of seed from the seed box to the soil.

On October 19, 2003 PMC personnel transported the drill to the Canyon Creek site in Idaho to begin seeding Experiment 1. Due to the time constraints imposed by the recall of the drill in August, PMC personnel did not have a chance to fully field 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 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 in the soil

**Photo 2.2.** Wider disc opening in the soil for seed to drop into and press wheel adjustment to better cover seeds with soil behind disc openers.

wide enough for seed to enter slot. 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 much 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 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 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) (**Photo 2.2**)
- Added flute adjustment crank wheel to improve adjustment of calibration (**Photo 2.3**)
- Constructed side load trailer ramps on 35 foot PMC trailer in order to haul both the drill and tractor (now supplied by PMC) 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

**Photo 2.3.** Addition of a crank wheel to improve accuracy and ease of calibration.

**Photo 2.4.** Addition of windshields to reduce seed loss during windy conditions.

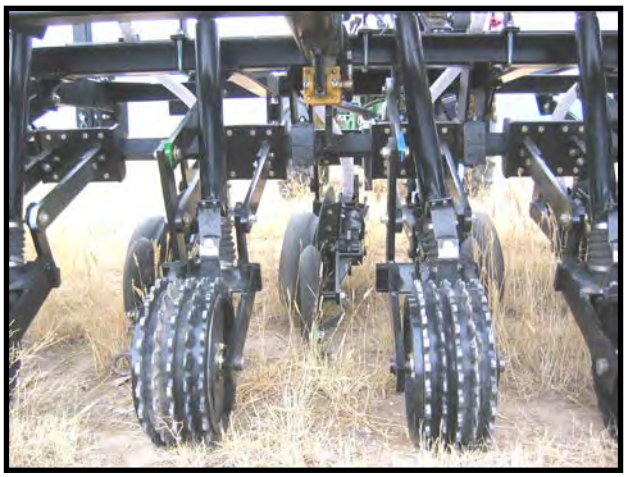


**Photo 2.5.** Addition of broadcast seeders to alternate rows of drilled and broadcast seeds to facilitate planting shallow-seeded species and deep-seeded species in a single operation.

improved the efficiency of the project. A cover crop (triticale) was seeded on the Experiment 3 site in early November. The additional drill 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 new drill. Additional modifications included:

- Windshields added around seed cup drops to reduce seed loss during windy conditions (**Photo 2.4**)
- Broadcast seeders added to alternate rows to facilitate planting shallow seeded species as well as deeper seeded species in a single operation (**Photo 2.5**)
- 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 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 in Nevada.

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 Rough Rider Rangeland Drill. The Truax drill is a significant improvement over the older rangeland drills which had very poor control of seeding depth.

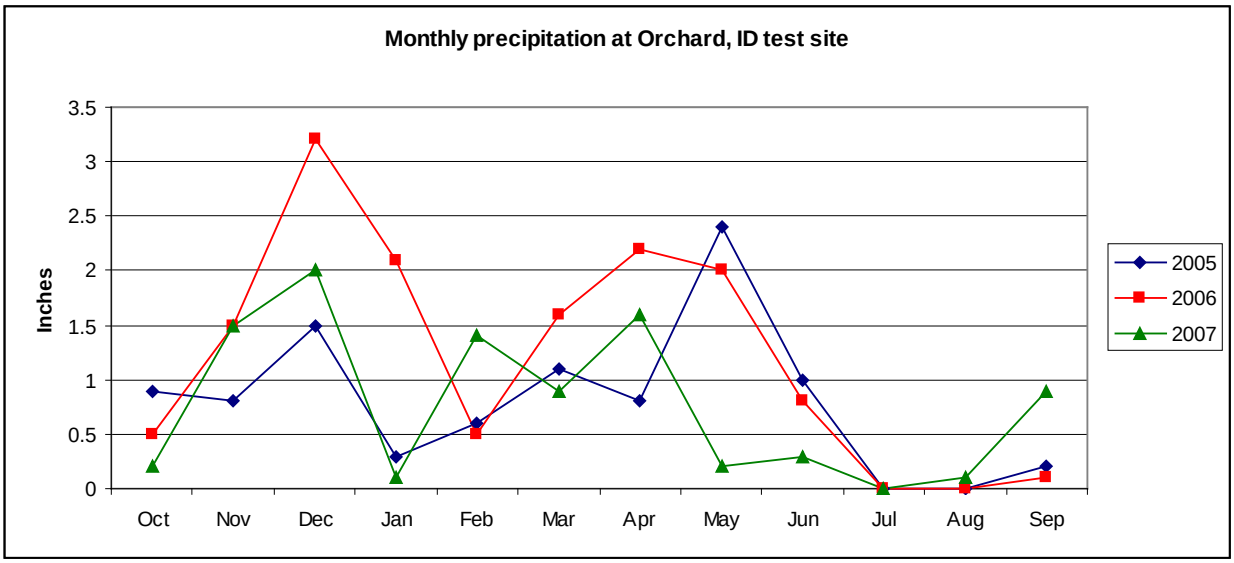
The cooperators of the IFAFS project thank Mr. Jim Truax for providing the drill for the project and his willingness to work with the project to make improvements to the drill. The excellent cooperation will undoubtedly pay great dividends in future rangeland seeding projects throughout the western United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

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

Orchard test site on May 16, 2007.



**Materials and Methods**

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

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

The first evaluation of the plots for initial establishment was conducted on April 27, 2005 using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40X41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The first grid was laid on the rows approximately two grid lengths (80 inches) into the plot. Counts were made of the cells that contained at least one plant. Grids were subsequently flipped and evaluated three more times giving a total of 80 evaluated cells. Total area for one grid is approximately 1m². Total area evaluated is therefore approximately 4m². A conservative estimate of plant density (plants/m²) is the total number of cells containing at least one plant divided by four. The second evaluation occurred on May 25, 2005. The 2006 evaluation was conducted on May 31, and the 2007 evaluation took place on May 16. The methods followed in 2006 and 2007 were the same as described above; however, the frame was evaluated five times for a total of 100 cells or $5m^2$. Total counts were then divided by five for approximate plants/$m^2$. Numbers for approximate plants/$m^2$ were then divided by 10.8 to calculate approximate plants/$ft^2$. It is important to note that because cells with plants were counted and not number of plants per cell, the best possible score is 100 hits per five frames which converts to 20 plants/$m^2$ or 1.85 plants/$ft^2$. Actual plant density may be higher than the numbers indicated below. All tables have been arranged with accessions ranked from highest plant density to the lowest at the time of the second evaluation in 2005. Data were not analyzed for significance.

**Native Grasses**

There were forty-seven accessions of native grasses planted. Overall the native grasses established well considering the limited amount of precipitation received over the winter and early spring of 2005. Especially good stands were seen in the bluebunch wheatgrass and Snake River wheatgrass plots during 2005. There was a marked decrease in plant density between the first and second evaluations with some notable exceptions. Seven of nine bluebunch wheatgrass

accessions and three of four Snake River wheatgrass accessions increased in density from the first evaluation to the second. This is possibly due to receiving 2.5 inches of precipitation during that period and/or from a lack of pressure by black grass bugs (*Labops* sp.). Most of the native grasses decreased steadily in density from 2005 to 2007.

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

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

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

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

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

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

Jim Creek bluebunch wheatgrass, 2007.

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

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

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

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

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

| Species | Name or accession | 4/27/05 | 5/25/05 | 5/30/06 | 5/16/07 |
|---|---|---|---|---|---|
| | | Plants/ft$^2$ | | | |
| **Indian ricegrass** | Rimrock | 0.37 | 0.20 | 0.00 | 0.00 |
| | White River | 0.56 | 0.17 | 0.00 | 0.00 |
| | Nezpar | 0.42 | 0.17 | 0.00 | 0.00 |
| | Ribstone | 0.14 | 0.09 | 0.00 | 0.00 |
| | Paloma | 0.05 | 0.00 | 0.00 | 0.00 |
| **Squirreltail** | Fish Creek | 0.97 | 0.54 | 0.26 | 0.22 |
| | Sand Hollow | 0.37 | 0.20 | 0.19 | 0.20 |
| | Shaniko Plateau | 0.81 | 0.52 | 0.06 | 0.09 |
| | Toe Jam Creek | 0.58 | 0.17 | 0.00 | 0.00 |
| | 9019219 | 0.02 | 0.02 | 0.00 | 0.00 |
| **Thickspike wheatgrass** | Bannock | 1.04 | 1.07 | 0.58 | 0.43 |
| | Schwendimar | 0.69 | 0.52 | 0.39 | 0.24 |
| | Critana | 0.90 | 0.56 | 0.24 | 0.17 |
| | Sodar | 0.37 | 0.30 | 0.15 | 0.07 |
| **Slender wheatgrass** | Revenue | 1.00 | 0.93 | 0.00 | 0.00 |
| | San Luis | 0.60 | 0.69 | 0.00 | 0.00 |
| | Pryor | 0.30 | 0.30 | 0.02 | 0.00 |
| **Western wheatgrass** | Rodan | 0.28 | 0.35 | 0.13 | 0.00 |
| | Rosana | 0.05 | 0.20 | 0.04 | 0.00 |
| | Arriba | 0.16 | 0.15 | 0.06 | 0.00 |
| **Bluebunch wheatgrass** | Jim Creek | 0.83 | 1.02 | 1.02 | 1.07 |
| | Wahluke | 0.97 | 1.26 | 1.02 | 0.98 |
| | P-12 | 1.34 | 1.59 | 1.04 | 0.89 |
| | Columbia | 1.30 | 1.23 | 0.84 | 0.83 |
| | Anatone | 0.81 | 1.15 | 0.80 | 0.69 |
| | P-7 | 0.93 | 1.15 | 0.67 | 0.57 |
| | P-15 | 0.60 | 0.93 | 0.54 | 0.50 |
| | Goldar | 0.51 | 0.37 | 0.33 | 0.19 |
| | P-5 | 0.42 | 0.61 | 0.22 | 0.13 |
| **Snake River wheatgrass** | SERDP | 1.02 | 0.94 | 0.67 | 0.70 |
| | Secar | 1.00 | 1.11 | 0.76 | 0.56 |
| | Expedition | 1.27 | 1.44 | 0.54 | 0.41 |
| | E-26 | 0.21 | 0.23 | 0.22 | 0.13 |
| **Basin wildrye** | Trailhead | 0.60 | 0.52 | 0.26 | 0.17 |
| | U100-01 | 0.53 | 0.41 | 0.11 | 0.13 |
| | U108-02 | 0.56 | 0.57 | 0.24 | 0.11 |
| | Washoe | 0.21 | 0.09 | 0.09 | 0.06 |
| | Magnar | 0.28 | 0.22 | 0.04 | 0.04 |
| | U70-01 | 0.30 | 0.22 | 0.02 | 0.02 |
| **Sheep fescue** | Covar | 0.16 | 0.00 | 0.07 | 0.07 |
| | Initial Point | 0.21 | 0.04 | 0.02 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| **Thurber's needlegrass** | Thurber's | 0.00 | 0.00 | 0.00 | 0.00 |
| **Sandberg bluegrass** | High Plains | 0.25 | 0.00 | 0.54 | 0.00 |
| | Sherman | 0.00 | 0.00 | 0.02 | 0.00 |
| | Mountain Home | 0.00 | 0.00 | 0.35 | 0.00 |
| | Toole County, MT | 0.00 | 0.00 | 0.04 | 0.00 |
| | Hanford Source | 0.00 | 0.00 | 0.19 | 0.00 |

