USDA NRCS
Natural Resources Conservation Service

Aberdeen Plant Materials Center

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United States
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Agriculture

Natural Resources
Conservation Service

Aberdeen, Idaho

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INTRODUCTION

The Plant Materials Center at Aberdeen is part of a national plant materials program operated by the United States Department of Agriculture, Natural Resources Conservation Service. The purpose of the Plant Materials Center is to develop and communicate new technology for the use and management of plants. We also assemble, evaluate and release plant materials for conservation use and develop new techniques for establishment of conservation plants. The Aberdeen Plant Materials Center was established in 1939 and currently maintains 15 cultivars and 31 pre-variety (Selected Class) releases. The Aberdeen Plant Materials Center serves portions of Nevada, Utah, Oregon, Wyoming and Idaho. This document is a compilation of progress reports for activities by the Aberdeen Plant Materials Center during FY 2009.

The following documents and presentations were developed during FY 2009 and may be obtained by contacting the Aberdeen Plant Materials Center:

DOCUMENTS

Young, Stanford, editor 2009. Growing Grass and Forb Seed. Certified Seed Gleanings, Utah Crop Improvement Association, Logan, UT. Vol. 28, # 1 February, 2009. 1p.

Tilley, DJ, St. John, L and DG Ogle 2008. Orchard Display Nursery Evaluation Summary (2005-2008) Final Report. IDPMC, Aberdeen ID. 10/15/08. 9p.

Tilley, DJ, Ogle, DG, and L. St. John 2008. Yellow Sweetclover & White Sweetclover Plant Guide. Aberdeen PMC, Aberdeen, ID. 10/22/08. 7p.

Tilley, DJ and JC Hoag 2009. Pre-soaking hardwood willow cuttings for fall versus spring dormant planting. Aberdeen PMC, Aberdeen, ID. Information Series 25. 9p.

Tilley, DJ 2008. Options and Cost Breakdown for Direct Seeding Wetlands with Baltic Rush. Aberdeen PMC, Aberdeen, ID. 10/22/08. 6p.

Tilley, D.J., Ogle, D.G., St. John, L. and N. Shaw 2008. Royal Penstemon Plant Guide. Aberdeen PMC, Aberdeen ID. 10/6/08. 3p.

Tilley, D.J., Hoag, J.C., Ogle, D.G. and L. St. John 2008. 2008 Aberdeen Plant Materials Center Progress Report of Activities. Aberdeen Plant Materials Center, Aberdeen, Idaho. December 18, 2008. 4p.

Tilley, D.J. and L. St John 2008. Skull Valley Off-Center Evaluation (2007 Planting) 2008 Progress Report. Aberdeen PMC, Aberdeen, ID. 10/6/08. 13p.

Tilley, D.J. and L. St. John 2008. Caribou-Targhee and Bridger-Teton National Forest Native Grass Initial Evaluation, 2008 Final Report. Aberdeen PMC, Aberdeen, ID. 10/6/08. 11p.

Tilley, D.J. and L. St. John 2008. Coffee Point Off-Center Evaluation (2006 Planting), 2008 progress report. Aberdeen PMC, Aberdeen, ID. 10/8/08. 11p.

Tilley, D.J. and L. St. John 2008. Yellowstone National Park Containerized Plant Production, 2008 Progress Report. Aberdeen, PMC, Aberdeen, ID. 10/6/08. 6p.

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Tilley, D.J. 2008. Zeba® Seed Coating and Soil Amendment Product Evaluation. Aberdeen PMC, Aberdeen, ID. 10/6/08. 6p.

St. John, L., D.G. Ogle and N.L. Shaw 2009. Plant Guide - Hotrock Penstemon. Aberdeen Plant Materials Center, Aberdeen, ID. January 8, 2009. 3p.

St. John, L. and D.G. Ogle 2008. Plant Guide - Red Clover. Aberdeen Plant Materials Center, Aberdeen, Idaho. December 18, 2008. 4p.

St. John, L. and D.G. Ogle 2008. Plant Guide - Alsike Clover. Aberdeen Plant Materials Center, Aberdeen, Idaho. December 18, 2008. 4p.

St. John, L. and D.G. Ogle 2009. Plant Guide - Scarlet Globemallow. Aberdeen Plant Materials Center, Aberdeen, ID. February 6, 2009. 3p.

St. John, L. and D.G. Ogle 2008. Plant Guide - White Clover. Aberdeen Plant Materials Center, Aberdeen, ID. December 2, 2008. 4p.

St. John, L. and D.G. Ogle 2009. Technical Note No. 16 Green Strips or Vegetative Fuel Breaks. Aberdeen Plant Materials Center, Aberdeen, Idaho. March 5, 2009. 16p.

St. John, L. 2009. Aberdeen Plant Materials Center Grass Display Nursery - 2008 Evaluation Report. Aberdeen Plant Materials Center, Aberdeen, ID. October 2, 2008. 3p.

St. John, L. 2009. Equipment and Strategies to Enhance the Post-Wildfire Establishment and Persistence of Great Basin Native Plants. Aberdeen Plant Materials Center, Aberdeen, ID. October 2, 2008. 4p.

St. John, L. 2009. FY 2008 - Yellowstone National Park - Wetland Plant Propagation (short version). Aberdeen Plant Materials Center, Aberdeen, Idaho. January 20, 2009. 3p.

St. John, L. 2009. Grand Teton National Park - FY 2008 report (short version). Aberdeen Plant Materials Center, Aberdeen, Idaho. January 20, 2009. 4p.

St. John, L. 2008. Hybrid Poplar Initial Evaluation - 2008 Progress Report. Aberdeen Plant Materials Center, Aberdeen, ID. October 2, 2008. 2p.

St. John, L. 2009. National Park Service - FY 2008 Wetland Establishment Research Study (short version). Aberdeen Plant Materials Center, Aberdeen, Idaho. January 20, 2009. 4p.

St. John, L, D.G. Ogle and N.L. Shaw 2009. Plant Guide - Sharpleaf Penstemon. Aberdeen Plant Materials Center, Aberdeen, Idaho. January 20, 2009. 3p.

St. John L. and D.G. Ogle 2009. Great Basin Native Plant Selection and Increase Project - 2008 Progress Report from Aberdeen Plant Materials Center. Aberdeen Plant Materials Center, Aberdeen, Idaho. February 27, 2009. 15p.

St. John and D.G. Ogle 2009. Agronomy Technical Note #9 Vegetative Filter or Buffer Strips. Aberdeen Plant Materials Center, Aberdeen, ID. October 1, 2008. 12p.

St. John, L, D.G. Ogle, J.Scianna, S. Winslow, C. Hoag and D. Tilley 2009. Technical Note No. 1 Plant Materials Collection Guide. Aberdeen Plant Materials Center, Aberdeen, ID. February 27, 2009. 17p.

Hoag, JC and D Tilley 2009. View from a Wetland 2008. Aberdeen PMC, Aberdeen, ID. Number 14 (2008). 4p.

Hoag, JC 2008. Wetland Sodmats. Aberdeen PMC, Aberdeen, ID. Tech Note 22. 5p.

Fripp, J, JC Hoag, and T. Moody 2008. Streambank Soil Bioengineering: A Proposed Refinement of the Definition. Aberdeen PMC, Aberdeen, ID. Information Series 23. 13p.

compiled by L. St. John 2009. Aberdeen Plant Materials Center 2008 Annual Technical Report. Aberdeen Plant Materials Center, Aberdeen, ID. February 10, 2009. 524p.

Blaker, P. and L. St. John 2008. Foundation Seed Production at Aberdeen Plant Materials Center (2000-2008). Aberdeen Plant Materials Center, Aberdeen, Idaho. October 10, 2008. 1p.

Arp, Ron 2008. Zeba Tested in Reclamation Grasses, Wildflowers. Amplify Group, Nov. 28, 2008. 1p.

Tilley, Derek J. and Daniel G. Ogle 2009. Field and Demonstration Plantings. USDA NRCS, Boise, Idaho. March 2009. 17p.

Ogle, Daniel G., Mark Stannard and Thomas Jones 2009. Snake River Wheatgrass. USDA NRCS, Boise, ID. October 2008. 4p.

Ogle, Dan, Derek Tilley and Loren St John 2009. Plant and Seed Vendors for ID-MT-NV-OR-UT-WA-WY. USDA NRCS, Boise, ID. October 2008. 24p.

Ogle, Dan, D Tilley, M Majerus, R Hybner, L Holzworth, M Stannard 2009. Sandberg Bluegrass. USDA NRCS, Boise, ID. October 2008. 7p.

Ogle, Dan and Loren St. John 2009. Plants for Saline to Sodic Soil Conditions. USDA NRCS, Boise, Idaho. October 2008. 12p.

Ogle, Dan and Jay Davison 2009. Switchgrass for the Intermountain West. USDA NRCS, Boise, ID, Reno, NV, SLC, UT. October 2008. 8p.

Ogle, Dan 2009. 2008 Idaho Plant Materials Evaluation Summaries - Field, Seed Increase and Demonstration. USDA NRCS, Boise, Idaho. February 2009. 35p.

Ogle, Dan 2009. 2008 Utah Plant Materials Evaluation Summaries - Field, Seed Increase and Demonstration. USDA NRCS, Boise, Idaho. February 2009. 11p.

Ogle, Daniel G., Mark Skinner, Loren St. John, James Briggs and Elizabeth Neese 2008. Cheatgrass. USDA NRCS, Boise, ID. November 2008. 5p.

Jensen, Kevin B., Anthony Palazzo, Blair Waldron, Joseph Robins, Shaun Bushman, Doug Johnson and Dan Ogle 2009. 'Vavilov II' a New Siberian Wheatgrass Cultivar with Improved Persistence and Establishment on Rangelands. Journal of Plant Registrations, Logan, Utah. Vol. 3, No.1 January 2009. 4p.

Hoag, Chris and Dan Ogle 2009. The Stinger A Tool to Plant Unrooted Hardwood Cuttings. USDA NRCS, Boise, ID. October 2008. 12p.

PRESENTATIONS

Date: 9/16/2008
Title: Streambank Soil Bioengineering Technical Training at Yreka, CA
Presenter: Hoag, JC and J Fripp Location: Etna, CA

Date: 9/18/2008
Title: Streambank Soil Bioengineering field exercise at Yreka, CA
Presenter: Hoag, JC and J Fripp Location: Etna, CA

Date: 9/22/2008
Title: Riparian Issues that affect Arborists at the National Arborists Convention, Boise, ID
Presenter: Hoag, JC Location: Boise, ID

Date: 9/24/2008
Title: Assessment and inventory of Cottonwood Cr, Muffler Slough, and Martin Cr in Paradise Valley, NV
Presenter: Hoag, JC Location: Paradise Valley, NV

Date: 10/1/2008
Title: Streambank Soil Bioengineering Technical Training for Teton Regional Land Trust at Driggs, ID
Presenter: Hoag, JC Location: Driggs, ID

Date: 10/2/2008
Title: Assessment of Camas Cr and Spring Cr after excluding grazing for one grazing season - Rigby, ID
Presenter: Hoag, JC Location: Rigby, ID

Date: 10/7/2008
Title: Streambank Soil Bioengineering Technical Training Nevada 2008
Presenter: Hoag, JC and J. Fripp Location: Elko, NV

Date: 10/9/2008
Title: Streambank Soil Bioengineering Technical Training Field Exercise at Cottonwood Creek, NV
Presenter: Hoag, JC and J Fripp Location: Cottonwood Creek, NV

Date: 11/6/2008
Title: Management Strategies and Plant Materials for Rangelands - The Role of Plant Materials Centers
Presenter: L. St. John Location: Provo, UT

Date: 11/13/2008
Title: Testing and Selecting Plants for Rangeland Rehabilitation
Presenter: L. St. John Location: Idaho Falls, ID

Date: 11/19/2008
Title: Evaluation of riparian planting methods on the Trinity River for the Trinity River Restoration Project in Weaverville, CA
Presenter: Hoag, JC Location: Trinity River Restoration Project, Weaverville,

Date: 1/14/2009
Title: Overview of Aberdeen Plant Materials Center
Presenter: L. St. John Location: Aberdeen PMC

Date: 1/22/2009
Title: Technology Transfer update to the Idaho Plant Materials Committee Meeting Members
Presenter: Hoag, J.C. Location: Boise, ID

Date: 1/22/2009
Title: 2008 PMC Activities for Idaho NRCS Plant Materials Committee
Presenter: L. St. John Location: Boise, Idaho

Date: 1/27/2009
Title: 2008 PMC Activities Update to Utah Plant Materials Committee Meeting
Presenter: L. St. John Location: Provo, UT

Date: 2/18/2009
Title: Soil and water needs of riparian and wetland plants on the middle John Day River
Presenter: Hoag, JC Location: Warm Springs Indian Reservation, Warm

Date: 3/4/2009
Title: Assessment and planting design of a riparian restoration project on the Santa Clara River near Gunlock, UT
Presenter: Hoag, JC Location: St. George, UT

Date: 3/24/2009
Title: Status of Riparian Restoration Projects over a 20 year period
Presenter: Hoag, J.C. Location: 5th Intermountain Native Plant Summit, Boise,

Date: 3/25/2009
Title: Aberdeen Plant Materials
Center - Conserving Ecosystems of the West
Presenter: St. John, Ogle Location: Boise, Idaho

Date: 3/25/2009
Title: Helping People Help the Land in the Intermountain West
Presenter: L. St. John Location: Boise, ID

Date: 3/31/2009
Title: Aberdeen Plant Materials Center 2008 Activities - Great Basin Native Plant Selection and Increase Project
Presenter: L. St. John Location: Boise, Idaho

Date: 4/1/2009
Title: Aberdeen Plant Materials Center - Conserving Ecosystems of the West
Presenter: St. John, Ogle Location: Ontario, OR

Date: 4/7/2009
Title: Wetland plants and constructed wetland systems: their role in improving water quality
Presenter: Hoag, JC Location: North City Wetlands, Pocatello, ID

Date: 6/2/2009
Title: Restoration of disturbed sites with native plants: an Integrated approach
Presenter: Hoag, JC, K Wilkinson, T Location: Sunriver, OR

Date: 6/16/2009
Title: Plant Materials Training
Presenter: PMC Staff Location: Aberdeen PMC

Date: 6/26/2009
Title: Tour for Chinese and Russian Scientists.
Presenter: L. St. John Location: Aberdeen PMC

Date: 7/10/2009
Title: PMC tour for Idaho State Office Administrative Assistants
Presenter: PMC Staff Location: Aberdeen PMC

Date: 7/15/2009
Title: Aberdeen Plant Materials Center Open House
Presenter: St. John, Blaker Location: Aberdeen PMC

Date: 7/21/2009
Title: Wetland Restoration and Enhancement
Presenter: Hoag, JC Location: Burlington, IA

Date: 8/18/2009
Title: Evaluations and recommendations on riparian planting methods used in dredge tailing on middle fork of John Day River
Presenter: Hoag, JC Location: Warms Springs Indian Reservation, OR

Date: 8/19/2009
Title: Evaluation of McCoy Creek and Meadow Cr, OR plantings
Presenter: Hoag, JC Location: McCoy Cr and Meadow Cr. Near LaGrande,

Date: 9/1/2009
Title: PMC tour for Farm Credit Association
Presenter: L. St. John Location: Aberdeen PMC

Date: 9/8/2009
Title: restoration of riparian vegetation on Crow Creek, Afton, WY
Presenter: Hoag, JC Location: Crow Creek, Afton, WY

Date: 9/22/2009
Title: Wetland Plant Propagation and Seed Increase for Yellowstone National Park.
Presenter: L. St. John Location: Mammoth Hot Springs, YNP

Date: 1/16/2009
Title: NRCS Poster
Presenter: Dan Ogle Location: Boise, Idaho

Date: 1/16/2009
Title: Planting Considerations
Presenter: Dan Ogle Location: Boise, Idaho

Date: 1/22/2009
Title: Idaho Plant Materials Committee Meeting
Presenter: Dan Ogle Location: Boise, Idaho

Date: 1/27/2009
Title: Utah Plant Materials Committee Meeting
Presenter: Dan Ogle Location: Provo, Utah

Date: 3/26/2009
Title: Seed Buy-Back Program Proposal
Presenter: Stan Young and Dan Ogle Location: Boise, Idaho

Date: 4/1/2009
Title: Species Considerations - Native Grasses and Forbs
Presenter: Dan Ogle Location: Ontario, Oregon

Date: 4/9/2009
Title: CRP Inventory and Mid Management Practice Planning
Presenter: Dan Ogle Location: Lewiston, Idaho

Date: 6/16/2009
Title: Plant Identification and Adaptation
Presenter: Dan Ogle Location: Aberdeen PMC

Date: 6/16/2009
Title: Planning a Seeding
Presenter: Dan Ogle Location: Aberdeen PMC

Date: 6/16/2009
Title: Plant Materials to Solve Resource Concerns
Presenter: Dan Ogle Location: Aberdeen PMC

Date: 6/18/2009
Title: Field Plantings and Planting Evaluations
Presenter: Dan Ogle Location: Aberdeen PMC

Note: *Trade names are used solely to provide specific information and should not be considered a recommendation or endorsement by the Natural Resources Conservation Service.*

NEW PLANT RELEASE

'Recovery' Western Wheatgrass

The United States Department of Agriculture - Agricultural Research Service, the United States Department of Army Corps of Engineers - Engineer Research and Development Center, and the United States Department of Agriculture - Natural Resources Conservation Service announce the release of the cultivar 'Recovery' western. It was developed as a rapidly establishing grass for revegetation of semiarid rangelands in the Intermountain West, Great Basin, and Northern Great Plains regions of the western United States. It is especially intended for revegetation of frequently disturbed rangelands, military training lands, and areas with repeated wildfires. Recovery was evaluated in field trials as TC3, TC-Rich, Army WWG, SERDP WWG, and 9076517 (NRCS designation). Recovery was developed as part of the Strategic Environmental Research and Development Program project CS-1103 to identify resilient plant characteristics and develop wear-resistant plant cultivars for use on military training lands. Recovery was selected for seedling establishment under rangeland conditions and has been extensively evaluated at semiarid sites representative of different ecological regions in northern plains and western U.S. Overall, it has shown superior and faster seedling establishment compared to commercially available cultivars Arriba, Barton, Flintlock, Rodan, and Rosana.

The development of Recovery western wheatgrass was initiated to breed a western wheatgrass cultivar with rapid establishment for use in areas that are frequently disturbed such as military training lands. Recovery traces it parentage to three maternal sources and was selected for superior vegetative vigor, seed yield, and seedling establishment. The parentage consists of Rosana (28%), D2945 (50%), and WW117FC (22%). Rosana traces to USDA-NRCS, Bridger Plant Materials Center collections from a native meadow near Forsyth, MT and was released in 1972 having improved seedling establishment, sod-forming ability, and forage and seed production (U.S. Department of Agriculture, 1995). Accession D2945, evaluated as Mandan456 or T05659, is a different seed lot of the same population that gave rise to Rodan western wheatgrass. WW117FC is a native western wheatgrass collection made by the USDA-ARS Forage and Range Research Lab from the Fort Carson Army base near the site of the initial evaluations.

The breeding of Recovery was initiated in 1996 with an evaluation trial of 14 germplasm sources at the Fort Carson, Turkey Creek Recreation area approximately 20 km south of Colorado Springs, CO. After two years of evaluation, five entries were identified with the desired phenotype. Open-pollinated seed was harvested in August 1998 from all plants within the five entries and 17 plants with the highest seed yield were identified. The seed from the 17 plants was screened for seedling vigor by determining rate of emergence from 6.35 cm, and 4 of the 17 plants were determined to have superior seedling vigor (one from Rosana, two from D2945, and one from WW117FC). A total of 196 seedlings (49 from each of the four parents) were intermated in a randomized crossing block. Of the 196 plants, 155 were identified with high seed production and used in the next cycle. Twenty-eight seeds from each of the 155 plants were planted at a 5 cm depth in cones. Those seedlings that emerged on or before 14 DAP were saved and pooled together by maternal source (559 plants from Rosana, 490 plants from D2945-1, 537 plants from D2945-2, and 446 plants from WW117FC). Seedlings were randomized and transplanted to an isolation block in Richmond, Utah, May 2001. Seed was harvested from the isolated block and designated as breeder seed. This seed was used for testing and morphological evaluation.

Rapid establishment is one of the keys to successful revegetation in the western U.S. Thus, western wheatgrasses' inherent slow establishment limits its effectiveness in reducing erosion and controlling weeds in areas with frequent, severe disturbances. During the spring of the establishment year, Recovery had significantly higher ($P \leq 0.05$) frequency of seedlings (0.60) than parental/closely-related cultivars Rosana (0.48) and Rodan (0.45), and the western wheatgrass cultivars of Arriba (0.45), Barton (0.42), and Flintlock (0.53) when analyzed across eight locations in Utah, Idaho, and Wyoming (Supporting Data, Table 1). Within locations, Recovery had significantly better establishment than Rodan in three of five test locations, and more than Rosana in three of eight test locations (Supporting Data, Table 1). On average, Recovery's establishment was better than Bozoisky Russian wildrye, similar to Bozoisky II Russian wildrye and Vavilov Siberian wheatgrass, and lower than Vavilov II Siberian wheatgrass and Hycrest and Hycrest II crested wheatgrasses (Supporting Data, Table 1).

The ability of seedlings to survive the first year after planting can be difficult due to competition from invasive annual and biennial grasses and forbs that benefit from the disturbed, open environment. Across locations, Recovery had significantly ($P \leq 0.05$) more surviving plants (frequency of 0.77) the year after establishment than parental/closely-related cultivars Rosana (0.68) and Rodan (0.66), and the western wheatgrass cultivars of Arriba

(0.63), Barton (0.68), and Flintlock (0.66) (Supporting Data, Fig. 1). In fact, Recovery had higher frequency ($P \leq 0.05$) of plants than any other western wheatgrass cultivar until the fourth to sixth year after planting (Supporting Data, Fig. 1). The equilibrating of stand frequency after this period of time is in part due to western wheatgrasses' extensive rhizomes that fill in blank areas of the plot, and in part because of the limited resources available on rangelands, thus restraining the number of plants that can be supported in a given area. The rapid establishment of Recovery, in comparison to other western wheatgrass cultivars, will allow land managers to use this native grass species to help limit weed infestation and soil erosion in areas where the regularity of disturbances normally prevents western wheatgrass from becoming fully established.

Forage yield of Recovery was not significantly different than other western wheatgrass cultivars at Blue Creek, UT and Curlew Valley, ID with the exception of a higher yield than Rosana at Curlew Valley. However, at Nephi, UT, Recovery forage yield was significantly lower than all other western wheatgrass cultivars except Arriba. Overall, these results suggest that Recovery will yield comparable or slightly less than other western wheatgrasses.

Overall, Recovery is similar in height as other western wheatgrasses, but has a longer spike than Arriba, Barton, and Rodan, and a wider spike than Barton, Flintlock, and Rodan. Recovery's flag leaf is oriented lower on the culm than Arriba and Barton, and at a similar position as Flintlock, Rodan, and Rosana. Recovery has a shorter flag leaf than Barton, but is similar to other western wheatgrass cultivars. On average, the flag leaf width of Recovery is similar to other cultivars; however, at the Nephi, UT location it was narrower than that for Arriba, Barton, Flintlock, and Rosana. These results indicate that in appearance, Recovery is most like Rosana and the least like Barton.

The USDA-NRCS conducts an environmental evaluation of all plant material releases. From this evaluation and the USDA-NRCS Plant Guide the following has been determined. Western wheatgrass is a long-lived perennial species that spreads primarily via rhizomes. It establishes only in areas where major disturbance has occurred, and has no perceivable negative impacts on native plant populations. It has no known allelopathic effects on other plants, and no negative impact on wildlife habitat. Western wheatgrass is not regarded as having any adverse negative characteristics that would preclude its use. (See Appendix A - Environmental Evaluation of Plant Materials Releases).

A Foundation seed production field was established at the USDA-NRCS Aberdeen Plant Materials Center in August 2005 and again in 2008. Foundation seed has been harvested each year beginning in 2007. The first Registered/Certified seed will be produced in 2009 in North Dakota and in 2010 in Idaho. Breeder, Foundation, Registered, and Certified seed classes will be recognized. Breeder seed will be maintained by the USDA-ARS Forage and Range Research Laboratory at Logan, UT, and Foundation seed will be maintained by the USDA-ARS Forage and Range Research Laboratory and the USDA-NRCS Plant Materials Center at Aberdeen, ID. Plant Variety Protection (PVP) will not be sought for this cultivar. Foundation seed is available through the following contacts: Foundation seed is available through the following contacts: Utah Crop Improvement Association (435-797-2082; sayoung@mendel.usu.edu) and University of Idaho Foundation Seed Program (208-423-6655; Williams@kimberly.uidaho.edu).

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USDA-ARS: B.L. Waldron (lead plant breeder, germplasm evaluation, breeding, and field trials); and K.B. Jensen, J.G. Robins, and M.D. Peel (germplasm evaluation, breeding, and field trials).

USDA-NRCS: D.G. Ogle (plant materials specialist); and L. St. John (PMC Manager – replicated plantings, foundation seed production).

U.S. Army Engineer Research and Development Center: A.J. Palazzo (germplasm evaluation, and SERDP and ERDC project manager); and T.J. Cary (germplasm evaluation and field trials).

RELEASE DATE FOR PUBLICITY PURPOSES SHALL BE EFFECTIVE ON THE DATE OF THE FINAL SIGNATURE ON THE RELEASE NOTICE.

APPROVAL SIGNATURES:

11/18/09
Date

Antonio J. Palazzo, Principle Investigator,
ERDC, CE, CRREL
Department of the Army

12/7/09
Date

National Program Leader - Plant Materials
Mike Hubbs, Director, Ecol. Sci. Div.
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12/10/09
Date

Administrator,
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Supporting Data

Table 1. Establishment year stand of 'Recovery' western wheatgrass compared with standard western wheatgrass and other rangeland grass checks at eight locations. Stand establishment measured as seedling frequency during the first May or June following a late-fall-dormant or early-spring planting.

Cultivar†	Beaver, UT	Guernsey, WY – site 1	Guernsey, WY – site 2	Malta, ID	Fillmore, UT – site 1	Fillmore, UT – site 2	Curlew Valley, ID	Yakima, WA	Across loc. Mean
Recovery	**0.54**	**0.61**	**0.51**	**0.68**	**0.66**	**0.63**	**0.46**	**0.73**	**0.60**
WWG checks									
Arriba	0.21*	.	.	0.41*	0.54	0.82	0.44	.	0.45*
Barton	0.36*	.	.	0.55*	0.38*	0.64	0.37	.	0.42*
Flintlock	.	0.57	0.22*	.	.	0.84	.	.	0.53*
Rodan	0.25*	.	.	0.55*	0.48*	0.78	0.39	.	0.45*
Rosana	0.51	0.55	0.39	0.45*	0.35*	0.73	0.49	0.40*	0.48*
SB3	0.40*	0.54	0.49	0.69	0.45*	0.88	0.34*	.	0.53*
Other checks									
Bannock	0.73	0.50	0.51	.	.	.	.	.	0.61
Bozoisky	0.72	0.17	0.65	0.61	0.21	0.63	0.56	.	0.50
Bozoisky_II	0.70	0.48	0.50	0.67	0.23	.	0.60	0.54	0.55
Firststrike	0.84	0.81	0.62	0.86	0.56	0.81	.	0.82	0.75
Hycrest	0.86	.	.	0.92	0.65	.	0.56	.	0.74
Hycrest_II	0.90	.	.	0.94	0.64	0.63	0.72	.	0.73
Vavilov	0.82	0.38	0.65	0.92	0.54	.	0.40	0.23	0.58
Vavilov_II	0.94	0.54	0.67	0.95	0.79	.	0.70	0.52	0.76
WWG mean	0.38	0.57	0.40	0.56	0.48	0.76	0.41	0.56	0.50
Entry Mean	0.62	0.52	0.52	0.71	0.50	0.74	0.50	0.54	0.58
LSD (0.05)	0.13	0.23	0.18	0.12	0.18	0.18	0.12	0.17	0.06

†Designations in this column include: WWG=western wheatgrass; SB3 is a WWG breeding population closely related to Recovery; Bannock is a thickspike wheatgrass; Bozoisky and Bozoisky II are Russian wildryes; Firststrike is a slender wheatgrass; Hycrest and Hycrest II are crested wheatgrasses; and Vavilov and Vavilov II are Siberian wheatgrasses.

*Western wheatgrass check cultivars with stand frequency significantly ($P < 0.05$) lower than Recovery western wheatgrass.