## Introduced Grasses

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

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

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

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

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

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

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

| Species | Name or accession | 4/27/05 | 5/25/05 | 5/30/06 | 5/16/07 |
|---|---|---|---|---|---|
| | | ----------Plants/$ft^2$---------- | | | |
| **Crested wheatgrass** | Nordan | 1.30 | 1.19 | 1.10 | 0.67 |
| | Roadcrest | 1.30 | 0.07 | 0.52 | 0.19 |

| | | | | | |
|---|---|---|---|---|---|
| | Hycrest | 0.39 | 0.24 | 0.15 | 0.07 |
| | Ephraim | 0.65 | 0.28 | 1.23 | 0.02 |
| | CD-II | 0.56 | 0.24 | 0.20 | 0.00 |
| | Douglas | 0.28 | 0.04 | 0.09 | 0.00 |
| **Siberian wheatgrass** | Vavilov | 0.65 | 0.20 | 0.61 | 0.26 |
| | P-27 | 0.09 | 0.02 | 0.33 | 0.00 |
| **Pubescent wheatgrass** | Manska | 0.69 | 0.65 | 0.28 | 0.13 |
| | Greenleaf | 0.60 | 0.59 | 0.15 | 0.09 |
| | Luna | 0.79 | 0.54 | 0.13 | 0.00 |
| **Intermediate wheatgrass** | Rush | 0.60 | 0.56 | 0.00 | 0.00 |
| | Pearl | 0.35 | 0.15 | 0.02 | 0.04 |
| **Altai wildrye** | Prairieland | 0.56 | 0.39 | 0.00 | 0.00 |
| | Eejay | 0.16 | 0.28 | 0.00 | 0.00 |
| **Russian wildrye** | Bozoisky Select | 0.72 | 0.54 | 0.58 | 0.35 |
| | Syn-A (Bozoisky II) | 0.21 | 0.13 | 0.24 | 0.26 |
| | Mankota | 0.46 | 0.28 | 0.32 | 0.19 |
| | Tetracan | 0.42 | 0.20 | 0.17 | 0.07 |

## Forbs and Shrubs

Stand of Eagle yarrow, May 2007.

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

| Species | Name or accession | 4/27/05 | 5/25/05 | 5/30/06 | 5/16/07 |
|---|---|---|---|---|---|
| | | ----------Plants/ft$^2$---------- | | | |
| **Western yarrow** | Eagle | 0.51 | 0.50 | 0.07 | 0.24 |
| | Great Northern | 0.19 | 0.09 | 0.00 | 0.00 |
| **Utah sweetvetch** | Timp | 0.14 | 0.02 | 0.00 | 0.00 |
| **Firecracker penstemon** | Richfield Selection | 0.02 | 0.02 | 0.00 | 0.00 |
| **Scarlet globemallow** | | 0.00 | 0.00 | 0.00 | 0.00 |
| **Lewis flax** | Maple Grove | 0.42 | 0.15 | 0.00 | 0.00 |
| **Blue flax** | Appar | 0.90 | 0.26 | 0.00 | 0.00 |
| **Wyoming big sagebrush** | | 0.02 | 0.02 | 0.00 | 0.00 |
| **Fourwing saltbush** | Snake River Plains | 0.00 | 0.00 | 0.00 | 0.02 |
| | Wytana | 0.00 | 0.00 | 0.00 | 0.00 |
| | Rincon | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| **Gardner's saltbush** | 9016134 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Winterfat** | Hatch | 0.28 | 0.17 | 0.00 | 0.00 |
| | Northern Cold Desert | 0.00 | 0.00 | 0.00 | 0.00 |
| | Open Range | 0.00 | 0.00 | 0.00 | 0.00 |
| **Forage kochia** | Immigrant | 0.00 | 0.00 | 0.00 | 0.00 |

## Cover Crop

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

## Discussion

Despite large amounts of Russian thistle, native and introduced grasses had fair to good emergence and plant density during the establishment year. Germination and emergence might have 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 and again into 2007. The low precipitation at the site, especially the lack of moisture in July and August every year seems to have eliminated many of the less drought tolerant accessions. One concern is the effect of black grass bugs on the introduced grasses. Plants subjected to black grass bug are normally affected by decreased seed yield and a reduction in palatability. Infestations rarely result in the death of established plants, but in low water years establishing plants may be under enough stress to kill the establishing seedlings (Hammon and Peairs 2001). The second evaluation in 2005 indicated a loss in plant densities; however it appears that many of the plants survived, although stunted, through 2006. In 2007 many more plants had died out leaving poor or no stands in many plots. Snake River and blue bunch wheatgrass had consistently good stands from essentially all accessions. Introduced species like crested wheatgrass and Russian wildrye also had good performers such as Nordan and Bozoisky select.

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

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**Coffee Point Off-Center Evaluation (2006 planting)**
**2007 Progress Report**
**Derek J. Tilley**
**Natural Resources Conservation Service**
**Plant Materials Center**
**Aberdeen, Idaho**

## INTRODUCTION

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

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

## MATERIALS AND METHODS

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

The seed bed was prepared with chemical treatments of 16 oz 2,4-D and 64 oz Roundup per acre applied on May 2, 2005, August 1, 2005 and May 17, 2006. The site was disked on August 3, 2006. The trial was planted on November 20, 2006 with a modified Tye Drill with a width of 80 inches (8 spouts at 10” spacing). Experimental design was a randomized complete block with 4 replications. Each plot was one drill width wide (80 in) and 20 ft long. Species were arranged into blocks with the exception of introduced grasses, forbs and shrubs making up one block each. Seeding depths were dependent on species and were planted according to Ogle et al (2006). Species were seeded at a target rate of 20 to 30 pure live seeds (PLS) per ft² for large seeded species (<500,000 seeds per pound) and 40 to 50 PLS/ft² for smaller seeded species (>500,000 seeds/lb). PLS was determined by seed lab results or, when lab results were not available, PLS was estimated visually or the PLS from other accessions were averaged. All seed was mixed with rice hulls as an inert carrier for better seed flow according to St. John et al (2005) with the exception of fourwing and Gardener’s saltbush. A cover crop of 50% Anatone bluebunch wheatgrass, 20% Bannock thickspike wheatgrass, 20% Magnar basin wildrye and 10% Snake River Plains fourwing saltbush was planted in the prepared areas surrounding the trial.

Plot evaluations were conducted on April 30 and May 1, 2007 and again on September 7, 2007 using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40X41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The first grid was laid on the rows approximately 1 ft into the plot. Counts were made of the cells that contained at least one plant. Grids were subsequently advanced one grid length in the plot and evaluated four more times giving a total of 100 evaluated cells. All tables have been arranged with accessions ranked from highest plant density to the lowest at the time of the first evaluation. Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$. If significance was detected, means were separated using a Tukey HSD all pairwise comparison.

ZEBA

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

**Table 1**

| Species | Accession | Seed source |
|---|---|---|
| **Basin wildrye** | Trailhead | MTPMC |
| | Washoe | MTPMC |
| | Topinish | Benson Seed Farm |
| | Jim Creek | Benson Seed Farm |
| | Gund | UNR |
| | Magnar | IDPMC |
| | L-45 | ARS |
| | L-46 | ARS |
| **Sandberg bluegrass** | High Plains | MTPMC |
| | Mountain Home | FS |
| | Duffy Creek | Benson Seed Farm |
| | Wallowa | Benson Seed Farm |
| | 9081633 | MTPMC |
| **Bluebunch wheatgrass** | P-7 | ARS |
| | P-32 | ARS |
| | Wahluke | Benson Seed Farm |
| | 9081636 | MTPMC |
| | Anatone | IDPMC |
| | Goldar | IDPMC |
| | P-19 | ARS |
| | P-24 | ARS |
| | P-22 | ARS |
| | P-27 | ARS |

| | | |
|---|---|---|
| **Snake River wheatgrass** | SERDP | ARS |
| | E-45 | ARS |
| | E-46 | ARS |
| | E-51 | ARS |
| **Thickspike wheatgrass** | Critana | MTPMC |
| | Bannock | IDPMC |
| | Sodar | IDPMC |
| **Western wheatgrass** | Rosana | MTPMC |
| | 9081630 | MTPMC |
| | 9076517 | DOD/ARS |
| **Slender wheatgrass** | Pryor | MTPMC |
| | 9076516 | DOD/ARS |
| | Copperhead | MTPMC |
| **Bottlebrush squirreltail** | 9019219 | MTPMC |
| | Toe Jam Creek | ARS |
| **Shrubs** | Wytana fourwing saltbush | MTPMC |
| | SRP fourwing saltbush | IDPMC |
| | 9016134 Gardner saltbush | MTPMC |
| | N. Cold Desert winterfat | IDPMC |
| | Open Range winterfat | MTPMC |
| | Wyoming big sagebrush | BLM |
| **Forbs** | Great Northern w. yarrow | MTPMC |
| | Eagle w. yarrow | Geertson |
| | Antelope P. clover | MTPMC |
| | Stillwater coneflower | MTPMC |
| | 9081632 Phacleia | MTPMC |
| | Old works penstemon | MTPMC |
| | Cedar penstemon | NMPMC |
| | Maple Grove flax | IDPMC |
| | Richfield penstemon | IDPMC |
| **Intro. Grasses** | Bozoisky Russian wildrye | ARS |
| | Bozoisky II | ARS |
| | Vavilov Siberian wheatgrass | ARS |
| | Vavilov II | ARS |
| | Mustang Altai wildrye | ARS |
| **ZEBA** | Nezpar Indian ricegrass | IDPMC |
| | Magnar | IDPMC |
| | Goldar | IDPMC |
| | Appar blue flax | IDPMC |

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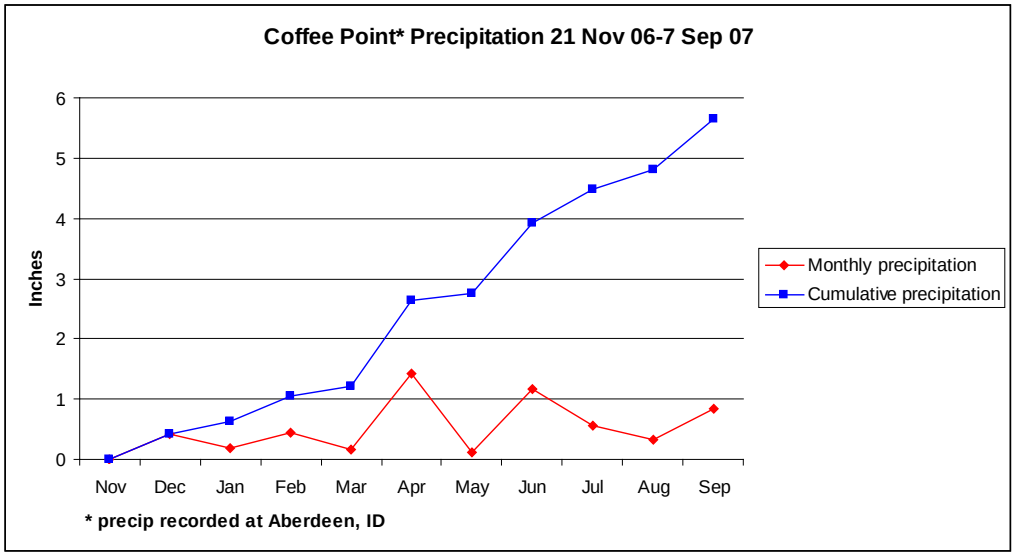
RESULTS

At the time of the first evaluation in the spring of 2007, there was major crusting of the soil surface to about 0.5 in depth. Soil moisture conditions below the soil crust were good and most species had managed to break through the crust or had germinated inside the cracks in the soil. Most species had reached 1 to 4 true leaves by the first evaluation. Weed control from the

chemical and mechanical treatments was excellent. Young plants of prickly lettuce (*Lactuca serriola*), white-stem blazing star (*Mentzelia albicaulus)*, flixweed (*Descurainia sophia*), lupine (*Lupinus* sp.), tumble mustard (*Sisymbrium altissimum*) and Russian thistle (*Salsola* kali) were common throughout the test site, but were not in such numbers as would present a problem with competition.




Rainfall during the establishment year was lower than normal. In the 2007 water year, less than 6 inches of precipitation accumulated at Aberdeen. Spring rains in April helped establishment, but sparse summer rains caused many germinants to die by September.

## SPECIES DISCUSSION

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

Basin wildrye

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

[a]Not significant at $p<0.05$

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

Sandberg bluegrass

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

[a]Not significant at p<0.05

In the bluebunch wheatgrass trial no significance was detected between density means for the spring or fall evaluation. Plant densities in the spring ranged from 0.1 plant/ ft² to 0.37 plants/ft². The top performer was P-19, a test accession from the ARS (0.37 plants/ft ²). Plant densities generally stayed the same between the spring and fall evaluations indicating good adaptability of the species to the site conditions.

Bluebunch wheatgrass

| | | Density (plants/ft ²) | |
|---|---|---|---|
| Accession | % PLS | 5/07 | 9/07 |
| P-19 | 92.9 | 0.37[a] | 0.37 [a] |
| Anatone | 88.1 | 0.33 | 0.29 |
| P-24 | 91.2 | 0.28 | 0.28 |
| 9081636 | 92.0 | 0.27 | 0.17 |
| P-22 | 85.3 | 0.24 | 0.28 |
| Wahluke | 87.3 | 0.24 | 0.25 |
| Goldar | 90.6 | 0.13 | 0.13 |
| P-27 | 87.4 | 0.11 | 0.09 |
| P-7 | 89.4 | 0.11 | 0.12 |
| P-32 | 86.5 | 0.01 | 0.12 |

[a]Not significant at p<0.05

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

Snake River wheatgrass

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

[a]Not significant at $p<0.05$

Thickspike and streambank wheatgrass exhibited good drought tolerance and seedling vigor with spring plant densities between 0.84 and 0.98 plants/ft². No significant differences were detected between means. Densities remained high through the fall evaluation, with all accessions having densities between 0.66 and 0.78 plants/ft².

Thickspike and streambank wheatgrass

| Accession | % PLS | Density (plants/ft²) 5/07 | 9/07 |
|---|---|---|---|
| Sodar | 96.5 | 0.98[a] | 0.78 [a] |
| Critana | 90.0 | 0.86 | 0.67 |
| Bannock | 94.3 | 0.84 | 0.66 |

[a]Not significant at $p<0.05$

Western wheatgrass is typically recommended for use in sites receiving 12 inches or more annual precipitation and is not well adapted to the conditions faced at Coffee Point. Although some plants did germinate from each of the accessions tested. Densities were very low, 0.03 to 0.05 plants/m² in the spring and slightly lower in the fall.

Western wheatgrass

| Accession | % PLS | Density (plants/ft²) 5/07 | 9/07 |
|---|---|---|---|
| Rosanna | 90.0 | 0.05[a] | 0.02 [a] |
| 9076517 | 90.0 | 0.03 | 0.03 |
| 9081630 | 85.0 | 0.03 | 0.03 |

[a]Not significant at $p<0.05$

Among the slender wheatgrass accessions, 9076516 slender wheatgrass from the Department of Defense and ARS had significantly greater plant densities than Copperhead from the MT PMC. 9076516 was developed for superior traits in germination and establishment for use on Army training grounds. The other tested accession, Pryor did not differ significantly in establishment from of the other accessions. At the fall evaluation, the ranking remained constant, although densities decreased for all accessions.

Slender wheatgrass

| Accession | % PLS | Density (plants/ft²) 5/07 | 9/07 |
|---|---|---|---|
| 9076516 | 90.0 | 0.53 a | 0.37 a |
| Pryor | 95.9 | 0.46 ab | 0.30 ab |
| Copperhead | 85.0 | 0.23 b | 0.08 b |
| Critical value (0.05) | | 0.28 | 0.28 |

In the bottlebrush squirreltail trial, accession 9019219, test material from the MT PMC had a density of 0.65 plants/ft² and was significantly greater than the plant density of Toe Jam Creek (0.20 plants/ft²). Fall densities remained essentially the same as spring. Accession 9019219 is likely the subspecies *elymoides* and is currently being tested by the Bridger PMC in Montana, while Toe Jam Creek is subspecies c*alifornicus* and was collected in a higher precipitation area near Elko, Nevada.

Bottlebrush squirreltail

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

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

Shrubs

| Accession | % PLS | Density (plants/ft²) 5/07 | 9/07 |
|---|---|---|---|
| Snake River Plains 4-wing | 44.5 | 0.17[a] | 0.13 ab |
| Gardener's saltbush, 9016134 | 30.0 | 0.15 | 0.19 a |
| Open Range winterfat | 80.8 | 0.02 | 0.04 bc |
| Wytana 4-wing | 45.0 | 0.01 | 0.00 c |
| Northern Cold Desert winterfat | 85.2 | 0.00 | 0.00 c |
| Wyoming big sagebrush | 21.3 | 0.00 | 0.01 bc |
| [a]Not significant at p<0.05 | | | 0.13 |

In the forb trial, only Maple Grove Lewis flax and the test accession of Phacelia, 9081632, from the MT PMC had fair establishment. Maple Grove had a plant density of 0.45 plants/ft² and was significantly greater than all other accessions with the exception of Phacelia which had a density of 0.28 plants/m². All other accessions had essentially zero plants emerge. In the fall, Maple Grove continued to have the best density (0.20 plants/ft²). Most of the Phacelia plants had died

by the fall evaluation, and Cedar penstemon had an increase in density, from 0.00 to 0.06 plants/ft².

Forbs

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

As a group, the introduced grasses outperformed all others with regard to establishment densities. All performed well with the lowest density coming from Bozoisky II Russian wildrye with a density of 0.54 plants/ft². The best density was achieved by Vavilov II, a new release of Siberian wheatgrass from the ARS, DOD and NRCS which had 1.48 plants/ft². Fall densities were generally slightly lower than in the spring, but all accessions maintained good plant densities. Vavilov II again had a significantly higher density than all other accessions (1.46 plants/ft²).

Introduced grasses

| Accession | % PLS | Density (plants/ft²) 5/07 | 9/07 |
|---|---|---|---|
| Vavilov II Siberian | 90.0 | 1.48 a | 1.46 a |
| Vavilov Siberian | 90.0 | 0.74 b | 0.68 b |
| Mustang Altai wildrye | 90.0 | 0.75 b | 0.58 b |
| Bozoisky Select Russian | 90.7 | 0.70 b | 0.65 b |
| Bozoisky II | 90.0 | 0.54 b | 0.59 b |
| Critical value (0.05) | | 3.70 | 0.42 |

## Zeba Initial Evaluation

We also included one plot each of Magnar, Goldar, Appar and Nezpar which were treated with Zeba® moisture retention seed coating. Because there was only one plot of each these could not be analyzed statistically and only general observations can be made. The treated Magnar seed had a mean density of 0.71 plants/ft² as compared with 0.15 plants/ft² achieved in the untreated plots. Likewise, the treated goldar plot had an average plant density of 0.43 plants/ft² while the untreated plots averaged only 0.13 plants/ft². Appar and Nezpar were not included in the main trial, so a comparison cannot be made, however, the results achieved with Magnar and Goldar are favorable. Further examinations could determine more accurately the benefits and costs of using the Zeba® product. In the fall evaluation, all densities had decreased with the exception of Nezpar which increased from 0.90 to 0.15 plants/ft².

Zeba®

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

[a] Means not separated

The plots will continue to be evaluated in future years. In 2008, the grass plots will be sampled for air-dry forage yield in addition to evaluation of plant density.