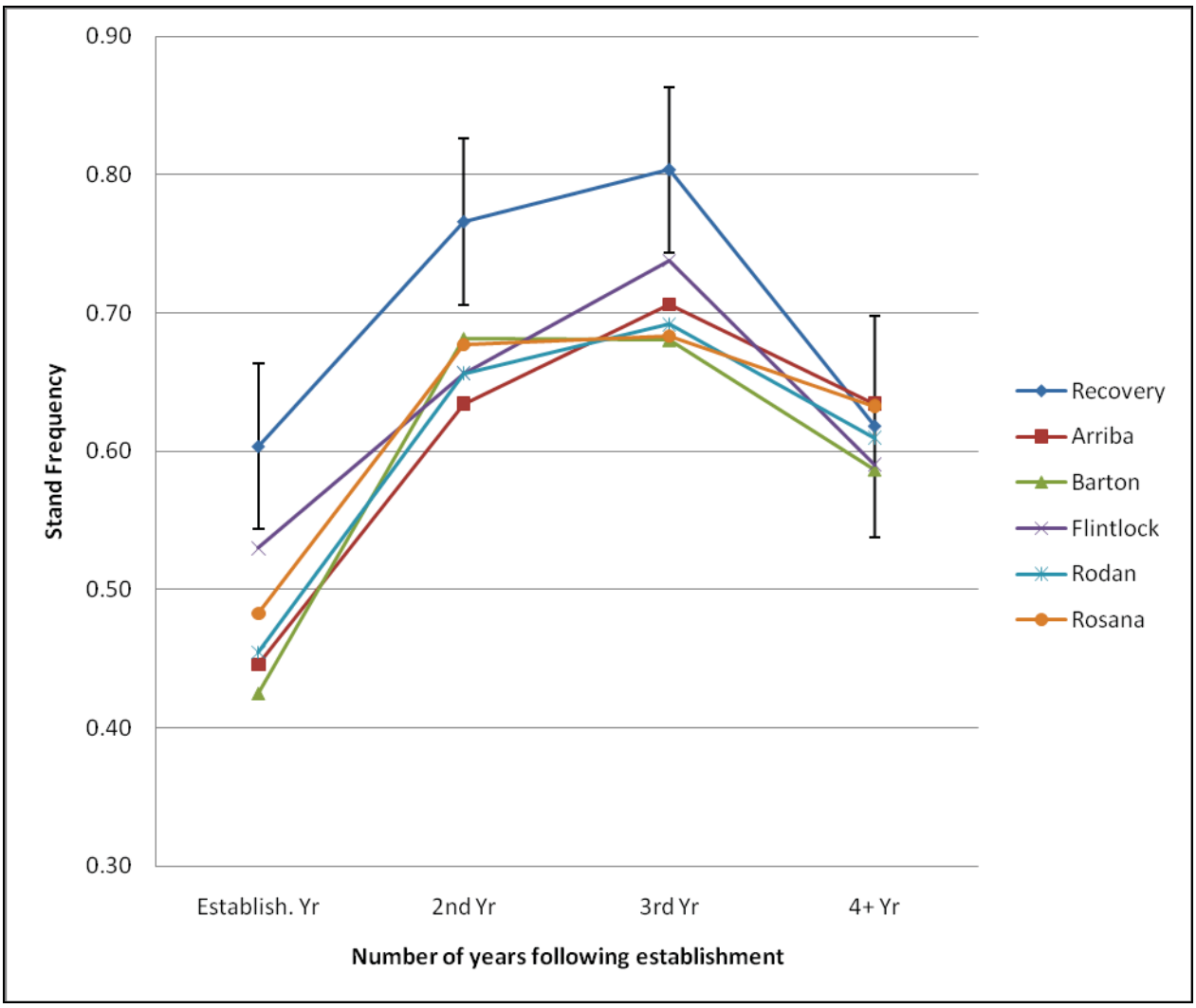


Figure 1. Stand of Recovery western wheatgrass as compared to standard western wheatgrass checks when evaluated at eight locations throughout the western U.S. Error bars are the LSD value at the P=0.05 probability level. The "4+ Yr" category is the latest evaluation taken at a given site and ranges from four to six years after planting.

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 2001 through 2009:

Cultivar	2001	2002	2003	2004	2005	2006	2007	2008	2009	TOTAL POUNDS
					POUNDS PLS					
Anatone bluebunch wheatgrass	-	-	-	20	250	350	400	775	450	2245
Appar blue flax	300	470	65	0	848	955	150	150	200	3138
Bannock thickspike wheatgrass	250	550	25	0	1110	900	240	150	0	3225
Delar small burnet	150	75	0	1250	945	490	100	1225	0	4235
Ephraim crested wheatgrass	455	696	0	200	0	1300	300	500	605	4056
Goldar bluebunch wheatgrass	100	375	250	200	200	170	250	450	300	2295
Magnar basin wildrye	1035	490	150	245	0	0	490	50	0	2460
Maple Grove Lewis flax	-	-	-	240	280	70	0	0	0	590
Nezpar Indian ricegrass	150	75	340	0	300	500	700	150	100	2315
P-27 Siberian wheatgrass	200	500	0	0	0	0	200	200	0	1100
Penstemon "Clearwater Selection"	10	1	10	4	8	0	0	0	1	34
Penstemon "Richfield Selection"	1	7	6	3	11	25	6	4	11	74
Paiute orchardgrass	450	200	0	0	0	75	200	50	300	1275
Recovery western wheatgrass	-	-	-	-	-	-	-	-	400	400
Regar meadow brome	1061	207	50	50	0	650	50	400	0	2468
Rush intermediate wheatgrass	525	0	0	0	800	300	500	0	0	2125
S.R.P. fourwing saltbush	-	25	5	2	16	0	0	0	0	48
Sodar streambank wheatgrass	500	500	200	0	625	775	250	400	50	3300
Tegmar dwarf intermediate wheatgrass	0	0	0	200	0	0	0	0	250	450
Northern Cold Desert winterfat	-	8	3	8	20	5	4	0	0	48
Vavilov II Siberian wheatgrass	-	-	-	-	-	-	-	600	300	900
TOTAL POUNDS	5,187	4,179	1,104	2,422	5,413	6,565	3,840	5,104	2,967	36,781

April 14, 2009

Aberdeen Plant Materials Center

2009 FIELD ANNUAL PLAN OF OPERATION
HOME FARM

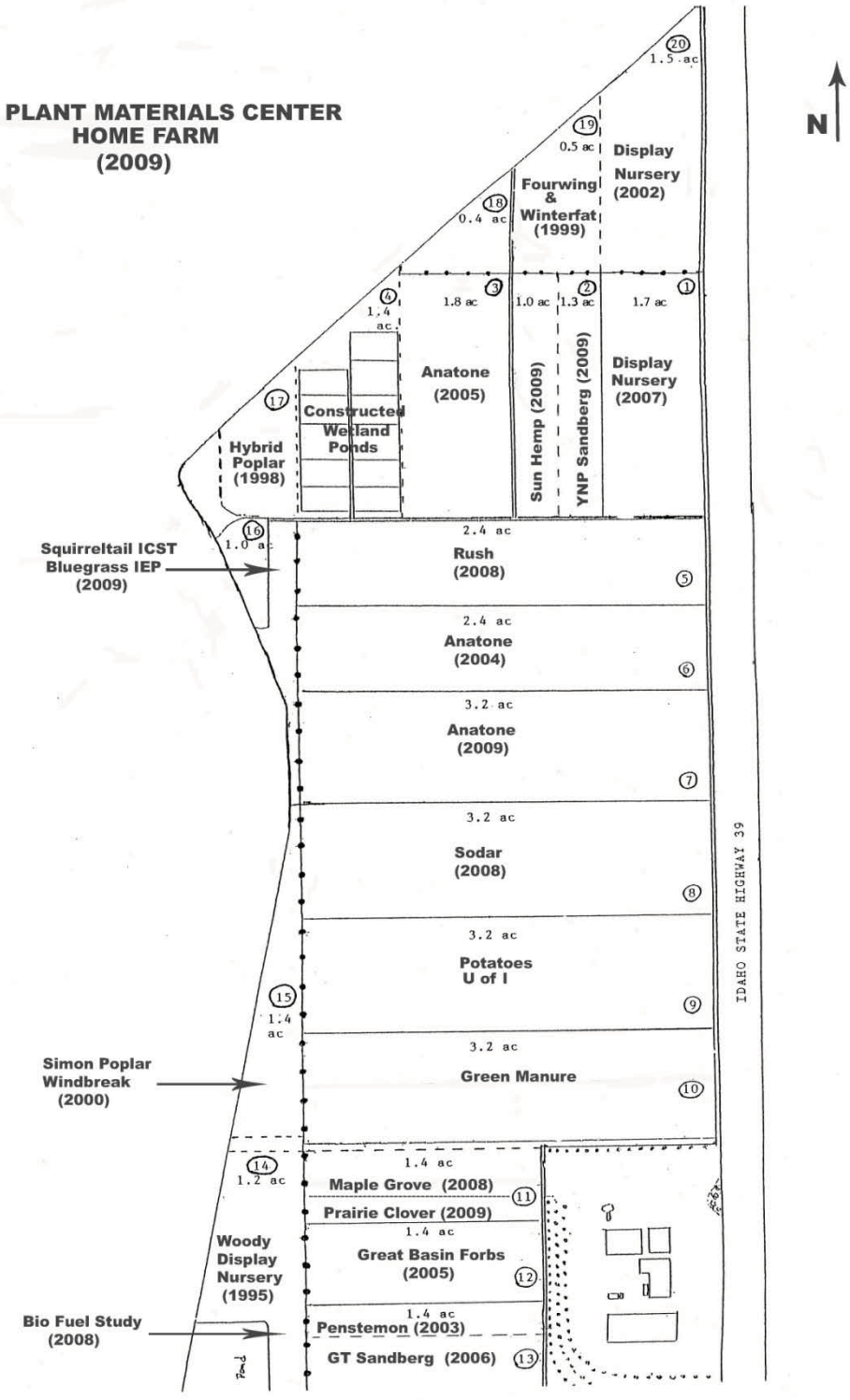
Field	Acres	Crop	Operation
1	1.7	Display Nursery (2007)	Manage for display.
2E	1.3	Sandberg Bluegrass (2009) (Yellowstone NP)	Establish and manage for seed production.
2W	1.0	Sun Hemp Cover Crop	Establish, manage and evaluate according to study plan.
3	1.8	Anatone Bluebunch (2005)	Manage for Certified seed production.
4	1.4	Constructed Wetland Ponds	Evaluate test plots according to study plan.
5	2.4	Rush (2008)	Manage for Foundation seed production.
6	2.4	Anatone Bluebunch (2004)	Manage for Certified seed production.
7	3.2	Anatone (2009)	Establish and manage for Certified seed production.
8	3.2	Sodar (2008)	Manage for Foundation seed production.
9	3.2	Potatoes	U of I will plant potatoes.
10	3.2	Green Manure	Establish annual legume for plow down.
11N	1.1	Maple Grove (2008)	Manage for Certified seed production.
11S	0.2	Prairie Clover (2009)	Establish seed increase and cooperate in release.
12	1.4	Buckwheat IEP (2007)	Evaluate and manage according to study plan.
		Great Basin Forbs (2005)	Evaluate for potential release.
13N	0.1	Penstemon (2003)	Manage for Certified seed production.
13S	0.25	Sandberg Bluegrass (Grand Teton NP - 2006)	Manage for seed production.
14	1.2	Woody Display Nursery (1995)	Maintain display of woody conservation plants. Manage Durar/Covar cover crop.
14S	0.3	Biofuel Study (2008)	Manage and evaluate according to study plan.

Aberdeen Plant Materials Center

2009 FIELD ANNUAL PLAN OF OPERATION

HOME FARM (Continued)

Field	Acres	Crop	Operation
15	1.4	Field windbreak (2000)	Maintain Simon poplar field windbreak.
16	1.0	Squirreltail ICST (2009) Bluegrass IEP (2009)	Establish and evaluate according to study plans.
17	0.5	Hybrid Poplars (1998)	Manage and evaluate according to study plan.
18-19	0.9	Fourwing and winterfat (1999)	Manage for Certified seed production.
20	1.5	Grass Display Nursery (2002)	Maintain grass cover and control weeds.


PLANT MATERIALS CENTER
HOME FARM
(2009)
N
20
1.5 ac
19
0.5 ac
Display
Nursery
(2002)
Fourwing
&
Winterfat
(1999)
18
0.4 ac
4
1.4
ac.
3
1.8 ac
1.0 ac
2
1.3 ac
1
1.7 ac
Anatone
(2005)
Sun Hemp (2009)
YNP Sandberg (2009)
Display
Nursery
(2007)
17
Constructed
Wetland
Ponds
Hybrid
Poplar
(1998)
16
1.0 ac
2.4 ac
Rush
(2008)
5
Squirreltail ICST
Bluegrass IEP
(2009)
2.4 ac
Anatone
(2004)
6
3.2 ac
Anatone
(2009)
7
3.2 ac
Sodar
(2008)
8
3.2 ac
Potatoes
U of I
9
15
1.4
ac
3.2 ac
Green Manure
10
Simon Poplar
Windbreak
(2000)
14
1.2 ac
1.4 ac
Maple Grove (2008)
11
Prairie Clover (2009)
1.4 ac
Great Basin Forbs
(2005)
12
Woody
Display
Nursery
(1995)
1.4 ac
Penstemon (2003)
GT Sandberg (2006)
13
Bio Fuel Study
(2008)
Pond
IDAHO STATE HIGHWAY 39

Aberdeen Plant Materials Center

2009 FIELD ANNUAL PLAN OF OPERATION

FISH AND GAME FARM

Field	Acres	Crop	Operation
21W	0.2	Bluebunch Wheatgrass (Grand Teton NP – 2008)	Manage for seed production.
21W	0.3	Idaho Fescue (Grand Teton NP – 2008)	Manage for seed production.
21M	1.3	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
21E	1.4	Pipe yard (2004)	Maintain permanent yard for pipe storage.
21N	1.3	Bozoisky Cover crop (1985)	Maintain as needed for permanent cover.
22W	4.1	Alfalfa (2008)	Manage for hay production and wildlife benefits.
22E	1.3	Willow IEP (1984)	Maintain for wildlife cover.
23W	2.4	Bozoisky Cover crop (2007)	Maintain as needed for permanent cover.
23M	--	Windbreak	Maintain and irrigate as needed.
23E	2.2	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
24W	1.1	Windbreaks	Maintain and irrigate as needed.
24 M	2.2	Wildlife Food Plot	Establish and maintain corn for wildlife use.
24E	1.5	Durar Cover Crop	Maintain as needed for permanent cover.
25W	1.5	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
25E	3.5	Goldar (2009)	Establish and manage for Foundation seed production.
26W	1.0	Bozoisky Cover crop (2005)	Maintain as needed for permanent cover.
26E	2.7	Willow Cutting Nursery (1994)	Maintain as needed.
27W	2.2	Bozoisky Cover crop (2005)	Maintain as needed for permanent cover.
27M	1.2	Bozoisky Cover crop (2007)	Maintain as needed for permanent cover.
27E	1.0	Slender Wheatgrass (Grand Teton NP - 2006)	Manage for seed production.
28	5.3	Alfalfa (2004)	Manage for hay production and wildlife benefits.
29W	1.3	Willows (1994)	Manage for cuttings.
29E	3.7	Alfalfa (2008)	Manage for hay production and wildlife benefits.