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| 34’ | 20’ | | | | 14’ | | | | | 34’ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Trailhead | Washoe | Jim crk | Magnar | 1. | Rosanna | 9076517 | 9081630 | Rosanna | 1. |
| 2. | Washoe | Jim crk | Topinish | L-45 | 2. | 9081630 | Rosanna | Rosanna | 9076517 | 2. |
| 3. | Topinish | Gund | Trailhead | Washoe | 3. | 9076517 | 9081630 | 9076517 | 9081630 | 3. |
| 4. | Jim crk | L-45 | L-46 | Topinish | 4. | Pryor | Pryor | 9076516 | Copper | 4. |
| 5. | Gund | Magnar | Washoe | L-46 | 5. | 9076516 | Copper | Copper | Pryor | 5. |
| 6. | Maganr | Trailhead | Gund | Jim crk | 6. | Copper | 9076516 | Pryor | 9076516 | 6. |
| 7. | L-45 | L-46 | L-45 | Gund | 7. | 9019219 | Toe jam | 9019219 | Toe jam | 7. |
| 8. | L-46 | Topinish | Magnar | Trailhead | 8. | Toe jam | 9019219 | Toe jam | 9019219 | 8. |
| 9. | High plains | Mt home | Wallowa | Duffy | 9. | Wytana | SRP | Gardner’s | Open range | 9. |
| 10. | Mt home | Wallowa | Duffy | High plains | 10. | SRP | Gardner’s | WY sage | NCD | 10. |
| 11. | Duffy | 9081633 | High plains | 9081633 | 11. | Gardner’s | Open range | NCD | WY sage | 11. |
| 12. | Wallowa | Duffy | 9081633 | Mt home | 12. | NCD | Wytana | Open range | Gardner’s | 12. |
| 13. | 9081633 | High plains | Mt home | Wallowa | 13. | Open range | WY sage | SRP | Wytana | 13. |
| 14. | p-7 | p-32 | Goldar | Anatone | 14. | WY sage | NCD | Wytana | SRP | 14. |
| 15. | p-32 | 9081636 | p-27 | Goldar | 15. | Great northern | Eagle | Old works | Stillwater | 15. |
| 16. | Wahluke | p-7 | 9081636 | p-32 | 16. | Eagle | Phacelia | m. grove | Old works | 16. |
| 17. | 9081636 | p-27 | p-19 | p-22 | 17. | Antelope | Great northern | Richfield | Antelope | 17. |
| 18. | Anatone | p-24 | p-32 | p-19 | 18. | Stillwater | Cedar | Phacelia | Great northern | 18. |
| 19. | Goldar | p-22 | p-24 | Wahluke | 19. | Phacelia | M. grove | Stillwater | M. grove | 19. |
| 20. | p-19 | Goldar | Anatone | p-7 | 20. | Old works | Stillwater | Antelope | Richfield | 20. |
| 21. | p-24 | Wahluke | p-22 | p-27 | 21. | Cedar | Antelope | Great northern | Cedar | 21. |
| 22. | p-22 | p-19 | p-7 | p-24 | 22. | Maple grove | Richfield | Cedar | Eagle | 22. |
| 23. | p-27 | Anatone | Wahluke | 9081636 | 23. | Richfield | Old works | Eagle | Phacelia | 23. |
| 24. | SERDP | e-45 | e-51 | e-46 | 24. | Bozoisky | Vav II | Mustang | Vavilov | 24. |
| 25. | E-45 | e-46 | Serdp | e-51 | 25. | Boz II | Bozoisky | Vavilov | Mustang | 25. |
| 26. | E-46 | Serdp | e-45 | e-45 | 26. | Vavilov | Mustang | Vav II | Bozoisky | 26. |
| 27. | E-51 | e-51 | e-46 | SERDP | 27. | Vav II | Vavilov | Boz II | Vav II | 27. |
| 28. | Critana | Bannock | Bannock | Sodar | 28. | Mustang | Boz II | Bozoisky | Boz II | 28. |
| 29. | Bannock | Critana | Sodar | Critana | 29. | ZEBA Nezpar | ZEBA Magnar | ZEBA Goldar | ZEBA Appar | 29. |
| 30. | Sodar | sodar | critana | bannock | 30. | blank | blank | blank | blank | 30. |
| | 20’ | | | | | | | | | |

Figure 1. Plot map; Coffee Point, 2006

→ NE

# FIELD PLANTING, DEMONSTRATION AND DISTRICT SEED INCREASE EVALUATION SUMMARIES

# PLANT MATERIALS

# 2007

# IDAHO EVALUATION SUMMARIES

# FIELD, SEED INCREASE and DEMONSTRATION PLANTINGS

# IDAHO DIVISION I
# PLANT MATERIALS PLANTINGS

**FIELD OFFICE: BONNERS FERRY**

**ID99005 Paul Headings** Regar meadow brome - Field Plantings (2). Materials ordered February 22, 1999. Field 1–pure stand of Regar. Field 2-mixed stand of Regar and alfalfa. Purpose – demonstration planting to document growth patterns, production, and forage quality. Site characteristics – MLRA E43b, silt loam soils, 5-10 percent slopes, north aspect, 2300 feet elevation, 24 inch precipitation zone, non-irrigated, T62N R1E NW ¼ Section 2. FY99 planted spring 1999. FY00 due to dry years 1999 and 2000 stand establishment was slow, but excellent stands in each field are establishing. Plantings average 3 tons per acre. FY01 Planting 1 - The "pure" stand of Regar Brome planting averaged 2 ton/acre. A forage analysis indicted the crude protein to be 8.75%. The forage grass for hay is fine leaves and stems. The hay feeds well to animals. In hot dry weather, the "windrows" have to be carefully harvested and cured to avoid damaging brittle leaves and stems. The crop can be "pulverized" easily. The average bale weight was 103 pounds. The owner applied 110 lbs. 40-0-0 to enhance production and will increase application rates up to 200 lbs/acre 40-0-0. There were no second cuttings since the field was planted three years ago due to poor to fair moisture conditions. Planting 2 - The Regar/Agate alfalfa mixture established well. The first cutting has grass present and makes great cattle feed. The second cutting has very little grass within the alfalfa due to slow recovery. This may be due to dry weather conditions. Also, this may be a good attribute for the producer who can sell hay with grass and no grass. FY01 Planting 1 - The "pure" stand of Regar has an excellent stand with 5 plants per square foot, good vigor, and 4000 pounds per acre production. Landowner applied 220 lbs. 40-0-0 in early spring. Planting 2 - Regar/alfalfa mixture has a good stand with 2 Regar/5 alfalfa plants per square foot, fair to good vigor, and 7000 pounds per acre production. **FY06** The field is still in production. It has been an excellent hay crop averaging 4 tons/ac dryland over the 10 year period with one year producing 5.5 tons/ac. Landowner applies 300 pounds/ac of Nitrogen each spring. This grass needs to be managed for harvesting - cut and windrow at 50% cured. 80% cured results in loss of leaves because it is too brittle because of fine leaves. Cooperator also reports Regar also does well when planted with alfalfa, is easy to manage and he is very happy with it. **Next evaluation FY09.**

**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 FY08.**

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

**ID06007 Idaho Fish and Game** – Field planting for wildlife winter nesting habitat. Blackwell switchgrass and 905439 switchgrass seed ordered March 9, 2006. Site characteristics: Farnhampton silt loam soil, 0-2 percent slopes, south aspect, elevation 1760 feet, 24 inch precipitation, non-irrigated, T65N R2W Sections 23 and 25. FY06 Idaho Fish and Game field planting of native grasses is slow establishing. The field was mowed in 2006 for wild oats weed control. FY07 no evaluation.

**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 and FY07 no evaluation.

**FIELD OFFICE: COUER D'ALENE**
**None**

**FIELD OFFICE: PLUMMER**
**None**

**FIELD OFFICE: SANDPOINT**
**None**

# IDAHO DIVISION II
# PLANT MATERIALS PLANTINGS

**FIELD OFFICE: GRANGEVILLE**

**ID02002 Teresa Seloske** Forest Field Planting. Lind Douglas fir (30 plants) and Yakima Douglas fir (13 plants) ordered July 16, 2001. Plants delivered to FO April 3, 2002 by WAPMC. FY02 Planting completed April 6, 2002. Lind Douglas fir 10 percent survival with poor vigor. Yakima Douglas fir 15 percent survival with fair vigor. Survival effected by extremely dry conditions. FY03 very hot dry summer resulted in failure of this planting. File was cancelled at end of 2003. **FY06** field determination indicated the Yakima ecotype failed to establish, but the Lind ecotype is still alive. Lind ecotype has not grown much, but there is good survival of this ecotype during field evaluation in July 2006. **Next evaluation FY08.**

**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. **Next evaluation FY09.**

**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. **FY07** no evaluation.

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

**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 and FY07** 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. **FY07** no evaluation.

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

**ID07009 Darrel _____ Ventenata Study.** Demonstration planting seed ordered February 14, 2007. Site was prepared for planting in fall of 2006 and spring of 2007. Site was planted on May 8, 2007. **FY07** Mark Stannard visited the plots on 7/27/07. The weeds were not bad but he mowed the plots to keep the weeds from going to seed. The grasses were doing fairly well. Vavilov was the best performing grass and alfalfa, cicer milkvetch, and small burnet were also doing very well. The ground was very hard and very dry. A lot of the plants were totally dormant.

**ID07010 Debbie Hatter** – Butcher Creek woody field planting. 15 cuttings each of coyote willow and Laurel willow were ordered March 1, 2007. Shipping is scheduled for April 2 for delivery on approximately April 6th. Site characteristics MLRA B9, DeMasters-Riggins silt loam soil, 10 percent slopes, north aspect, 3200 feet elevation, 24 inch precipitation, T30N R3E SW Quarter Section 15. **FY07** cuttings shipped in early April.

**FIELD OFFICE: LEWISTON**

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

**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. **FY07** very poor stand with very poor vigor – site is dominated by yellow starthistle and annual grasses – competition from weeds and perhaps poor grazing management may have affected stand life. **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. **FY07** no evaluation.

**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. **FY07** no evaluation.

**FIELD OFFICE: NEZPERCE**

**ID05009 William Stillman** – Weed control project. Rush intermediate wheatgrass, Topar pubescent wheatgrass, Bannock thickspike wheatgrass, Paiute orchardgrass, Delar small burnet and Sherman big bluegrass seed was ordered on February 4, 2005. Site characteristics: 12 acres, MLRA B9, Jacket-Larkin silt loam soil, 20 percent slopes, south aspect, elevation 2900 feet, 23 inch precipitation, non-irrigated, T36N R1E SW ¼ section 19. **FY06** plots were broadcast seeded March 12, 2005 and trampled by cattle and sprayed with Roundup. All plots contain intermediate wheatgrass from prior planting making identification of planted wheatgrass species difficult. Scattered patches Paiute were observed. Small burnet was observed across all plots. No Sherman was observed. There is heavy competition from weeds such as yellow starthistle, medusahead and ventenata. **FY07** Delar small burnet fair stand with fair vigor; Topar pubescent wheatgrass and Paiute orchardgrass poor stand with poor vigor; Rush intermediate wheatgrass, Bannock thickspike wheatgrass and Sherman big bluegrass very poor stand with very poor vigor. Severe competition from weeds - medusahead, cheatgrass, yellow starthistle and ventenata.