Aberdeen Plant Materials Center

2009 FIELD ANNUAL PLAN OF OPERATION (continued)

FISH AND GAME FARM (continued)

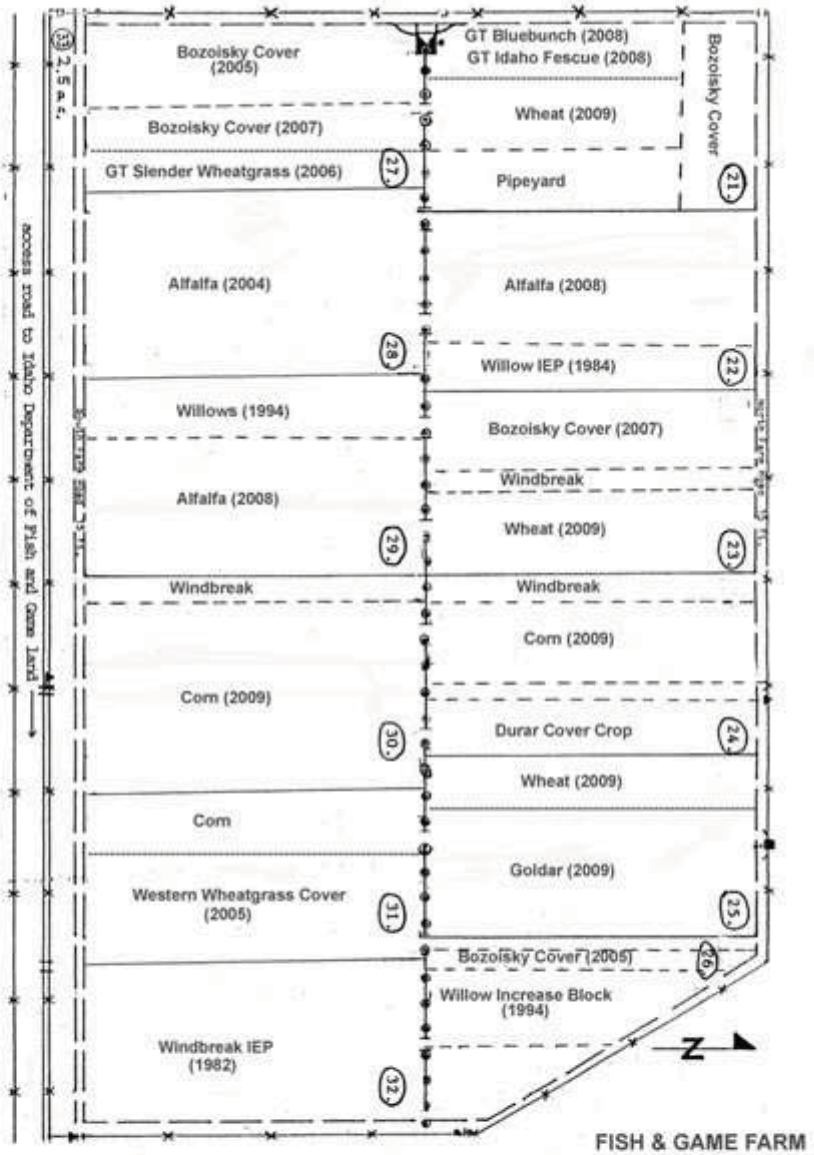
Field	Acres	Crop	Operation
30W	0.7	Windbreak/Guard Row	Maintain and irrigate as needed.
30M	2.5	Wildlife Food Plot	Establish and maintain corn for wildlife use.
30E	2.3	Wildlife Food Plot	Establish and maintain corn for wildlife use.
31W	1.5	Wildlife Food Plot	Establish and maintain corn for wildlife use.
31E	3.75	DOD Western w.g. (2005)	Maintain for wildlife cover.
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)

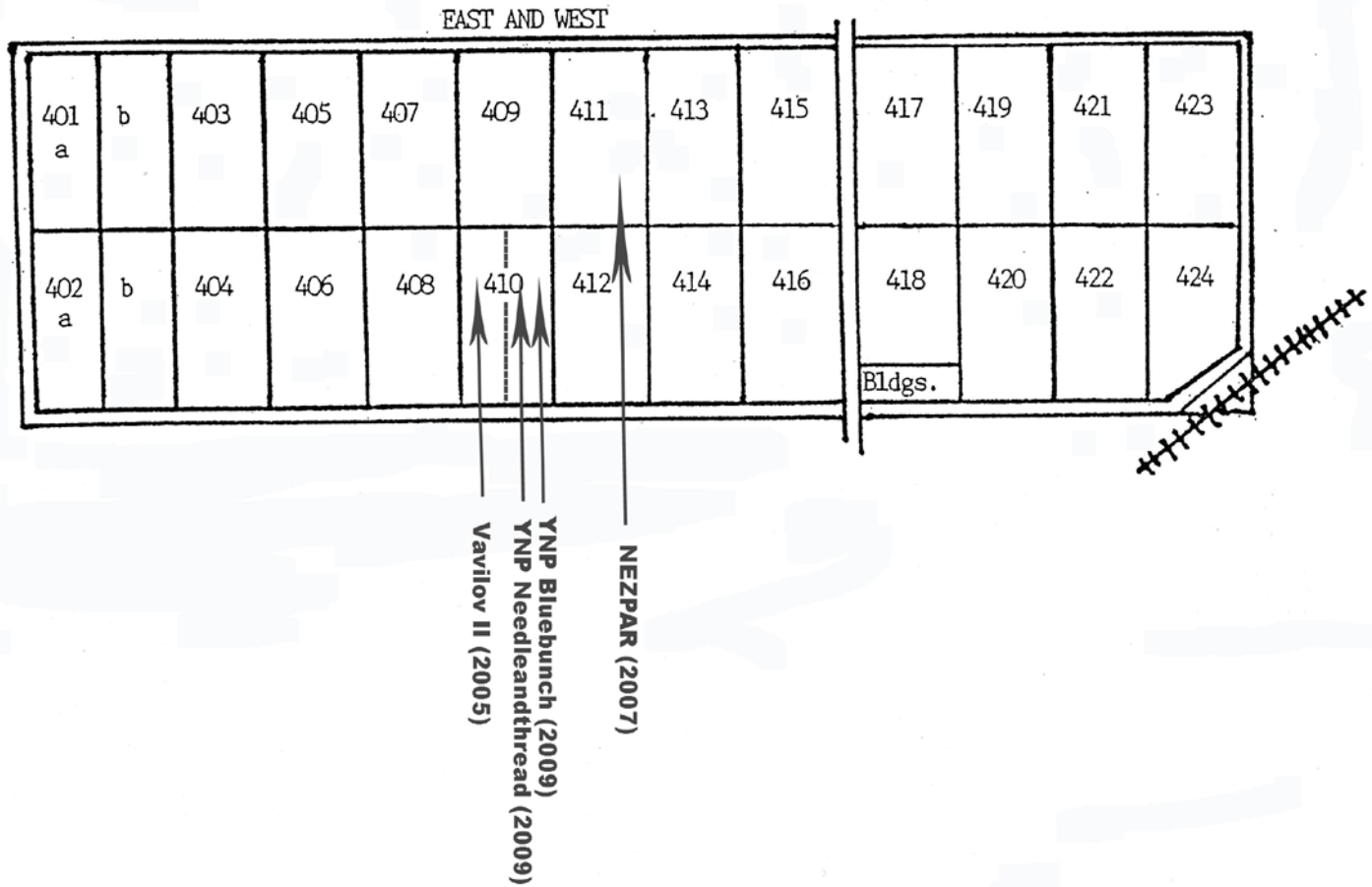
Field	Acres	Crop	Operation
410W	2.0	Vavilov II Siberian w.g. (2005)	Manage for Foundation seed production.
410M	1.0	Needleandthread (2009) (Yellowstone NP)	Establish and manage for seed production.
410E	1.0	Bluebunch Wheatgrass (2009) (Yellowstone NP)	Establish and manage for seed production.
411	4.5	Nezpar (2007)	Manage for Foundation seed production.



FISH & GAME FARM
(2009)

UNIVERSITY OF IDAHO

BREWINGTON FARM (2009)



Aberdeen Plant Materials Center

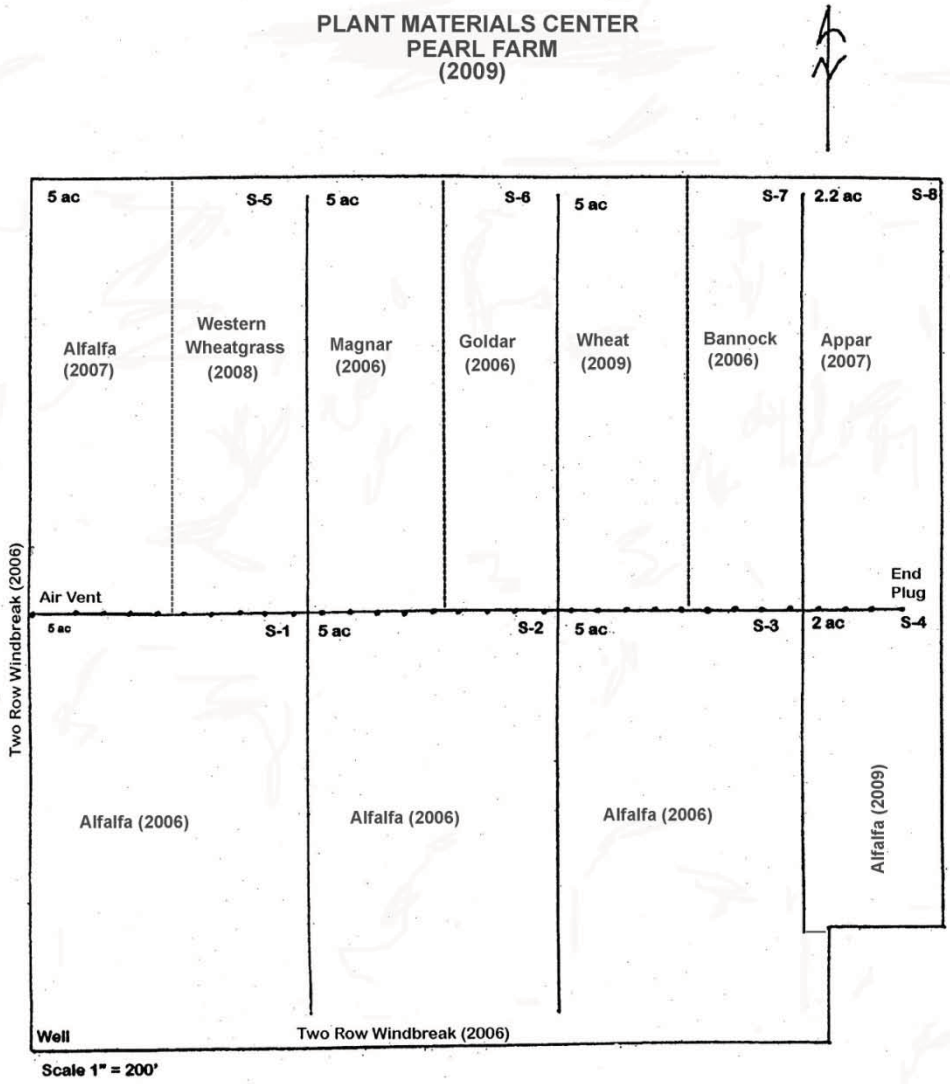
2009 FIELD ANNUAL PLAN OF OPERATION (continued)

PEARL FARM (continued)

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.
S4	2.0	Alfalfa (2009)	Establish and manage for hay and to improve soil quality.
S5W	2.5	Alfalfa (2007)	Maintain for hay production and to improve soil quality.
S5E	2.5	Western Wheatgrass (DOD – 2008)	Manage for Foundation seed.
S6W	2.5	Magnar (2006)	Manage for Foundation seed production.
S6E	2.5	Goldar (2006)	Manage for Foundation seed production.
S7W	2.5	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
S7E	2.5	Bannock (2006)	Manage for Foundation seed production.
S8	2.2	Appar	Manage for Foundation seed production.

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

PLANT MATERIALS CENTER
PEARL FARM
(2009)



1998 - 2009 Progress Summary
Hybrid Poplar Initial Evaluation Planting
Field 17, Aberdeen PMC
Loren St. John, Team Leader

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

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

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

Between-row weed control was accomplished with mechanical cultivation between 1998 and 2000. The between-row area was seeded to a mixture of 'Durar' hard fescue and 'Bighorn' sheep fescue (3.5 pounds PLS per acre of each species) in June, 2001. The grass seeding is well established and controlling weeds. This report summarizes the data collected from 1998 to 2009.

1998 Evaluations

The following table summarizes evaluation data collected on September 25, 1998:

Accession No.	Survival (percent)	Height (cm)	Vigor 1/	Worm infestation 2/
9076418 (OP-367)*	88.9	136.7	2.7	3.0
9076421 (52-225)*	88.9	117.2	3.7	3.0
Siouxland	66.7	29.3	6.6	2.3
9076419 (184-411)*	55.6	35.1	7.6	1.8
9076420 (50-197)*	55.6	36.8	7.7	3.6
9076422 (15-29)*	55.6	68.1	5.7	2.7
Imperial	55.6	56.0	5.8	2.0
Robust	33.3	25.6	7.4	1.3
Canam	22.2	14.6	7.8	2.0

1/ vigor is a subjective rating of plant health with 1 best, 9 dead
2/ a subjective rating of infestation of Poplar tentmaker with 1 = none, 9 = severe
* the number in ( ) is the accession number assigned by Mt. Jefferson Farms

Survival ranged from 22.2 to 88.9 percent. The standards of comparison were expected to achieve survival rates of at least 90 percent but their poor survival was attributed to being unable to obtain dormant cuttings. Accession no. 9076418 and 9076421 had the best survival rates as well as the best growth rates and vigor.

The accessions were also rated for infestation by the Poplar tentmaker, *Clostera inclusa*. The larvae of this insect can completely defoliate young trees. Robust had the least infestation and accession no. 9076420 had the highest infestation.

1999 Evaluations

On June 1, 1999 forty-three plots were re-planted. Most of the replacements were for those plots which did not establish during the first growing season. However, there was winterkill, especially accession nos. 9076419 and 9076420. Table 1 summarizes the evaluation data collected during 1999.

The plots were evaluated on September 23, 1999. 9076418 (OP-367) and 9076419 (52-225) had the best survival and were the tallest. These two accessions appear to be the best-adapted accessions to the soil and climate in the Snake River Plains of southeastern Idaho. 9076419 (184-411) and 9076420 (50-197) had the best vigor ratings from the original planting. No pests were observed on the plants this year.

Of the plots re-planted in 1999, accession no. 9076419 (184-411) had the best survival and was the tallest. Accession no. 9076422 (15-29) had the best vigor.