**ID07015 David Mosman** – Nezpar Indian ricegrass seed increase. Seed shipped March 1, 2007. **FY07** no report.

**ID07020 David Mosman** – Anatone bluebunch wheatgrass. Seed shipped August 31, 2006. **FY07** no report.

**FIELD OFFICE: OROFINO**

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

**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. **FY07** 9067541 peachleaf willow – 10% survival with good vigor, 9067546 peachleaf willow – 10% survival with good vigor, 9067549 peachleaf willow - failed, 9023733 redosier dogwood - failed, 9023739 redosier dogwood - failed, 9023740 redosier dogwood - failed and Okanogan snowberry - failed. **Cancel**

**ID04013 Paul Schroder 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. **FY07** 9067541 peachleaf willow – failed, 9067546 peachleaf willow – failed, 9067549 peachleaf willow - failed, 9023733 redosier dogwood - failed, 9023739 redosier dogwood - failed, 9023740 redosier dogwood - failed and Okanogan snowberry - failed. **Cancel**

# IDAHO DIVISION III
# PLANT MATERIALS PLANTINGS

**FIELD OFFICE: CALDWELL (see Meridian FO for additional field plantings)**
**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. **Next evaluation 2009.**

**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. **Next evaluation 2009.**

**ID06002 CB River Ranch** WRP upland planting. Seeding mixture includes Bozoisky Russian wildrye, Pryor slender wheatgrass, Vavilov Siberian wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass and Snake River Plain fourwing saltbush. Seed was ordered September 26, 2005 and planting date is scheduled for May 2006. Site Characteristics: Feltham loamy fine sand soil, 3-12 percent slope, NE aspect, 11 inch precipitation and site will be irrigated for establishment. FY06 no evaluation. **FY07** Previous seedings in this field have failed due to lack of moisture, sandy soils and weed competition. We discussed an irrigation system with handlines in order to get plants established, however it proved to be cost prohibitive, so operator will be trying a dryland seeding again. Manure has been added and disced in to increase organic matter and hopefully retain soil moisture. Seeding will occur around the 1st of November.

**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- FY07 no evaluation.

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

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

**ID08002 Randy Heffner field planting.** Bozoisky Russian wildrye and Syn – A Russian wildrye fall and winter forage trial. Seed ordered October 12, 2007. Site Characteristics: Boise County, MLRA B10, 6 acres, dormant fall planting, Brownlee sandy clay loam, 5-10 percent slope, south aspect, 2800 feet elevation, 14-16 inch rainfall, irrigated, T7N R2E NE1/4 Section 2

**FIELD OFFICE: MARSING/GRANDVIEW**

**None**

**FIELD OFFICE: MERIDIAN (Caldwell FO staff)**
**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. Initial evaluation in later fall 2006 indicated best stand establishment was Regar accession. **FY07** Regar - excellent stand, excellent vigor, 18 inch height and 3 plus plants per foot squared. Cache - excellent stand, excellent vigor, 12 inch height and 3 plus plants per foot squared. Cooperators rates Regar good to excellent and Cache good during establishment year.

**ID07002 Doug Austin** field planting. Regar meadow brome, orchardgrass and alfalfa field planting. Seed ordered August 28, 2006. Seed was planted in late summer – early fall and irrigated for establishment. Site characteristics: silt loam soil, 0-2 percent slope, 2800 feet elevation and irrigated. Seed was planted in early September 2006 and irrigated for establishment. **FY07** stand 75% Potomac orchardgrass, 10% Regar meadow brome and 15% alfalfa – cooperator took 3 cuttings of hay (1st 0.6 ton/ac; 2nd 0.9 ton/ac and 3rd 1.5 ton/ac = 3 ton/ac for first year).

**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.

**FIELD OFFICE: MOUNTAIN HOME**
**None**

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

**ID07016 Lower Payette Ditch Plots - Site preparation and seeding:** Seeded 3/22/07. Plots were cultivated with a front tine garden cultivator, raked, hand seeded, light raked, and rolled with a water-filled drum (estimate 30-40 pounds pressure) immedi after seeding. Some emergence, but plots essentially failed due to lack of soil moisture, extreme heat during summer and weeds (kochia and thistle). **Reseeded: 11/8/07**. Site prep included hand-raking before seeding (no cultivation), seeding, and rolling v water filled drum.

**ID07017 Clay Peak Landfill Plots - Site preparation and seeding:** Seeded 3/22/07**.** Plots were prepared with a "groundhog" cultivator, hand seeded, light raked, and rolled with a water-filled drum (estimate 30-40 pounds pressure) and immediately after seeding a tanker truck watered the plots. Some emergence, but essentially the plots failed due to lack of soil moisture and extrem heat. **Reseeded: 11/9/07**: hand-seeded and rolled with water-filled drum.

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

**ID07019 Four Rivers Cultural Center plots** – Plots were terminated 6/1/07 due to maintenance and watering problems, and problems with vandalism.

**FIELD OFFICE: WEISER**

**ID94025 Eckhardt** Ephraim crested wheatgrass, Magnar basin wildrye, Mankota Russian wildrye, Trailhead basin wildrye, P27 Siberian wheatgrass, Manska pubescent wheatgrass, Reliant intermediate wheatgrass, Bannock thickspike wheatgrass, Schwendimar thickspike wheatgrass, Greenar intermediate wheatgrass, Sherman big bluegrass, Secar Snake River wheatgrass, Goldar bluebunch wheatgrass, Bozoisky Russian wildrye, Hycrest crested wheatgrass, Rush intermediate wheatgrass demo plots. Site is clay loam soil, non-irrigated, 10-12 inch ppt, 3000 feet elevation, and 5% slopes on NE exposure. Seed ordered July 1994. FY94 and FY95 due to drought conditions, seeding planned for spring 96. FY96 planted April 9, 1996 by hand planting and raking plots to control bulbous bluegrass competition. June 19, 1996 evaluation for establishment: Mankota poor, Manska good, Sherman very poor, Greenar good, Trailhead fair, Reliant good, Bozoisky good, Bannock good. July 8, 1996 establishment: Mankota fair, Manska good, Sherman poor, Greenar good, Trailhead fair, Reliant good, Bozoisky good, Bannock good, Goldar good, Rush excellent, Secar fair. Rush has the best stand establishment to date with Goldar next. FY97 no evaluation. FY98 first set of plots; Reliant is out producing all other plots, Greenar is second in production, Sherman hand planted plot is third in production, Sherman broadcast plot failed, T6633-P is fourth in production. Second set of plots; Bozoisky performed the best with Mankota second, and trailhead the poorest. The wildryes, thickspike wheatgrasses and intermediate wheatgrasses have shown adaptation to this area and could play a roll in revegetating local rangelands. FY99 plots were grazed this spring and grazing preference was evaluated. Plots: Greenar and Reliant were grazed the heaviest, followed by Mankota and Bozoisky Russian wildrye. This was uniform for all replications. Thickspike wheatgrasses and all other varieties had slight utilization. Basin wildryes were not utilized. Grazing preference for the larger plantings: Bozoisky Russian wildrye was used the heaviest, followed by Goldar bluebunch wheatgrass, and Rush intermediate wheatgrass used the least. Cattle are grazing Fourwing saltbush. The producer is very happy with results from these plots and uses the information to make his planting decisions. Cattle in mid May grazed FY00 the small plot species. Grazing preference was for Goldar, Bozoisky, and the intermediate wheatgrasses. The intermediate wheatgrasses are spreading into adjacent plots. Moderate use was made on Magnar and Trailhead. Sherman was used only slightly. Fourwing saltbush was utilized and continues to get taller (20 inches tall). In the large acre sized plots adjacent to a Hycrest planting, grazing preference (mid May) in order are: 1) Goldar, 2) Bozoisky, 3) Rush, and 4) Secar. Use of Goldar was similar too slightly heavier than the Hycrest. FY01 all plots are grazed this year. Utilization was heaviest on Greenar intermediate wheatgrass and Reliant intermediate wheatgrass plots. The larger plantings showed grazing preference was highest for Bozoisky Russian wildrye, then Goldar bluebunch wheatgrass, followed by Rush intermediate wheatgrass. FY03 plots were grazed this fall at time of evaluation. FY04 – Cattle preference (cows were moved into filed 4 days prior to evaluation on 10/5/04). Most preferred species during this period was Bozoisky-Select Russian wildrye which was grazed very close. Second most preferred species was Goldar bluebunch wheatgrass which was grazed to a uniform 2 inch stubble height. Secar Snake River wheatgrass and Rush intermediate wheatgrass were not utilized. FY05 no evaluation. FY06 – observations in late June, grazing preference was Goldar bluebunch as first choice, Bozoisky-Select Russian wildrye as second choice, Rush intermediate as third and Secar as least desirable. Continue with this evaluation in 2007. **FY07 no evaluation - keep this as a viable planting and evaluate in 2008.**

**ID96024 Howard Sutton** Rush intermediate wheatgrass, Luna pubescent wheatgrass, and Oahe intermediate wheatgrass field planting. Site is loam soil, non-irrigated, 15-17-inch ppt, 3320 feet elevation, 1-4% slope on south exposure. Seed ordered March 14, 1996. FY96 planted in May into good seedbed with good weed control. Good stand establishing with about 3 plants per foot squared, each species was planted with alfalfa in alternate rows and alternating sections. FY97 good stands with excellent vigor of each cultivar. The Oahe/alfalfa stand was cut for hay and produced 1.5 tons/acre. Because of topography the Rush/alfalfa and Luna/alfalfa were not cut for hay. The entire field was grazed; grazing was uniform across all trials so preferences could not be determined. Producer is very happy with all three from standpoint of production potential when seeded with alfalfa. FY98 good stands and vigor for each species with about 7 plants per square foot. Yield for all species was about 5000 pounds per acre or about 3 AUMs per acre. Cattle are selecting Luna as first choice, then go to Rush before Oahe. The Rush was more mature than Luna when steers were put in pasture which may account for selection choices. FY99 good stands and vigor of all three species. Entire 84 acre seeding provided 135 AUMs or 1.6 AUMs/ac. Due to later season of use; cattle prefer Luna and Oahe to Rush. Rush initiates growth earlier and is more mature when cattle are turned into pasture, which probably accounts for this preference. FY00 similar report to last year. FY01 good stands and vigor for all species. Grazing preference continues to be for Oahe, followed by Luna, and the Rush. Production is about the same for all species although reduced this year due to two years of extreme drought. FY02 good stand, and vigor with greatly reduced production this drought year for all accessions. Produced 0.5-0.7 AUM/Acre for each accession, less than 50% of the normal precipitation year. Grazing is slowing spread of these species. FY04 – good stands with good vigor for all species.

Production was approximately 0.7 AUMs per acre. FY05 - **FY07 no evaluation - keep this as a viable planting and evaluate in 2008.**

**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 4$^{th}$ growing season - peachleaf willow 90% survival with excellent vigor, 15 feet plant height, 10 feet crown width, 3 inch DBH. Golden willow 90% survival with very good vigor, 10 feet plant height, 6 feet crown width and 2 inch DBH. Peachleaf plants are more vigorous than golden willow, but in a slightly better site based on soil and moisture availability. Plants are protected from grazing by domestic livestock. FY06 evaluation – peachleaf willow 90 percent survival, excellent vigor, 22-25 feet tall, 15 feet crown width; golden willow 90 percent survival, good vigor, 11-12 feet tall, 8 feet crown widths. Evaluate again in 2007 to document a good record of the success of planting and growth rates. **FY07 no evaluation - keep this as a viable planting and evaluate in 2008.**

**ID02011 Tom Vogel - Paddock Riparian Planting**. 9067546 Peachleaf willow - Burns source and local coyote willow. 50 cuttings ordered February 11, 2002 for shipment in late March 2002. To be planted with waterjet stinger. FY02 willows were planted on April 3, 2002 using the waterjet stinger. Stream was dry for most of July and August. Peachleaf willows have about 75 percent survival with some leader growth up to 36 inches. Coyote willow has about 60% survival. FY03 - FY05 - **FY07 - no evaluation - keep this as a viable planting and evaluate in 2008.**

# 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**

**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. **FY07** Bill Simon said the Bannock stand did not produce seed heads this year. Early dry spring and early freezes may have hurt seed production. Stand is also getting old and interspace rows are filled in due to rhizomatous spreading. Bill cut this 41 stand for hay about July 20 (unknown production). Recommend planting be **cancelled**.

**ID01007 Spring Cove Ranch – Butler** demonstration plantings of Magnar basin wildrye, Snake River Plain fourwing saltbush, and Northern Cold Desert winterfat. Seed ordered March 16, 2001. Site characteristics: Planting 1. Vertisol soil, 11-inch rainfall, irrigated, 3300 feet elevation, south of Pioneer Reservoir. Planting 2. Sodic soil, 12-inch rainfall, irrigated, 3500 feet elevation, near Clover Creek – Hill City Road – southern base of Bennett Mountain foothills. FY01 - FY04 seed not planted due to extreme drought. Cooperator plans to plant fall 2004. FY05 Planting Site 1: Seed again not planted. Dan said he still wants to drill the Magnar next spring (2006) in the planned site (Planting Site 1). Said site in 2005 was too dry. As of 1/10/06 site is under flood waters. Moisture should be good for spring 2006 planting. He said he will drill seed in spring 2006. **FY07** Dan has not planted the Magnar yet on account of other farming activities, but still wants to keep the seed and says he will try to get it planted this fall (2007).

**D02015 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. **FY07** switchgrass planting failed - **Cancel.**

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

**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 and FY07 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 and FY07 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. FY07 no evaluation.

| | 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. FY06 and FY07 no evaluation.

**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. FY06 and FY07 no evaluation.

**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. FY06 and FY07 no evaluation.

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

**ID06006 Twin Falls Co. Riparian Projects.** Woody field planting. Simon poplar (30), Peachleaf willow – Caribou Source (20), Peachleaf willow – Pocatello Source (20), Coyote willow (120), Golden willow (20), Laurel willow (20), White willow (20), Redosier dogwood – Harrington Source (50), Redosier Dogwood – Cheney Source (50) and Redosier dogwood – Wallowa Source (50). Cuttings ordered February 2, 2006. FY06 and FY07 no evaluation.

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

# IDAHO DIVISION V
# PLANT MATERIALS PLANTINGS

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

**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 - FY07 no evaluations. See attached tables at end of this section.

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

**ID06010 Shoshone Bannock Tribe – ShoBan High School** common camas field planting. FY06 Tribal members collected bulbs from the Camas Prairie near Fairfield in Camas County. The bulbs were planted about 4 inches deep in the native garden behind the field office and also near the constructed wetland at the ShoBan Jr./Sr. High School. Plantings are being heavily watered. FO– 1 plant/ft2; School– 1 plant/hole approximately 10-15 feet apart. **FY07** Planted 36 bulbs in the garden and all but 3 came up - 4 or 5 flowered and form seed pods. We are currently waiting for the seed to ripen so we can gather them and hopefully get some growing from seed.

**FIELD OFFICE: MALAD**
**None**

**FIELD OFFICE: MONTPELIER**
**None**

**FIELD OFFICE: POCATELLO**
**None**

**FIELD OFFICE: PRESTON**
**None**

**FIELD OFFICE: SODA SPRINGS**
**ID05001 Michael Tingey** – Irrigated forages Demonstration Plots. Latar orchardgrass, Regar meadow brome, Cache meadow brome, Paiute orchardgrass, Garrison creeping foxtail, Rush intermediate wheatgrass, Bozoisky Russian wildrye, 905439 switchgrass, Blackwell switchgrass and Lutana cicer milkvetch seed was ordered February 4, 2005. SCD/Cooperator Supplies the following: Paddock meadow brome, Forager alfalfa, Kemal festolium, Potomic

orchardgrass, Rebound meadow brome, Fuego tall fescue, Tekapo orchardgrass, Mara perennial ryegrass, Barliza timothy, Pradel meadow fescue, Barloex tall fescue, Bariane tall, fescue, Barcell tall fescue, Baridana orchardgrass, Hakari Alaska brome, Birdsfoot trefoil, Sainfoin, Sorgam, Grazing corn, Lakota prairie brome and Alice white clover. Site characteristics: 0.8 acres, MLRA B13, Rexburg-Ririe silit loam soil complex, 1-4 percent slopes, north aspect, elevation 5140 feet, 12-14 inch precipitation, irrigated, T11S R41E SW ¼ section 19. Planted in late spring 2005 due to persistent rainfall that did not allow earlier final land preparation and planting. No evaluation FY06 and FY07.

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

**ID05012 Don Ayers** – herbaceous windbreak field planting. Magnar basin wildrye seed ordered March 15, 2005. Site Characteristics: Lantonia-Chinahat silt loam soil, 1-4 percent slopes, 5983 feet elevation, 14-16 inch precipitation, non-irrigated, T8S R41E NW ¼ Section 24. FY05 Two of the four rows had good emergence and two rows had very poor emergence. Ground preparation was much better in rows that the best emergence. Plants that emerged have grown well and look very healthy - fair stand with 4 plants/$ft^2$, good vigor and 4 inch height. Several more plants emerged in the fall. **FY06** planting was accidentally tilled and destroyed – cooperator plans to replant.

# IDAHO DIVISION VI
# PLANT MATERIALS PLANTINGS

**FIELD OFFICE: ARCO**

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

**FIELD OFFICE: DRIGGS**

**None**

**FIELD OFFICE: IDAHO FALLS**

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

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

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

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

**ID07003 Winterfeld** Appar blue flax for seed increase. Seed shipped September 26, 2006. FY07 excellent stand with excellent vigor – establishment year – no seed production – clipped weed 3 times this season.

**ID07004 Winterfeld** Sodar streambank wheatgrass for Foundation seed increase. FY07 planting failed. **Cancel**

**ID07011 Winterfeld** Bannock thickspike wheatgrass for seed increase. Seed shipped March 5, 2007. FY07 fair stand with fair vigor establishing – no seed this year.

**ID07012 Winterfeld** Regar meadow brome for seed increase. Seed shipped March 1, 2007. FY07 excellent stand with excellent vigor – establishment year – no seed production.

**ID07013 Winterfeld** Magnar basin wildrye for seed increase. Seed shipped March 1, 2007. FY07 planting failed. **Cancel**

**ID07014 Winterfeld** Goldar bluebunch wheatgrass for seed increase. Seed shipped March 1, 2007. FY07 did not plant.

**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. **FY07** Very similar evaluation to FY03 evaluation – 100% survival for all species; Carolina poplar – height 55 feet – crown width 20 feet - sparsely branched partially due to shading by surrounding trees; Siouxland poplar – height 55 feet - crown width 19 feet - sparsely branched, good height, not filling in, tall and skinny; Robusta poplar – height 45 feet - crown width 20 feet - good growth, sparsely branched, lots of trunk with no limbs, galls on branches; White willow – height 30 feet - crown width 17 feet - lots of dead branches; Laurel willow – height 20 feet - crown width 12 feet -some dead branches; Coyote willow – height 25 feet - crown width 16 feet - lots of dead branches. **Cancel**

**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. **FY07** Very similar evaluation to FY03 evaluation – 100% survival for all species; Carolina poplar – height 20 feet – crown width 11 feet; Siouxland poplar – height 37 feet - crown width 13 feet – excellent new growth – health vigor good; Robusta poplar – height 10 feet - crown width 4 feet – doing very poorly – little new growth – poor health and vigor. **Cancel**

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

**FIELD OFFICE: SALMON/CHALLIS**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**ID08001 Shiner Ranch** Field Planting. Vavilov II Siberian wheatgrass seed ordered 9/27/07 and shipped 10/4/07 for November dormant planting.
Seed mixture 1 (5 ac): Vavilov II Siberian wheatgrass, Bozoisky Russian wildrye, falcata alfalfa;
Seed mixture 2 (75 ac): Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, falcata alfalfa
Site Characteristics: Leadore gravelly loam soil, 2-6 % slope. South aspect, 5,600 feet elevation, 8-12 inch rainfall, non-irrigated, T17N R24E NE1/4 Section 2.