2000 Evaluations

The plots were evaluated on September 22, 2000 and the data is summarized in Table 2. 9076418 (OP-367) and 9076421 (52-225) had the best survival and were the tallest. These two accessions appear to be the best-adapted accessions to the soil and climate in the Snake River Plains of southeastern Idaho. 9076420 (50-197) and Robust had the best vigor ratings from the original planting. Accession no. 9076418 (OP-367) also had the largest mean D.B.H. 3.1 in (7.9 cm). Imperial, Siouxland, and 9076421 (52-225) plots exhibited chlorotic symptoms to varying degrees. No pests were observed on the plants this year.

Of the plots re-planted in 1999, Robust had the best survival and was the tallest. Imperial had the best vigor and 9076420 (50-197) had the largest mean D.B.H. 0.5 in (1.2 cm).

2001 Evaluations

The plots were evaluated on September 21, 2001 and the data is summarized in Table 3. 9076418 (OP-367) and 9076421 (52-225) continued to have the best survival and were the tallest. These two accessions appear to be the best-adapted accessions to the soil and climate in the Snake River Plains of southeastern Idaho. 9076418 (OP-367) and Robust had the best vigor ratings from the original planting. Accession no. 9076418 (OP-367) also had the largest mean D.B.H. 5.0 in (12.8 cm). Canam, Imperial, and 9076421 (52-225) plots exhibited chlorotic symptoms to varying degrees. No pests were observed on the plants this year.

Of the plots re-planted in 1999, Robust continued to have the best survival and the tallest average height. Robust also had the best vigor (3.7) and the largest mean D.B.H.1.7 in (4.3 cm).

2002 Evaluations

The plots were evaluated on September 20, 2002 and the data is summarized in Table 4. Accession no. 9076418 (OP-367) and 9076421 (52-225) continued to have the best survival. Accession no. 9076418 (OP-367) was the tallest (mean plant height 858 cm) and also had the largest D.B.H. (mean 16.6 cm). This accession appears to be the best adapted to the soil and climate in the Snake River Plains of southeastern Idaho. Accession no. 9076418 (OP-367) and Robust had the best vigor ratings from the original planting. No pests were observed on the plants this year.

Of the plots re-planted in 1999, Robust continued to have the best survival and the tallest average height. Robust also had the largest mean D.B.H. 3.3 in (8.4 cm).

2003 Evaluations

The plots were evaluated on September 19, 2003 and the data is summarized in Table 5. Accession no. 9076418 (OP-367) and 9076421 (52-225) continued to have the best survival. Accession no. 9076418 (OP-367) was the tallest mean plant height at 421 in (1069 cm) and also had the largest mean D.B.H. at 7.2 in (18.4 cm). This accession appears to be the best adapted to the soil and climate in the Snake River Plains of southeastern Idaho. Accession no. 9076418 (OP-367) and Siouxland had the best vigor ratings from the original planting. No pests were observed on the plants this year.

Of the plots re-planted in 1999, Robust continued to have the best survival and the tallest average height. Robust also had the largest mean D.B.H. at 5.6 in (14.2 cm).

2004 Evaluations

The plots were evaluated on September 17, 2004 and the data is summarized in Table 6. Accession no. 9076418 (OP-367) and 9076421 (52-225) continued to have the best survival. Accession no. 9076418 (OP-367) was the tallest mean height at 452 in (1148 cm) and also had the largest mean D.B.H. at 8.8 in (22.3 cm). 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) and Imperial had the best vigor ratings from the original planting. No pests were observed on the plants this year.

Of the plots re-planted in 1999, Robust continued to have the best survival and the tallest average height. Siouxland had the largest mean D.B.H. at 5.9 in (15.0 cm) of the plots that were re-planted in 1999.

2005 Evaluations

The plots were evaluated on September 16, 2005 and the data is summarized in Table 7. An Abney Level was used to measure plant height. Accession no. 9076418 (OP-367) and 9076421 (52-225) continued to have the best survival. Robust was the tallest mean height at 48.5 ft (14.8 m). Accession no. 9076418 (OP-367) had the largest mean D.B.H. at 10.9 in (27.9 cm). 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) and Robust had the best vigor ratings from the original planting. No pests were observed on the plants this year.

Of the plots re-planted in 1999, Robust had the best survival and Siouxland had the tallest average height. Imperial had the largest mean D.B.H. at 7.0 in (17.8 cm) of the plots that were re-planted in 1999.

2006 Evaluations

The plots were evaluated on September 18, 2006 and the data is summarized in Table 8. 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 height at 56.1 ft (17.1 m) and also had the largest mean D.B.H. at 12.3 in (31.2 cm). This accession continues to appear to be the best adapted to the soil and climate in the Snake River Plains of southeastern Idaho. Accession no. 9076418 (OP-367) also had the best vigor rating from the original planting in 1998. No destructive pests were observed on the plants this year.

Of the plots re-planted in 1999, Robust continued to have the best survival and Siouxland had the tallest average height. Robust also had the largest mean D.B.H. at 6.8 in (17.3 cm) 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.

2007 Evaluations

The plots were evaluated on September 13, 2007 and the data is summarized in Table 9. 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 height at 59.4 in (18.1 m) and also had the largest mean D.B.H. at 13.6 in (34.6 cm). 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. at 7.7 in (19.5 cm) of the plots that were re-planted in 1999.

2008 Evaluations

The plots were evaluated on September 17, 2008 and the data is summarized in Table 10. An Abney Level was used to measure plant height. Accession no. 9076418 (OP-367) continued to have the best survival. 9076418 (OP-367) was the tallest mean height at 60.0 ft (18.7 m) and also had the largest mean D.B.H. at 14.5 in (36.9 cm). This accession continues to appear to be the best adapted to the soil and climate in the Snake River Plains of southeastern Idaho. Accession no. 9076418 (OP-367) also had the best vigor rating from the original planting in 1998. No destructive pests were observed on the plants this year.

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

2009 Evaluations

The plots were evaluated on September 17, 2009 and the data is summarized in Table 11. An Abney Level was used to measure plant height. Accession no. 9076418 (OP-367) continued to have the best survival. 9076418 (OP-367) was the tallest mean height at 63.6 ft (19.4 m) and also had the largest mean D.B.H. at 15.1 in (38.3 cm). 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 (83 percent), tallest mean height of 50.1 ft (15.3 m), largest mean D.B.H. at 8.7 in (22.1 cm), and best vigor (4.3) of the plots that were re-planted in 1999.

Conclusion

Based on 12 years of evaluation data, accession 9076418 (OP-367) had the overall best survival, vigor and the best growth rates of the 9 accessions planted in the trial. The trial will be maintained to observe mortality of the accessions over time.

Table 1.
1999 Evaluation Data
1998 Hybrid Poplar Planting

Accession Number	Number Survived	Percent Survival	Plant Height (cm) Minimum	Mean	Maximum	Vigor [1/]
9076418 (OP-367)	8	88.9	270	352.5	385	2.4
9076419 (184-411)	1	11.1	-	300.0	-	2.0
9076420 (50-197)	1	11.1	-	310.0	-	2.0
9076421 (52-225)	8	88.9	130	292.5	415	4.3
9076422 (15-29)	5	55.5	230	275.0	330	2.8
Canam	2	22.2	240	250.0	260	6.5
Robust	3	33.3	70	206.7	320	2.7
Siouxland	5	55.5	99	174.8	290	3.2
Imperial	5	55.5	200	259.4	310	4.8

Re-planted Hybrid Poplar 1999

Accession Number	Number Re-planted	Percent Survival	Plant Height (cm) Minimum	Mean	Maximum	Vigor [1/]
9076418 (OP-367)	1	0	-	0	-	9.0
9076419 (184-411)	8	100	37	92.8	180	6.3
9076420 (50-197)	8	60	0	58.1	120	7.3
9076421 (52-225)	1	0	-	0.0	-	9.0
9076422 (15-29)	4	80	0	90.3	206	4.3
Canam	7	60	0	36.7	120	6.9
Robust	6	80	0	51.8	70	4.3
Siouxland	4	80	0	26.3	50	5.3
Imperial	4	50	0	17.3	60	7.5

[1/] Rated 1 – 9, with 1 best, 9 worst

Table 2.
2000 Evaluation Data
1998 Hybrid Poplar Planting

Accession Number	Number Survived	Percent Survival	Plant Height (cm) Minimum	Mean	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	8	88.9	399	512	600	7.9	2.6
9076419 (184-411)	1	11.1	--	194	--	1.0	4.0
9076420 (50-197)	1	11.1	--	496	--	7.0	2.0
9076421 (52-225)	8	88.9	170	309	587	2.9	3.9
9076422 (15-29)	5	55.5	150	236	305	0.9	3.8
Canam	2	22.2	320	353	386	3.3	6.5
Robust	3	33.3	238	377	505	3.3	2.3
Siouxland	5	55.5	304	367	478	3.6	3.4
Imperial	5	55.5	307	404	515	4.3	4.8

Re-planted Hybrid Poplar 1999

Accession Number	Number Re-planted	Percent Survival	Plant Height (cm) Minimum	Mean	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	1	0	--	--	--	--	9.0
9076419 (184-411)	8	12	--	170	--	--	3.0
9076420 (50-197)	8	12	--	246	--	1.2	3.0
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	0	--	--	--	--	9.0
Canam	7	57	104	123	313	0.6	7.4
Robust	6	83	219	223	314	1.1	3.8
Siouxland	4	50	153	169	185	0.3	6.3
Imperial	4	25	--	260	--	1.4	2.0

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

Table 3.
2001 Evaluation Data
1998 Hybrid Poplar Planting

Accession Number	Number Survived	Percent Survival	Plant Height (cm) Minimum	Mean	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	8	88.9	633	686	770	12.8	2.0
9076419 (184-411)	1	11.1	--	362	--	2.2	3.0
9076420 (50-197)	1	11.1	--	523	--	10.2	4.0
9076421 (52-225)	8	88.9	107	423	760	5.1	3.9
9076422 (15-29)	5	55.5	225	329	390	1.9	3.0
Canam	2	22.2	185	364	543	3.6	7.0
Robust	3	33.3	449	575	676	7.2	2.3
Siouxland	5	55.5	400	529	642	7.4	3.2
Imperial	5	55.5	383	522	635	7.9	5.0

Re-planted Hybrid Poplar 1999

Accession Number	Number Re-planted	Percent Survival	Plant Height (cm) Minimum	Avg.	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	1	0	--	--	--	--	9.0
9076419 (184-411)	8	12	0	--	310	0.2	8.3
9076420 (50-197)	8	12	0	--	523	0.2	8.4
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	25	0	4	16	--	8.8
Canam	7	57	315	368	462	1.8	7.3
Robust	6	83	425	463	504	4.3	3.7
Siouxland	4	50	117	229	342	0.7	7.3
Imperial	4	25	0	--	470	1.4	7.5

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

Table 4.
2002 Evaluation Data
1998 Hybrid Poplar Initial Evaluation Planting

Accession Number	Number Survived	Percent Survival	Plant Height (cm) Minimum	Mean	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	8	88.9	691	858	1000	16.6	1.8
9076419 (184-411)	1	11.1	--	--	429	2.0	3.0
9076420 (50-197)	1	11.1	--	--	642	12.0	3.0
9076421 (52-225)	8	88.9	60	536	800	8.3	4.3
9076422 (15-29)	5	55.5	362	466	545	3.4	3.6
Canam	2	22.2	312	522	732	5.5	4.5
Robust	3	33.3	640	688	760	10.0	2.0
Siouxland	5	55.5	504	670	800	10.2	2.2
Imperial	5	55.5	558	640	748	10.8	2.2

Re-planted Hybrid Poplar 1999

Accession Number	Number Re-planted	Percent Survival	Plant Height (cm) Minimum	Avg.	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	1	0	--	--	--	--	9.0
9076419 (184-411)	8	0	--	--	--	--	9.0
9076420 (50-197)	8	12	0	--	420	3.0	6.0
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	0	--	--	--	--	9.0
Canam	7	57	304	454	612	4.8	7.0
Robust	6	83	574	611	686	8.4	4.0
Siouxland	4	50	345	424	503	4.0	6.0
Imperial	4	25	0	--	635	8.0	3.0

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

Table 5.
2003 Evaluation Data
1998 Hybrid Poplar Initial Evaluation Planting

Accession Number	Number Survived	Percent Survival	Plant Height (cm) Minimum	Mean	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	8	88.9	851	1069	1370	18.4	2.4
9076419 (184-411)	1	11.1	--	--	457	3.0	3.0
9076420 (50-197)	1	11.1	--	--	753	13.0	6.0
9076421 (52-225)	7	77.7	69	685	912	8.4	6.9
9076422 (15-29)	4	44.4	535	676	821	6.8	4.0
Canam	1	11.1	--	--	378	2.0	4.0
Robust	3	33.3	505	634	760	13.0	3.7
Siouxland	5	55.5	695	924	1095	13.4	2.6
Imperial	5	55.5	750	867	1065	14.2	3.2

Re-planted Hybrid Poplar 1999

Accession Number	Number Re-planted	Percent Survival	Plant Height (cm) Minimum	Avg.	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	1	0	--	--	--	--	9.0
9076419 (184-411)	8	12	--	--	535	4.0	3.0
9076420 (50-197)	8	12	--	--	943	13.0	3.0
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	0	--	--	--	--	9.0
Canam	7	57	304	579	851	6.5	7.0
Robust	6	83	821	973	1126	14.2	3.7
Siouxland	4	75	635	424	1126	11.7	4.5
Imperial	4	25	--	--	699	12.0	3.0

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

Table 6.
2004 Evaluation Data
1998 Hybrid Poplar Initial Evaluation Planting

Accession Number	Number Survived	Percent Survival	Plant Height (cm) Minimum	Mean	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	8	88.9	896	1148	1461	22.3	2.0
9076419 (184-411)	1	11.1	--	--	502	4.0	4.0
9076420 (50-197)	0	11.1	--	--	753	--	9.0
9076421 (52-225)	7	77.7	95	732	1018	10.3	6.8
9076422 (15-29)	4	44.4	580	672	791	6.3	7.4
Canam	2	22.2	420	716	1012	2.0	6.5
Robust	3	33.3	551	665	760	16.0	5.7
Siouxland	5	55.5	740	996	1186	15.8	4.4
Imperial	5	55.5	795	923	1156	15.0	3.6

Re-planted Hybrid Poplar 1999

Accession Number	Number Re-planted	Percent Survival	Plant Height (cm) Minimum	Avg.	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	1	0	--	--	--	--	9.0
9076419 (184-411)	8	12	--	--	580	8.0	8.1
9076420 (50-197)	8	12	--	--	--	--	9.0
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	0	--	--	--	--	9.0
Canam	7	57	350	612	896	8.0	7.4
Robust	6	83	869	1046	1156	14.0	4.7
Siouxland	4	75	680	864	1217	15.0	4.5
Imperial	4	25	--	--	744	14.0	7.8

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

Table 7.
2005 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	12.5	14.6	17.1	27.9	1.5
9076419 (184-411)	1	11.1	--	--	7.9	7.0	3.0
9076420 (50-197)	0	0.0	--	--	--	--	9.0
9076421 (52-225)	6	66.7	8.2	8.6	14.9	12.3	6.6
9076422 (15-29)	3	33.3	6.1	4.8	11.0	5.4	6.6
Canam	2	22.2	5.5	7.1	8.8	10.8	7.0
Robust	3	33.3	13.7	14.8	17.1	20.5	2.7
Siouxland	5	55.5	9.8	12.1	15.2	19.5	2.8
Imperial	5	55.5	9.4	12.1	12.2	19.4	3.4

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	--	--	7.9	9.2	3.0
9076420 (50-197)	8	0	--	--	--	--	9.0
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	0	--	--	--	--	9.0
Canam	7	57	2.8	4.9	11.9	5.5	7.7
Robust	6	83	9.8	9.9	14.3	15.4	4.2
Siouxland	4	50	10.1	10.5	11.0	7.5	6.3
Imperial	4	25	--	--	14.0	17.8	7.5

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

Table 8.
2006 Evaluation Data
1998 Hybrid Poplar Initial Evaluation Planting

Accession Number	Number Survived	Percent Survival	Plant Height (m) Minimum	Mean	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	8	88.9	14.6	17.1	19.8	31.2	1.4
9076419 (184-411)	1	11.1	--	--	10.4	6.9	5.0
9076420 (50-197)	0	0.0	--	--	--	--	9.0
9076421 (52-225)	6	66.7	8.5	8.7	16.8	13.7	6.8
9076422 (15-29)	3	33.3	6.4	5.2	12.2	7.1	6.2
Canam	2	22.2	6.7	8.9	11.0	11.9	6.0
Robust	3	33.3	12.8	13.9	14.6	22.3	3.0
Siouxland	5	55.5	11.6	14.2	15.5	21.5	3.0
Imperial	5	55.5	11.6	12.6	14.0	21.9	3.6

Re-planted Hybrid Poplar 1999

Accession Number	Number Re-planted	Percent Survival	Plant Height (m) Minimum	Avg.	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	1	0	--	--	--	--	9.0
9076419 (184-411)	8	12	--	--	9.4	12.3	4.0
9076420 (50-197)	8	0	--	--	--	--	9.0
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	0	--	--	--	--	9.0
Canam	7	57	2.4	5.0	12.2	6.1	7.7
Robust	6	83	10.7	11.4	14.9	17.3	4.7
Siouxland	4	50	11.6	12.4	13.1	8.5	6.0
Imperial	4	0	--	--	0.0	0.0	9.0

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

Table 9.
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

Table 10.
2008 Evaluation Data
1998 Hybrid Poplar Initial Evaluation Planting

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

Re-planted Hybrid Poplar 1999

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

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

Table 11.
2009 Evaluation Data
1998 Hybrid Poplar Initial Evaluation Planting

Accession Number	Number Survived	Percent Survival	Plant Height (m) Minimum	Mean	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	8	88.9	17.3	19.4	20.1	38.3	1.3
9076419 (184-411)	1	11.1	--	--	14.3	17.0	7.0
9076420 (50-197)	0	0.0	--	--	--	--	9.0
9076421 (52-225)	4	44.4	16.1	18.9	21.6	15.3	6.3
9076422 (15-29)	2	22.2	9.7	13.5	17.3	18.9	7.2
Canam	2	22.2	7.9	10.5	13.1	14.5	6.0
Robust	3	33.3	17.1	17.8	18.6	27.8	3.3
Siouxland	5	55.5	15.2	17.9	20.4	26.6	3.0
Imperial	5	55.5	13.7	14.6	16.1	26.3	3.6

Re-planted Hybrid Poplar 1999

Accession Number	Number Re-planted	Percent Survival	Plant Height (m) Minimum	Avg.	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	1	0	--	--	--	--	9.0
9076419 (184-411)	8	12	--	--	13.7	17.0	6.0
9076420 (50-197)	8	0	--	--	--	--	9.0
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	0	--	--	--	--	9.0
Canam	7	42	11.6	12.9	15.5	17.5	7.7
Robust	6	83	12.2	15.3	18.2	22.1	4.3
Siouxland	4	50	14.0	14.6	15.5	12.2	6.5
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

Project Title:

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

Location: NRCS Aberdeen, ID Plant Materials Center

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

Seed Production

Anatone Germplasm bluebunch wheatgrass – Currently 4.2 acres are in production. Estimated seed yield from 2008 seed crop is 478 pounds. Shipped 775 pounds of Generation 2 Certified seed to commercial growers in 2008.

Maple Grove Germplasm Lewis Flax – A 0.6 acre seed field was established in May 2008 with stock seed provided by the FS Rocky Mountain Research Station. Seed will be harvested from this field beginning in 2009.

Snake River Plains Germplasm fourwing saltbush – Estimated seed yield from 2008 crop is 15 pounds. No seed was requested by commercial growers in 2008.

Northern Cold Desert Germplasm winterfat – Estimated seed yield from 2008 crop is 8 pounds. No seed was requested by commercial growers in 2008.

Propagation of Native Forbs

The original project plan in 2005 was to propagate 8,000 plants total of *Lomatium dissectum* (LODI) fernleaf biscuitroot, *Lomatium grayii* (LOGR) Grays biscuitroot, *Lomatium triternatum* (LOTR) nineleaf biscuitroot, *Eriogonum umbellatum* (ERUM) sulphurflower buckwheat, *Penstemon deustus* (PEDE) hotrock penstemon, *Penstemon acuminatus* (PEAC) sharpleaf penstemon, and *Penstemon speciousus* (PESP) sagebrush penstemon in the greenhouse. Approximately 1000 plants each of ERUM and LOTR were to be transplanted into seed production plots 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 into seed production plots at the PMC during the 2005 growing season and direct dormant seeding of *Eriogonum*, *Lomatium* and *Penstemon* accessions were completed at the PMC in November 2005. Weed barrier fabric was installed to control weeds.

On May 15, 2008 the sulphurflower buckwheat plots were treated with a wick application of 100 percent Roundup to control weeds and on June 10-11 all plots were hand weeded. The following table shows harvest date and seed yield for the accessions that were harvested:

Species	Harvest Date	Clean seed (pounds)
ERUM	8/13	12.6
LODI	NA	NA
LOGR	NA	NA
LOTR	7/3	2.6
PEAC	NA	NA
PEDE	NA	NA
PESP	8/8	1.5

By early July, the *Lomatium* species were completely dormant. The only *Lomatium* to flower and set seed was LOTR. LODI and LOGR have yet to flower after 3 years of establishment. It is thought that most of their energy is still going to development of the tap root. In early November 2008 the dormant *Lomatium* plots were treated with a spray application of Roundup to control weeds that were still green. PEAC and PEDE (short-lived species) had died out to the point that no seed was harvested in 2008.

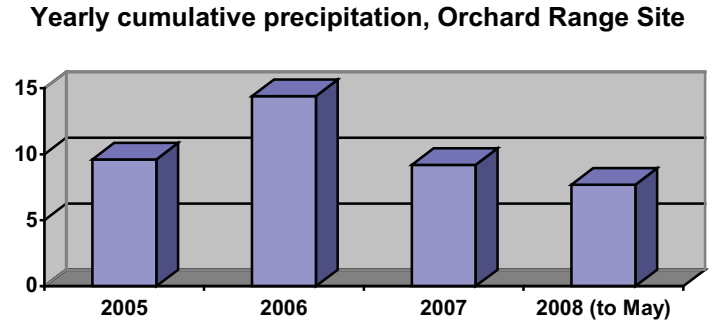
The Rocky Mountain Research Station in Boise, ID cleaned the seed that was harvested from the plots. Some of the seed was utilized for the seeding trial conducted at Snowville, UT for the Equipment and Strategies to Enhance the Post-wildfire Establishment and Persistence of Great Basin Native Plants study.

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

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. 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 for 2007 was 9.2 inches. At the time of the 2008 evaluation on May 5, the Orchard range site had received 7.70 inches of precipitation for water year 2008 (USDA 2008).



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

Materials and Methods

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

Native Grasses

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

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

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

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

established plots. In 2008 Bannock decreased to 0.28 plants/ft² and Schwendimar fell in density to 0.17 plants/ft².

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

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

The bluebunch wheatgrass accessions had the highest average densities of all the native grasses. All decreased slightly in density from 2005 to 2006, but still maintained good stands. P-12, Wahluke and Jim Creek all had densities over 1.00 plants/ft^2. Columbia, Anatone, P-7 and P-15 had densities between 0.50 and 1.00 plants/ft^2 while P-5 and Goldar both shared low densities. In 2007 densities were generally slightly lower, but still higher than all other species as a whole. The highest density recorded in 2007 was Jim Creek at 1.07 plants/ft^2. In 2008 Jim Creek, Wahluke, P-12 and P-7 had the best plant densities with 1.10, 1.10, 0.82 and 0.75 plants/ft² respectively.

Snake River wheatgrass accessions had good densities the establishment year with three accessions having densities greater than 1.00 plants/ft^2. Numbers declined slightly yet steadily over the next two years. In 2007 the best density was from SERDP with 0.70 plants/ft^2. In 2008 SERDP had risen in density to 0.80 plants/ft² making it the top performer of the group. Densities of other accessions remained essentially the same as 2007.

The basin wildrye accessions had fair to good stands in 2005, but decreased steadily from 2005 to 2008. U108-02 and Trailhead retained the highest densities in 2006 at 0.24 and 0.26 plants/ft^2 respectively. By 2007 the best density was achieved by Trailhead with 0.17 plants/ft^2. U108-02 and U100-01 had similar densities with 0.11 and 0.13 plants/ft^2 respectively. In 2008 basin wildrye had poor stands from all accessions, the best being 0.09 plants/ft² from U108-02.

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

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

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

Native Grasses Species	Name or accession	4/27/05	5/25/05	5/30/06	5/16/07	5/1/08
		----------	----------	Plants/ft²	----------	----------
Indian ricegrass	Rimrock	0.37	0.20	0.00	0.00	0.00
	White River	0.56	0.17	0.00	0.00	0.00
	Nezpar	0.42	0.17	0.00	0.00	0.00
	Ribstone	0.14	0.09	0.00	0.00	0.00
	Paloma	0.05	0.00	0.00	0.00	0.00
Squirreltail	Fish Creek	0.97	0.54	0.26	0.22	0.67
	Sand Hollow	0.37	0.20	0.19	0.20	0.24
	Toe Jam Creek	0.58	0.17	0.00	0.00	0.02
	Shaniko Plateau	0.81	0.52	0.06	0.09	0.00
	9019219	0.02	0.02	0.00	0.00	0.00
Thickspike wheatgrass	Bannock	1.04	1.07	0.58	0.43	0.28
	Schwendimar	0.69	0.52	0.39	0.24	0.17
	Critana	0.90	0.56	0.24	0.17	0.00
	Sodar	0.37	0.30	0.15	0.07	0.00
Slender wheatgrass	Revenue	1.00	0.93	0.00	0.00	0.00
	San Luis	0.60	0.69	0.00	0.00	0.00
	Pryor	0.30	0.30	0.02	0.00	0.00
Western wheatgrass	Rodan	0.28	0.35	0.13	0.00	0.00
	Rosana	0.05	0.20	0.04	0.00	0.00
	Arriba	0.16	0.15	0.06	0.00	0.00
Bluebunch wheatgrass	Jim Creek	0.83	1.02	1.02	1.07	1.10
	Wahluke	0.97	1.26	1.02	0.98	1.10
	P-12	1.34	1.59	1.04	0.89	0.82
	P-7	0.93	1.15	0.67	0.57	0.75
	Columbia	1.30	1.23	0.84	0.83	0.65
	Anatone	0.81	1.15	0.80	0.69	0.47
	P-15	0.60	0.93	0.54	0.50	0.41
	Goldar	0.51	0.37	0.33	0.19	0.24
	P-5	0.42	0.61	0.22	0.13	0.17
Snake River wheatgrass	SERDP	1.02	0.94	0.67	0.70	0.80
	Secar	1.00	1.11	0.76	0.56	0.54
	Expedition	1.27	1.44	0.54	0.41	0.34
	E-26	0.21	0.23	0.22	0.13	0.11
Basin wildrye	U108-02	0.56	0.57	0.24	0.11	0.09
	U100-01	0.53	0.41	0.11	0.13	0.06
	Trailhead	0.60	0.52	0.26	0.17	0.04
	Magnar	0.28	0.22	0.04	0.04	0.02
	U70-01	0.30	0.22	0.02	0.02	0.02
	Washoe	0.21	0.09	0.09	0.06	0.00
Sheep fescue	Covar	0.16	0.00	0.07	0.07	0.06
	Initial Point	0.21	0.04	0.02	0.00	0.02
Thurber's needlegrass	Thurber's	0.00	0.00	0.00	0.00	0.00
Sandberg bluegrass	Hanford Source	0.00	0.00	0.19	0.00	0.56
	Mountain Home	0.00	0.00	0.35	0.00	0.03
	High Plains	0.25	0.00	0.54	0.00	0.00
	Sherman	0.00	0.00	0.02	0.00	0.00
	Toole County, MT	0.00	0.00	0.04	0.00	0.00

Introduced Grasses

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

In 2006 all of the crested wheatgrass accessions increased in density or remained approximately where they were in 2005. Ephraim rose from 0.28 to 1.23 plants/ft^2; however, many of the plants were small in size due to the black grass bug infestation during the spring of 2005. In 2007 the best density was obtained from Nordan with 0.67 plants/ft^2. Ephraim had dropped from 1.23 to 0.02 plants/ft^2. In 2008 Nordan and Roadcrest had both increased in density to 0.88 and 0.71 plants/ft² respectively. The remaining crested wheatgrass plots had few remaining plants.

Both Siberian wheatgrass accessions similarly increased from 2005 to 2006, but decreased in 2007. In 2007 Vavilov was down to 0.26 plants/ft^2 and P-27 had 0.00 plants/ft^2. In 2008 Vavilov had rebounded to 0.54 plants/ft².

The three pubescent wheatgrass accessions decreased from 2005 to 2006 with the highest density in 2006 coming from Manska at 0.28 plants/ft^2. Manska continued to have the best density in 2007 with 0.13 plants/ft^2. Plant densities in 2008 remained low with Luna having the best stand with 0.22 plants/ft².

Rush intermediate wheatgrass, had 0.60 plants/ft² in 2005. Plant density decreased to 0.00 plants/ft^2 in 2006 and did not recover through 2008.