**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.

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

**FY07 Aspen** – survival is good with approximately 50% survival overall. Top growth die back is common with approximately half of the surviving plants leafing along stem and about half sprouting from the base. Winter was open and plants were exposed most of winter – this may have resulted in top growth injury. Spring moisture since March has been very poor resulting in drought injury. Aspen is doing best in sites with very good soil moisture to saturated conditions. On site that are drier and better drained, aspen is struggling.
Site 1 birm near pond - was the only location where wildlife use was evident – probably moose.
Site 2 birm near pond

Site 3 wetland near road junction – aspen are in nearly standing water (water table within 6 inches of surface)
Site 4 upland just across bridge on right side of road
Site 5 upland to east of ponds on south end of property
Site 6 wetlands near ponds on south end of property

**BLACKFOOT FIELD OFFICE**
**PAUL RICKS PLOTS - FIELD PLANTING – ID02006**
**(Evaluated by – Scott Engle/Cameron Williams/Karie Pappani/Dan Ogle – June 22-23, 2004)**
**Irrigated Plots (Approximately 28 to 32 inches of combined precipitation and irrigation)**

| Common Name | Cultivar | FY02 12/9/03 Initial Est. 2nd Year | FY04 Stand | FY04 Vigor | FY04 Spread | FY04 Weeds | FY04 6/23/04 Growth Stage | FY04 6/23/04 Lbs/Ac |
|---|---|---|---|---|---|---|---|---|
| Alfalfa | Forager | good | fair | good | N/A | low | harvested | --- |
| Ladino clover | Jumbo | fair | good | good | N/A | moderate | harvested | --- |
| Alfalfa | Rampage | good | good | excellent | N/A | low | harvested | --- |
| Alice clover | --- | good | good | good | N/A | moderate | harvested | --- |
| Alfalfa | Rowdy | excellent | good | good | N/A | low | harvested | --- |
| Cicer milkvetch | Lutana | poor | fair | fair | N/A | high | harvested | --- |
| Alfalfa | Ranger | fair | good | fair | N/A | low | harvested | --- |
| Kura clover | Endura | poor | poor | good | N/A | high | harvested | --- |
| Birdsfoot trefoil | Bull | fair | excellent | good | N/A | moderate | harvested | --- |
| Perennial ryegrass | Mara | good | excellent | poor | N/A | none | pre bloom | 1550 |
| Tall fescue | Fawn | good | good | fair | N/A | low | bloom | 1920 |
| Orchardgrass | Latar | good | good | fair | N/A | none | bloom | 3180 |
| Tall fescue | Johnstone | good | good | fair | N/A | none | bloom | 3480 |
| Orchardgrass | Potomic | good | good | good | N/A | none | bloom | 3420 |
| Tall fescue | Teton | good | good | good | N/A | none | bloom | 4620 |
| Orchardgrass | Baridana | excellent | excellent | good | N/A | none | bloom | 2580 |
| Tall fescue | Dovey | excellent | good | fair | N/A | none | bloom | 2100 |
| Orchardgrass | Paiute | good | good | good | N/A | none | bloom | 2760 |
| Tall fescue | Barcel | good | good | fair | N/A | none | bloom | 2460 |
| Meadow brome | Regar | good | excellent | good | low | none | bloom | 2880 |
| Tall fescue | Barcarella | good | good | good | N/A | none | bloom | 3660 |
| Meadow brome | Rebound | excellent | excellent | good | none | none | bloom | 3480 |
| Tall fescue | TF33 | good | good | good | N/A | low | bloom | 2940 |
| Meadow brome | Paddock | good | excellent | good | none | none | bloom | 3360 |
| Meadow fescue | Bartura | good | good | good | N/A | low | bloom | 3060 |
| Timothy | Climax | fair | fair | good | N/A | moderate | bloom | 2760 |
| Mountain brome | Hakari | excellent | excellent | good | N/A | none | bloom | 3240 |
| Timothy | Barliza | poor | fair | good | N/A | high | bloom | 2400 |
| Switchgrass | 9005438 | good | good | good | N/A | moderate | vegetative | 1500 |
| Switchgrass | Blackwell | good | good | good | N/A | moderate | vegetative | 2650 |
| Switchgrass | 9005439 | good | fair | good | N/A | high | vegetative | 3500 |
| Sunflower | Multimedia | fair | fair | good | N/A | high | vegetative | 900 |
| Russian wildrye | Bozoisky | good | excellent | excellent | N/A | none | bloom | 6200 |

**Semi-Irrigated Plots**
**(Approximately 18 inches of combined precipitation and irrigation)**

| Common Name | Cultivar | FY02 12/9/03 Initial Est. 2nd Year | FY04 Stand | FY04 Vigor | FY04 Spread | FY04 Weeds | FY04 6/23/04 Growth Stage | FY04 6/23/04 Lbs/Ac |
|---|---|---|---|---|---|---|---|---|
| Alfalfa | Forager | good | good | good | N/A | low | harvested | --- |
| Sainfoin | Eski | fair | good | good | N/A | moderate | harvested | --- |
| Alfalfa | Rampage | good | fair | good | N/A | low | harvested | --- |
| Sainfoin | Remont | fair | good | good | N/A | moderate | harvested | --- |
| Alfalfa | Rowdy | good | excellent | excellent | N/A | low | harvested | --- |
| Small burnet | Delar | fair | poor | fair | N/A | very high | harvested | --- |
| Alfalfa | Trevois | good | good | good | N/A | moderate | harvested | --- |
| Blue Flax | Appar | poor | fair | good | N/A | very high | harvested | --- |
| Alfalfa | Ladak | good | good | good | N/A | low | harvested | --- |
| Utah sweetvetch | Timp | poor | very poor | fair | N/A | very high | harvested | --- |
| Western Yarrow | 9057902 | poor | poor | fair | N/A | very high | harvested | --- |
| Ruby V. pointvetch | 9063520 | poor | failed | --- | --- | --- | --- | --- |
| Western wheatgrass | Arriba | fair | good | good | excellent | low | bloom | 4020 |
| Western wheatgrass | Rosana | fair | excellent | fair | excellent | none | bloom | 2880 |
| Orchardgrass | Paiute | fair | good | good | N/A | low | bloom | 4140 |
| Mountain brome | Bromar | excellent | excellent | good | N/A | none | bloom | 4900 |
| Pubescent wheatgrass | Luna | good | good | good | fair | none | bloom | 4410 |
| Mountain brome | Garnet | good | good | fair | N/A | low | bloom | 3080 |
| Thickspike wheatgrass | Bannock | poor | poor | fair | none | high | bloom | 1680 |
| Crested wheatgrass | Douglas | very poor | poor | good | N/A | very high | bloom | 3600 |
| Thickspike wheatgrass | Critana | poor | fair | good | fair | moderate | bloom | 3540 |
| Smooth brome | Manchar | fair | good | excellent | fair | none | bloom | 3780 |
| Thickspike wheatgrass | Schwendimar | fair | fair | fair | poor | high | bloom | 3420 |
| Green needlegrass | Lodorm | fair | fair | good | N/A | high | bloom | 2220 |
| Intermediate wheatgrass | Reliant | excellent | good | good | poor | none | bloom | 5160 |
| Hybrid wheatgrass | Newhy | good | excellent | excellent | fair | none | bloom | 4740 |
| Intermediate wheatgrass | Rush | good | excellent | good | fair | none | bloom | 5040 |
| Big bluegrass | Sherman | poor | poor | good | N/A | moderate | bloom | 4900 |
| Intermediate wheatgrass | Greenar | good | good | good | fair | none | bloom | 5340 |
| Russian wildrye | Bozoisky | good | good | good | N/A | none | bloom | 5250 |
| Intermediate wheatgrass | Tegmar | good | good | fair | fair | none | bloom | 3720 |
| Canada bluegrass | Foothills | poor | poor | good | good | very high | bloom | 2880 |
| Hybrid wheatgrass | SL | fair | poor | poor | N/A | high | bloom | 2280 |
| Tall wheatgrass | Largo | good | excellent | poor | N/A | none | s. dough | 3760 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| RS Hoffman wheatgrass | --- | poor | fair | good | very poor | moderate | bloom | 1740 |
| Slender wheatgrass | San Luis | fair | good | fair | N/A | low | bloom | 1800 |
| Slender wheatgrass | Pryor | fair | good | good | N/A | low | bloom | 1560 |
| Tall wheatgrass | Alkar | fair | good | good | N/A | low | bloom | 3120 |
| Canada wildrye | Mandan | fair | fair | good | N/A | moderate | pre-bloom | 950 |
| Basin wildrye | Magnar | poor | poor | fair | N/A | very heavy | bloom | 840 |
| Idaho fescue | Joseph | poor | very poor | poor | N/A | very heavy | bloom | 600 |
| Basin wildrye | Trailhead | poor | fair | fair | N/A | very heavy | bloom | 900 |
| Russian wildrye | Mankota | fair | good | fair | N/A | low | bloom | 4140 |
| Bluebunch wheatgrass | Goldar | poor | very poor | fair | N/A | very high | bloom | --- |
| Russian wildrye | Syn A | fair | good | good | N/A | low | bloom | 3060 |

**Dryland Plots (Irrigated Establishment Year – 10 to 12 inch rainfall zone)**

| Common Name | Cultivar | FY02 12/9/03 Initial Est. 2nd Year | FY04 Stand | FY04 Vigor | FY04 Spread | FY04 Weeds | FY04 6/23/04 Growth Stage | FY04 6/23/04 Lbs/Ac |
|---|---|---|---|---|---|---|---|---|
| Alfalfa | Forager | fair | fair | good | N/A | high | harvested | --- |
| Beardless wheatgrass | Whitmar | very poor | very poor | poor | N/A | very high | harvested | --- |
| Alfalfa | Rampage | good | good | good | N/A | moderate | harvested | --- |
| Forage Kochia | Immigrant | poor | fair | good | N/A | high | harvested | --- |
| Alfalfa | Rowdy | good | good | good | N/A | moderate | harvested | --- |
| Indian ricegrass | Rimrock | poor | fair | fair | N/A | high | harvested | --- |
| Alfalfa | Trevois | fair | excellent | good | N/A | moderate | harvested | --- |
| Indian ricegrass | Nezpar | poor | fair | fair | N/A | high | harvested | --- |
| Alfalfa | Ladak | fair | good | fair | N/A | moderate | harvested | --- |
| Siberian wheatgrass | P-27 | fair | fair | good | N/A | moderate | bloom | 2580 |
| Snake R. wheatgrass | Secar | poor | poor | fair | N/A | high | s. dough | 900 |
| Siberian wheatgrass | Vavilov | fair | excellent | excellent | N/A | very low | bloom | 4500 |
| Western wheatgrass | Arriba | fair | good | good | excellent | moderate | bloom | 2640 |
| Western wheatgrass | Rosana | fair | good + | good | excellent | low | bloom | 3750 |
| Crested wheatgrass | Nordan | poor | fair | good | N/A | high | bloom | 3500 |
| Streambank wheatgrass | Sodar | fair | good | good | good | moderate | bloom | 2240 |
| Pubescent wheatgrass | Luna | good | excellent | good | fair | very low | s. dough | 3120 |
| Crested wheatgrass | Ephraim | poor | fair | good | none | low | bloom | 2380 |
| Thickspike wheatgrass | Bannock | fair | good | good | good | moderate | bloom | 3080 |
| Crested wheatgrass | Hycrest | good | excellent | good | N/A | none | bloom | 3640 |
| Thickspike wheatgrass | Critana | good | good | good | fair | very low | bloom | 2170 |
| Crested wheatgrass | CD-II | good | excellent | excellent | N/A | none | bloom | 3290 |
| Thickspike wheatgrass | Schwendimar | fair | fair | good | fair | moderate | bloom | 1575 |

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

# PLANT MATERIALS

# 2007

# UTAH EVALUATION SUMMARIES

# FIELD, SEED INCREASE and DEMONSTRATION PLANTINGS

# UTAH AREA 1
# PLANT MATERIALS PLANTINGS

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

**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. FY07 no evaluation.

**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. FY07 no evaluation.

**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. FY07 no evaluation.

**UT07002 Niels Hansen seed increase planting. Northern Cold Desert winterfat** seed shipped February 8, 2007. Seed will be planted the spring of 2007. FY07 no evaluation.