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

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

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

Forbs and Shrubs

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

Native/Introduced Forbs and Shrubs		4/27/05	5/25/05	5/30/06	5/16/07	5/8/08
Species	**Name or accession**	----------Plants/ft²----------				
Western yarrow	Eagle	0.51	0.50	0.07	0.24	0.21
	Great Northern	0.19	0.09	0.00	0.00	0.00
Utah sweetvetch	Timp	0.14	0.02	0.00	0.00	0.00
Firecracker penstemon	Richfield Selection	0.02	0.02	0.00	0.00	0.00
Scarlet globemallow		0.00	0.00	0.00	0.00	0.00
Lewis flax	Maple Grove	0.42	0.15	0.00	0.00	0.00
Blue flax	Appar	0.90	0.26	0.00	0.00	0.00
Wyoming big sagebrush		0.02	0.02	0.00	0.00	0.00
Fourwing saltbush	Snake River Plains	0.00	0.00	0.00	0.02	0.00
	Wytana	0.00	0.00	0.00	0.00	0.00
	Rincon	0.00	0.00	0.00	0.00	0.00
Gardner's saltbush	9016134	0.00	0.00	0.00	0.00	0.00
Winterfat	Hatch	0.28	0.17	0.00	0.00	0.00
	Northern Cold Desert	0.00	0.00	0.00	0.00	0.00
	Open Range	0.00	0.00	0.00	0.00	0.00
Forage kochia	Immigrant	0.00	0.00	0.00	0.00	0.00

Cover Crop

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

Discussion

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

One concern is the effect of black grass bugs on the introduced grasses. Plants subjected to black grass bug are normally affected by decreased seed yield and a reduction in palatability. Infestations rarely result in the death of established plants, but in poor water years establishing seedlings may be under enough stress for bug damage to kill the plants.

The second evaluation in 2005 indicated a loss in plant densities; however it appears that many of the plants survived, although stunted (low vigor), through 2006. In 2007 many more plants had died resulting in poor or no stands in many plots. In 2008 most accessions continued to decrease in plant density; however, a few accessions that had earlier proven adapted to the site conditions had small gains.

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

Develop Technology to Improve the Diversity of Introduced Grass Stands

The PMC assisted Brigham Young University (BYU) Provo, UT and the Agricultural Research Service (ARS) Burns, OR in developing technology to improve the diversity of introduced grass stands by evaluating methods to introduce native species into established introduced plant communities. In 2005, the PMC modified a Truax Rough Rider range drill, mixed the seed and rice hull mixtures and completed the first year of seedings at sites in Utah and Oregon. In 2006, modified seed drop boots by the manufacturer were installed on the Truax drill and the second year of seeding was completed. In addition to these seedings, the PMC also seeded drill comparison trials near Elko, NV on recently burned rangeland to compare the Truax drill to the Kemmerer drill, the standard range drill used by BLM. The Truax drill is designed to both broadcast and drill seed in the same pass so species that require broadcasting or very shallow planting depth were broadcast and the deeper seeded species were drill seeded in alternating rows. No trials were established in 2007.

In 2008, seeding trials were planted near Elko, NV in cooperation with the University of Nevada Extension Service and near Aberdeen, Idaho in cooperation with the ARS Sheep Experiment Station. The following seed mixes were prepared and the sites planted in late October and early November.

South Fork, NV
Broadcast Mix
12.5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Mtn. Home Sandberg bluegrass	0.75	0.92
Appar blue flax	0.75	0.83
Eagle yarrow	0.20	0.45
Wyoming big sagebrush	0.20	1.31
Spiny hopsage	0.50	1.37
Rice Hulls		8.88

South Fork, NV
Drill Mix
12.5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Nezpar Indian ricegrass	2.00	2.03
Toe Jam Cr. squirreltail	2.00	2.26
Needleandthread	2.00	3.21
Magnar basin wildrye	2.00	2.10
Secar Snake River wheatgrass	1.00	1.08
Munro globemallow	0.50	0.76
Rice Hulls		2.32

Grandview, ID
Broadcast Mix
12.90 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Maple Grove Lewis flax	0.40	0.43
Mtn. Home Sandberg bluegrass	0.20	0.24
Royal Penstemon	0.40	0.56
Wyoming big sagebrush	0.05	0.29
Rubber rabbitbrush	0.15	1.01
Rice Hulls		7.29

Grandview, ID
Drill Mix
12.90 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Anatone bluebunch wheatgrass	3.20	3.60
Magnar basin wildrye	0.80	1.04
Bannock thickspike wheatgrass	0.60	0.74
Thurber's needlegrass	0.60	0.99
Rice Hulls		7.29

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

The objectives of this project are to: examine seeding techniques for Wyoming big sagebrush; test seeding technology for native species, particularly native forbs; compare the ability of a modified rangeland drill and an experimental minimum-till drill to plant native seeds of diverse size and to reduce surface disturbance; apply and examine the use

of USGS proposed monitoring protocols for gauging seeding success for both the short and long term; and provide plantings for long-term examination of livestock on diversity in native seedings.

The minimum-till drill (Truax Rough Rider range drill) which has been modified by PMC personnel was provided by the FS Rocky Mountain Research Station. The PMC provided a trailer and tractor and the Utah Division of Wildlife provided an additional tractor. The modified rangeland drill (Kemmerer range drill) was provided by the BLM. In 2007, the PMC had made modifications to the Kemmerer drill by replacing the existing drop tubes with aluminum 3 inch diameter irrigation pipe to facilitate seed flow to the drill openers. The aluminum pipe provided a more slippery surface for the seed to flow. The drills were set up to both broadcast and drill seed in the same pass so species that require broadcasting or very shallow planting were broadcast and the deeper seeded species were drill seeded in alternating rows.

The PMC mixed the seed and rice hull mixtures and calibrated the drills prior to seeding. A wildfire site near Snowville, UT was seeded during the week of November 10, 2008. A total of approximately 52.13 acres were seeded in plots to the following mixes:

Snowville, UT (fall 2008)
Cover Crop Mix
12.13 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Rimrock Indian ricegrass	4.50	4.61
Anatone bluebunch wheatgrass	4.00	4.50
Rice Hulls		6.32

Drill Mix
40.0 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Rimrock Indian ricegrass	1.00	1.02
Munro globemallow	0.50	0.76
Anatone bluebunch wheatgrass	2.00	2.25
Toe Jam Cr. b. squirreltail	1.00	1.06
Sulphurflower buckwheat	0.24	0.48
Rice Hulls		1.59

10X Broadcast Mix

5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.95	5.42
Rubber rabbitbrush	0.50	3.38
Eagle yarrow	0.15	0.17
Mtn. Home Sandberg bluegrass	0.40	0.49
Royal penstemon	0.09	0.13
Rice Hulls		4.17

5X Broadcast Mix

30 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.45	2.57
Rubber rabbitbrush	0.50	3.38
Eagle yarrow	0.15	0.17
Mtn. Home Sandberg bluegrass	0.40	0.49
Royal penstemon	0.09	0.13
Rice Hulls		7.03

This study will be repeated in the fall of 2009. Location of the study to be determined based on areas that burn during the 2009 fire season. PMC personnel also assisted in collection of monitoring data from the Mountain Home site which was planted in 2007.

Publications

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

St. John, L, Cornforth, B., Simonson, B., Ogle, D. and D. Tilley. 2008. Technical Note 20: Calibrating the Truax Rough Rider Drill for Restoration Plantings. Aberdeen Plant Materials Center, Aberdeen, ID. Revised April, 2008. 14p.

St. John, L., D. Ogle, and N. Shaw. 2009. Hotrock Penstemon Plant Guide. Aberdeen Plant Materials Center, Aberdeen, ID. January 8, 2009. 3p.

St. John, L., D. Ogle, and N. Shaw. 2009. Sharpleaf Penstemon Plant Guide. Aberdeen Plant Materials Center, Aberdeen, ID. January 20, 2009. 3p.

St. John, L. Equipment Strategies to Enhance the Post-Wildfire Establishment and Persistence of Great Basin Native Plants. Aberdeen Plant Materials Center, Aberdeen, ID. October 2, 2008. 4p.

St. John, L., D. Tilley and D. Ogle. 2008. Great Basin Native Plant Selection and Increase Project - 2007 Annual Report. Aberdeen Plant Materials Center, Aberdeen, Idaho. January 23, 2008. 14p.

Tilley, D.J. and L. St. John 2006. Orchard Display Nursery Evaluation Summary (2005-2008). Aberdeen Plant Materials Center, Aberdeen, ID. October 15, 2008. 9p.

Tilley, D.J., Ogle, D., St. John, L. and N. Shaw. 2008. Royal Penstemon Plant Guide. Aberdeen Plant Materials Center, Aberdeen, ID. October 6, 2008. 3p.

Tilley, D.J. 2008 Orchard Display Nursery Evaluation Summary (2005-2007). Aberdeen Plant Materials Center, Aberdeen, ID. January 15, 2008. 14p.

Presentations

Date: 2/13/2008

Title: Aberdeen PMC report of Activities 2007: Great Basin Native Plant Selection and Increase project

Presenter: Loren St. John

Location: Salt Lake City, UT

Management Applications

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

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

3. The Orchard Display Nursery has been established for 4 years. The best performing native accessions identified in 2008 are: Fish Creek germplasm bottlebrush squirreltail, 'Bannock' thickspike wheatgrass, Jim Creek germplasm bluebunch wheatgrass, SERDP Snake River wheatgrass, Hanford source Sandberg bluegrass and Eagle germplasm western yarrow.

Products

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

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

3. Technical Note 20: Calibrating the Truax Rough Rider Drill for Restoration Plantings was revised and should be a useful guide to calibrating the drill. Plant Guides were developed for Royal penstemon, Hotrock penstemon and Sharpleaf penstemon.

GRAND TETON NATIONAL PARK
FY2008 Annual Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION

The Aberdeen Plant Materials Center (PMC) entered into an interagency agreement with Grand Teton National Park (GTNP) in 2006 to produce seed of four native grasses for use in revegetation of disturbed areas following road construction. Seed fields were planted in 2006 and seed was harvested in 2007 and 2008. New fields of Idaho fescue (*Festuca idahonensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) were planted in May, 2008. Seed from these fields will be harvested in 2009 through 2010.

ACCOMPLISHMENTS

Seed fields were planted the last week of May 2006. Slender wheatgrass was planted in Field 27E at the PMC Fish and Game Farm. Mountain brome and Sandberg bluegrass were planted in Fields 2W and 13N respectively at the PMC Home Farm. Blue wildrye was planted in Field 6E at the PMC Pearl Farm. Idaho fescue (0.3 acres) and bluebunch wheatgrass (0.17 acres) were planted May 23, 2008 and are located in Field 21, Fish and Game 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 of total annual moisture. Weeds were controlled as needed during the growing season. All species with the exception of Sandberg bluegrass established well. Some Sandberg bluegrass plants were established but overall field establishment is spotty. Substantial effort was also required to rogue Kentucky bluegrass out of the Sandberg bluegrass field.

The following table lists the species, field acreage and seed yields from 2008 harvest (at time of report, seed had not been tested):

Species	Scientific Name	Acres	Clean seed (lbs)
Slender wheatgrass	*Elymus trachycaulis*	1.0	650
Blue wildrye	*Elymus glaucus*	2.7	417
Mountain brome	*Bromus marginatus*	1.0	200
Sandberg bluegrass	*Poa secunda*	0.25	15

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

GTNP has requested that seed production continue from the slender wheatgrass and Sandberg bluegrass in 2009.

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

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

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

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

Grand Teton National Park Seed Increase - Idaho Fescue.
Aberdeen Plant Materials Center, July 24, 2008

Grand Teton National Park Seed Increase - Bluebunch wheatgrass.
Aberdeen Plant Materials Center, July 24, 2008

NATIONAL PARK SERVICE
WETLAND ESTABLISHMENT RESEARCH STUDY

FY2008 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

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

ACCOMPLISHMENTS - This project was designed in incremental steps for ease of evaluation and development of seeding rates. Trial 1 compared seedling establishment in the greenhouse from four hydroseed mulches and four dry, inert carriers was conducted in 2006. The second trial occurred in 2007 with the most promising treatments from trial 1 and compared each treatment with Submerseed™ pellets, a promising treatment from an earlier trial, in a controlled outdoor seeding in 4' X 8' tanks. In 2008, field testing the best methods of direct seeding into the PMC wetland ponds occurred.

TECHNOLOGY DEVELOPMENT – The wetland pond is approximately 50' X 60' and is lined with a plastic liner. The soil was lightly cultivated and watered to field capacity prior to seeding. Plots were 8' x 10' arranged in a randomized complete block design with four replications.

The trial was planted on July 31, 2008 using Sterling Selection Baltic Rush (*Juncus balticus*). Hydroseed treatments were mixed and applied by Frank McClure of Mountain West Hydroseeding. Hydroseed component rates followed the industry standards with the exception of the straw mulch which was applied at one-half the normal rate. This was done based on results shown in 2007 that indicated the industry straw mulch rate was possibly too thick for wetland applications involving Juncus. Seed was applied at a target rate of 100 PLS/ft².

Amounts	/ft²	/plot	/treatment	/ac
Submerseed	20 pellets	3.75lb	15lb	2000lb
Fertil Fibers	20.8g	3.7lb	14.6lb	2000lb
Tackifier	0.03g	2.5g	10.0g	3lb
Rice hulls	1.35g	0.25lb	1lb	130lb
Seed (100PLS/ft)	0.002g	0.17g	0.68g	0.19lb
Water	2gal	160gal	640gal	87120gal
Straw mulch	10.4g	1.85lb	7.3lb	1000lb

Evaluations conducted on September 5, 2008 found no seedlings of *Juncus*. The trial will be evaluated again in the spring of 2009.

Hydroseed application of Fertil Fibers treatment.

Hydroseed application of Fertil Fibers and straw mulch treatment.

Pressing the rice hull and seed broadcast mix with a lawn roller.

Rice hulls and seed pressed into soil with roller.

Submerseed pellets partially submerged at time of flooding.

Perforated irrigation pipe watering the pond.

YELLOWSTONE NATIONAL PARK - WETLAND PLANT PROPAGATION

FY2008 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION - In 2008, the Natural Resources Conservation Service (NRCS), Plant Materials Center (PMC), Aberdeen, Idaho entered into an interagency agreement with the National Park Service (NPS), Yellowstone National Park (YNP) to propagate and deliver approximately 35,000 plants in 10 cubic inch containers. Delivery is to take place over a three year period (approximately 12,000 plants per year) beginning in the fall of 2009. Species to be grown include *Carex aquatilis, C. microptera, C. rostrata, C. utriculata, Juncus ensifolius, and Deschampsia caespitosa*. Due to limited availability of information regarding the propagation of the desired species, it was determined that the PMC would conduct propagation research studies on available seed during 2008. Seed used for these studies came from YNP collections being stored at the Bridger, Montana, PMC.