**UT07003 Bill Hopkin field planting Randolph Field Office.** Peachleaf willow (accessions 9076375, 9076376, 9067549, 9067560), black cottonwood (accessions 9067538, 9067562, 9067563, 9067568), Siouxland poplar, Carolina poplar and coyote willow cuttings to be shipped April 23, 2007. Cuttings shipped April 4. Site conditions – cobbly semi wet soil, 0-20 percent slopes, 6300 feet elevation and 12- 14 inch rainfall area. Cuttings were planted April 28, 2007. FY07 no evaluation.

**UT07004 _____ Logan Field Office.** Peachleaf willow (accessions 9076375, 9076376, 9067549, 9067560) and coyote willow cuttings to be shipped April 9, 2007. Cuttings shipped April 4. FY07 no evaluation.

# UTAH AREA 2
# PLANT MATERIALS PLANTINGS

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

**UT03001 Merlin Webb – Cedar City FO.** Seed shipped February 2003. Rimrock Indian ricegrass, Critana thickspike wheatgrass, Trailhead basin wildrye, Volga mammoth wildrye , Nezpar Indian ricegrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Vavilov Siberian wheatgrass, P-27 Siberian wheatgrass, Snake River Plains fourwing saltbush broadcast seeded into good seedbed on February 22, 2003 - rained soon after planting. FY03 no evaluation. FY04 stand/survival – Planting # 1 P27 fair/100%, Bannock fair/100%, Nezpar fair/100%, Mesa alfalfa fair/100% and Volga failed. Planting # 2 Vavilov fair/100%, Nezpar fair/100%, Bannock fair/100%, Magnar poor/25%, Volga failed, and Snake River Plains failed. FY05 Planting # 1 P27 fair stand with ½ plant/ft2 – Bannock fair stand with ¼ plant/ft2 – Nezpar poor stand with 1/10 plant/ft2 – alfalfa poor stand with 1/10 plant/ft2 – Volga failed. Mix has about 1 plant/ft2. Planting # 2 Vavilov good stand with 4 plants/ft2 - Nezpar poor stand with 1/10 plant/ft2 – Bannock fair stand with ½ plant/ft2 – Magnar and Volga failed – Snake River Plains fourwing saltbush fair stand with ¼ plant/ft2. Mix has 4.9 plants/ft2. Vavilov had the best survival of all plants in this trial and thus was able to respond to better moisture conditions that occurred this year. FY06 and FY07 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 and FY07 no evaluation.

**UT04001 Blake Walbeck project – Richfield FO** demonstration plots. P27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Douglas crested wheatgrass and Ephraim crested wheatgrass. Seed packets ordered November 2003. FY04 - FY07 no evaluations.

**UT04015 Soren Nielsen project – Manti FO.** Riparian woody field planting – 9067538 black cottonwood. Cuttings ordered March 5, 2004. FY04 – FY06 no evaluations. FY07 very poor survival with 1 of 25 still alive - vigor is very poor. **Cancel**

**UT05006 Lars Rasmussen – Fillmore FO** seed increase. Maple Grove Lewis flax seed was purchased and shipped March 9, 2005. FY06 planting planned for fall 2006. FY07 no evaluation.

**UT05007 Lars Rasmussen – Fillmore FO** Seed increase planting of sagebrush penstemon *Penstemon speciosis.* Planting installed in 2005 using weed barrier material and full irrigation. Weed barrier materials utilized was the cloth type materials which broke down in less than a year resulting in heavy weed competition. An excellent stand is established (5/17/06) and some seed production is expected this year. Weed control is difficult requiring extensive hand rouging. FY07 no evaluation.

**UT08001 Demonstration Plots – Fillmore FO** planting planned for late November 2007.

# UTAH AREA 3
# PLANT MATERIALS PLANTINGS

**UT86018 Smith – Roosevelt FO** Hycrest crested wheatgrass, Ephraim crested wheatgrass, Appar blue flax, Arriba western wheatgrass, T28606 needle and thread, Magnar basin wildrye, and Nordan crested wheatgrass field planting. FY90 Hycrest, Ephraim, Appar, Magnar, Nordan all 80-100 % survival. Arriba and T28606 are less than 40% survival. FY91 and FY92 no evaluations. FY93 Hycrest, Ephraim, Appar, Nordan, and T28606 doing best. Magnar and Arriba poor stands. Sagebrush invading site, heavy use by elk, and Appar has many new seedlings. FY94 Hycrest, Appar, Arriba, and Nordan all have good stands. Ephraim, T28606 and Magnar have fair stands. All species are adapted to site and wildlife use is heavy. FY95 no change except vigor has improved due to excellent moisture year. FY96 Hycrest, Ephraim, Appar, T28606 and Nordan have good vigor. Fair vigor for Arriba and Magnar. FY97 Hycrest, Ephraim, Appar, Arriba and Nordan good stands. T28606 and Magnar fair stands. Many sagebrush seedlings within plots, particularly heavy in Arriba western wheatgrass and T28606 needle and thread. FY98 Hycrest, Ephraim, Appar, Arriba, Magnar, and Nordan all have excellent vigor. T28606 has good vigor. FY99 very heavy wildlife use in winter and spring. Poor regrowth due to dry spring/ summer and fair regrowth following late summer rains. Planting is being invaded by sagebrush. FY00 Heavy spring use by wildlife and a very dry spring and summer. Rains began in early September and plants began to green-up. Evaluation indicated good vigor for Ephraim, Appar, Arriba, T28606, Nordan and fair vigor for Hycrest and Magnar. FY01 fair to poor vigor for all species following two years of drought and heavy wildlife use. Sagebrush invasion is effective plant growth and vigor. FY03 good stands of Hycrest, Ephraim, Arriba and Nordan. Fair stands of T28606 needle and thread and Magnar. Appar failed. Area is experiencing heavy wildlife use. FY04 Stands are experiencing heavy wildlife use – no livestock use for the last two years. Good vigor and stands of Hycrest, Ephraim and Nordan. Fair vigor and stands of Arriba, T28606 and Magnar. Poor stand and vigor of Appar – most plants are along the edge of planting. FY05 Stands are experiencing heavy wildlife use – no livestock use for the last three years. Good to excellent vigor and stands of Hycrest, Ephraim, Nordan, Arriba and T28606. Fair vigor and stand of Magnar. Appar failed. **Next evaluation FY08.**

**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. FY07 Prevedel trial looked good. Brett tried to plant alfalfa with the Rush but it has not done well. Furthermore with the alfalfa in it does not allow him to spray out weeds (knapweed) in the spring without affecting the alfalfa. He has decided he will end up spraying out the weeds and alfalfa and going back to a grass only pasture. He indicated that to increase the vigor of the pastures he needs/plans to fertilize. **Next evaluation FY10.**

**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. **Next evaluation 2008.**

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

**UT05004 Mike Wilcox – Monticello FO** field planting. This is a dormant spring or fall planting of Topar pubescent wheatgrass and Rush intermediate wheatgrass. Barnam loam soil, 3 percent slopes, south aspect, 6000 feet elevation, 14 inch precipitation, non-irrigated, T31N R26E Section 8. Seed ordered March 3, 2005. FY05 planted as a dormant fall planting. FY06 not planted – cooperator plans to plant in spring of 2007. FY07 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 broadcast and harrow planting completed August 19, 2006 – plants germinated and looked good on evaluation date. FY07 During the evaluation, it was difficult to find established plants from the seeding but we did find a few which was encouraging. It was discussed that the plants that were observed did appear to have grown enough to make it until next year. It was also noted that there had been some effects from prairie dogs and rabbits. The planting area had a lot of weeds which could be expected in new seeding. This site will continue to be monitored and evaluated.

**UT06001 Carol Vansteeter - Monticello FO** field planting. Seed of Alma blue grama, Appar blue flax and Richfield Selection firecracker penstemon was ordered on May 23, 2006. FY06 broadcast and rake planting completed on November 15, 2006. Two days following seeding site was snow covered. FY07 no evaluation.

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

**UT07001 James Wheeler – Monticello FO** field planting. Seed of P-7 bluebunch wheatgrass, Anatone bluebunch wheatgrass, Regar meadow brome, Cache meadow brome, Rush intermediate wheatgrass, Topar pubescent wheatgrass, Paiute orchardgrass, Bozoisky Russian wildrye, Vavilov Siberian wheatgrass and Sherman big bluegrass were ordered on August 28, 2006. A dormant fall planting is scheduled for late October to early November. Site characteristics include MLRA 36, silty clay loam soil, 0-2 percent slopes, NE aspect, 14-16 inch precipitation, T32S R26E NE ¼ Section 31. FY06 seed was drill planted into prepared seedbed on November 17, 2006. Soil moisture and fall rain was good prior to and after planting. It turned cold and snowy soon after planting. FY07 this area is suffering from the

current drought conditions. Kyle explained that they did have some grass coming up from the planting in the spring but not much since. We walked around and looked and in fact did find some dormant grass plants that had become established. Dan indicated that it looks as if they got established enough for them to come up this next spring. We did see quite a few weeds in the planting but that is to be expected in the early stages of a new planting. Kyle and his Dad are optimistic and look forward to this coming spring to see how the grasses come back.