ACCOMPLISHMENTS - Propagation studies were conducted on seed from identified species. Two irrigation regimes were tested. The first technique was overhead irrigation with sprinklers programmed to water 2 minutes per hour from 8:00am to 3:00pm, plus a 60 minute weekly deep soak to flush accumulated salts. The second technique was subsurface irrigation by placing the containers in 4'x8'x1' tanks filled with 4 to 8 inches of water.

Juncus species were planted on April 25, 2008. *Deschampsia* was seeded on April 30. *Carex* seed was stratified from May 5 to June 9. *Deschampsia* and *Carex* were seeded with 5 to 20 seeds per cone. Seed of all species was sprinkled on the soil surface and pressed by hand. *Deschampsia* seed was additionally covered with a thin later of soil. Soil used was a 1:1:1 mixture of peat, sand and perlite with the addition of 18g 11-15-11 fertilizer and 16ml Redimil fungicide per cubic foot. Germination counts of cones with established plants were taken on July 28, 2008.

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

PHOTOS

Unidentified species grown out in 12”x18” flats.

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

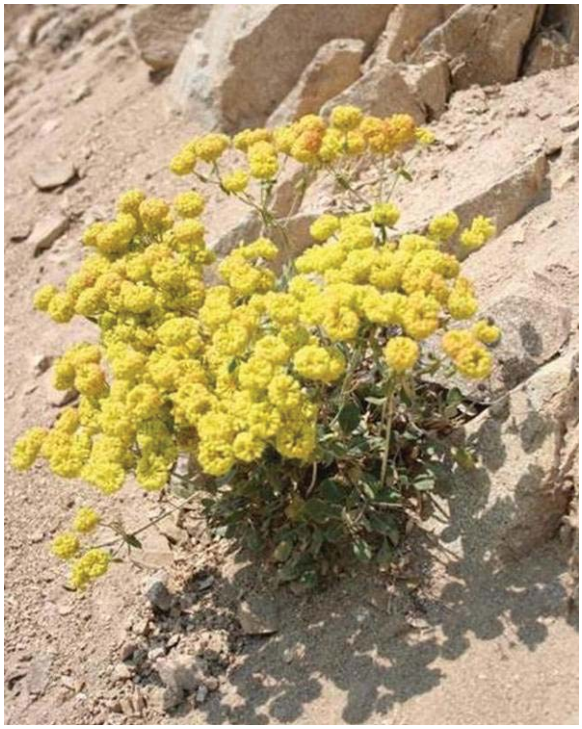
Deschampsia caespitosa **seedlings grown with subsurface irrigation (top plant) and with overhead irrigation (bottom plant) after 90 days of growth.**

Native Buckwheat Initial Evaluation Planting

2009 Progress Report
Study Number: IDPMC-P-0815-RA
Derek J. Tilley, Range Conservationist (plants)
Loren St. John, PMC Team Leader
Natural Resources Conservation Service
Plant Materials Center
Aberdeen, Idaho

Introduction

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



Sulphurflower buckwheat in its natural habitat

Materials and Methods

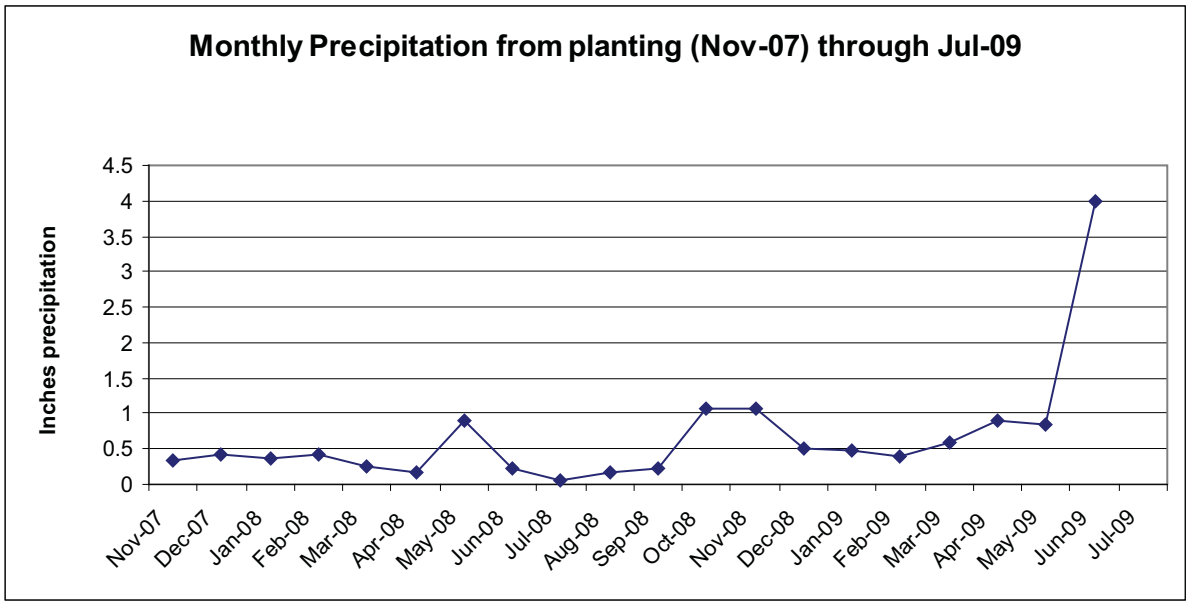
The Aberdeen, Idaho Plant Materials Center (IDPMC) assembled 39 collections of *Eriogonum* spp. from Idaho, California, Oregon and Wyoming (appendix 1). Collections were made primarily by NRCS employees from Idaho, but collections were also received from the Lockeford, California NRCS Plant Materials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

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

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

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

Precipitation for the establishment season was low with 0.16 inches precipitation in April and 0.89 inches in May 2008. The following season provided good winter snow in October and November as well as good spring and early summer rain from April into June 2009.



The plots were evaluated for percent stand on August 4, 2008. Stand establishment was recorded as the number of holes per plot containing plants divided by 6 holes. Diameters of all living plants from each accession were measured and averaged to provide a mean diameter per accession. On July 7, 2009 the plots were evaluated for percent stand, average plant height, plant vigor and flower production. Vigor and flower production for each plot were assigned a visual rating of 1-9 with 1 being best and 9 being worst or dead. Data were analyzed with Statistix 8.2 software using an Analysis of Variance to determine significance (α=0.05) and a Tukey's test to separate means when significance was detected. Plant diameters were not tested for significance.

Results

At the time of the first evaluation in 2008, no significant differences were detected between stand means for either species. Stand percentages were generally low with the best initial establishment of the sulphurflower buckwheat accessions being accession 9076549 with 20.8%. The largest average diameter recorded among the sulphurflower buckwheats was 18.6 cm from accession

9076550. In 2009 there were no significant differences detected in any of the measured characters in the sulphurflower buckwheat trial. All stand percentages were lower in 2009 than 2008. Accession 9076549 continued to have the best stand with 16.5%. The tallest accession was 9076550 with 16.5 cm. Vigor and flower production ratings were poor. The best vigor rating belonged to accession 9076549 (6.0), and the top average flower producer was accession 9076550 with 6.3.

Accession 9076543, whorled buckwheat, August 2008

Table 1. Sulphurflower buckwheat

	Aug. 4, 2008		Jul. 7, 2009			
Accession No.	Stand	Plant diameter	Stand	Height	Vigor	Flr. Prod.
	----%----	----cm----	----%----	----cm----	-------(1-9)-------	
9076549	20.8[1]	13.5[2]	16.5[1]	14.3[1]	6.0[1]	6.8[1]
9076550	16.7	18.6	12.3	16.5	6.8	6.3
9076554	16.7	17.3	12.5	6.5	8.0	8.3
9076560	8.3	10.9	4.0	7.0	7.3	7.3
9076514	4.2	3.3	0.0	8.3	7.8	8.3
P=			0.62	0.84	0.85	0.75

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

In 2008, whorled buckwheat stands ranged from 4.2% (9076555) to 50.0% (9076543). Stands varied enough between plots that no significant difference was detected. Accession 9076543 had the largest average plant diameter of 17.4 cm. In 2009, accessions 9076543 and 9076540 had the best stands, both with 45.3%; however no significant difference was found for percent stand among the accessions. The tallest average plants in 2009 were those of accession 9076542 with an average of 53.3 cm. The best vigor ratings of the whorled buckwheat trial were from

Whorled buckwheat accession 9076542 on July 8, 2009

accessions 9076543 (2.3) and 9076542 (2.5). These two accessions also had the highest rating for flower production (both with 2.3).

Table 2.Whorled buckwheat

	Aug. 4, 2008		Jul. 7, 2009			
Accession No.	Stand	Plant diameter	Stand	Height	Vigor	Flr. Prod
	----%----	----cm----	----%----	----cm----	-------(1-9)-------	
9076543	50.0[1]	17.4[2]	45.3[1]	40.8 ab	2.3[3]	2.3 a
9076540	41.7	8.6	45.3	27.0 ab	4.8	7.0 a-c
9076538	37.5	9.0	33.3	33.0 ab	5.5	6.0 a-c
9076536	37.5	11.1	20.8	20.8 ab	6.3	6.8 a-c
9076561	33.3	13.0	20.8	15.5 ab	6.0	6.8 a-c
9076546	33.3	10.8	32.8	45.0 ab	2.8	3.0 a-b
9076553	29.2	12.5	33.0	34.3 ab	2.8	5.0 a-c
9076548	25.0	8.3	20.5	28.8 ab	4.3	5.5 a-c
9076533	25.0	9.5	24.5	24.3 ab	5.0	6.3 a-c
9076542	25.0	15.2	28.8	53.3 a	2.5	2.3 a
9076532	16.7	14.9	20.8	22.3 ab	5.8	5.8 a-c
9076558	12.5	10.0	20.5	27.0 ab	5.0	5.5 a-c
9076529	8.3	9.1	8.3	8.3 b	7.5	8.0 b-c
9076547	8.3	9.1	12.3	15.8 ab	6.5	7.3 a-c
9076539	8.3	7.4	8.0	13.3 b	7.0	8.8 c
9076555	4.2	3.2	8.0	12.0 b	6.5	8.3 c
P=			0.146	0.004	0.023	0.000
Critical value (0.05)=			NA	38.6	5.9	5.0

[1] No significant difference
[2] Not tested for significance
[3] Significance was detected but means could not be separated

Discussion

None of the accessions of either species had very good establishment, yet mortality from the first season to the next was low. Flower production ratings were generally low for both species; however, it may be possible to increase flower and seed production by supplemental summer irrigation (Shock et al., 2007). Shock's study, however, used drip tape in plots without weed barrier fabric, so an accurate comparison cannot be made. With the four inches of rain received in Aberdeen in June, it would seem that the plots received sufficient, if not too much moisture.

Of the 19 evaluated accessions, whorled buckwheat accession 9076543 appears to be the most successful in this trial. It had the highest initial establishment (50.0%) in 2008 and maintained the best stand in 2009 (45.3%). It had the third largest average plant height and highest vigor and flower production ratings in 2009. The original collection of this accession was made at Bonneville County, ID at McCoy Creek in a mountain big sagebrush, antelope bitterbrush, bluebunch wheatgrass plant community at 5692 ft elevation. Another accession worth considering is whorled buckwheat 9076542 which had only 25% establishment, but had the tallest plants (53.3 cm), highest flower production rating (2.3) and second best vigor rating (2.5). This collection was made in Bonneville County, ID, at Fall Creek in a mountain big sagebrush, antelope bitterbrush, Thurber's needlegrass community at 5368 ft elevation. The two populations are both found in the Caribou-Targhee National Forest within 20 miles of each other.

In 2010 the plots will be evaluated for stand/survival, seed production, vigor, and general appearance (aesthetic value). Following the 2010 evaluation and analysis a determination will be made on whether any of the evaluated accessions merit commercial release.

References

Bureau of Reclamation. 2009. Agrimet weather data. [Online] accessed Dec. 8, 2009 at. http://www.usbr.gov/pn/agrimet/. USDI-BOR.

Shock, C.C., E.B. Feibert, and L.D. Saunders. 2007. Native forb seed production in response to irrigation in 2007. In: Great Basin native plant selection and increase project FY07 progress report.

Appendix 1. Assemblage of collections

Acc. No.	Species	County, State	Date coll.	Collector, Affiliation	Wt. clean (g)
9076479	*E.* sp.	ID	2004	CMNM	29.47
9076514	ERUM	ID	2004	CMNM	28.01
9076560 [a]	ERUM	ID	2006	Shaw, USFS	31.79
9076561	ERHE2	ID	2005	CMNM	24.44
'Sierra'	ERUM ssp. *polyanthum*	El Dorado, CA	2003	Lockeford PMC, NRCS	1.8 lb
9076559	ERUM	Mono, CA	10 July 05	Comstock Seed	25.74
9076528	ERHE2	Washington, ID	27 July 06	Tilley, NRCS	6.68
9076529	ERHE2	Washington, ID	27 July 06	Tilley, NRCS	35.34
9076530	ERHE2	Washington, ID	27 July 06	Tilley, NRCS	9.30
9076531 [bc]	*E. thymoides*	Adams, ID	27 July 06	Tilley, NRCS	Trace
9076532	ERHE2	Adams, ID	28 July 06	Tilley, NRCS	81.25
9076533	ERHE2	Valley, ID	28 July 06	Tilley, NRCS	116.92
9076534	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	9.75
9076535 [b]	ERUM	Elmore, ID	28 July 06	Tilley, NRCS	2.72
9076536	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	34.34
9076537	ERUM	Elmore, ID	28 July 06	Tilley, NRCS	9.69
9076538	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	122.30
9076539	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	21.58
9076540	ERHE2	Blaine, ID	29 July 06	Tilley, NRCS	21.22
9076541	ERUM	Butte, ID	29 July 06	Tilley, NRCS	13.28
9076542	ERHE2	Bonneville, ID	1 Aug 06	Tilley, NRCS	42.19
9076543	ERHE2	Bonneville, ID	1 Aug 06	Tilley, NRCS	53.55
9076544	ERHE2	Caribou, ID	1 Aug 06	Tilley, NRCS	16.60
9076545	ERHE2	Caribou, ID	1 Aug 06	Tilley, NRCS	12.55
9076546	ERHE2	Caribou, ID	1 Aug 06	Tilley, NRCS	36.92
9076547	ERHE2	Cassia, ID	1 Aug 06	Tilley, NRCS	45.90
9076548	ERHE2	Twin Falls, ID	1 Aug 06	Tilley, NRCS	56.30
9076549	ERUM	Teton, WY	25 July 06	Yegorova, USFS	1.8 lb
9076550	ERUM	Elmore, ID	14 Aug 06	Ogle, NRCS	37.10
9076551 [b]	ERUM	Clark, ID	28 July 06	Edgerton, NRCS	2.08
9076552 [b]	ERUM	Fremont, ID	27 July 06	Edgerton, NRCS	No seed
9076553	ERHE2	Madison, ID	5 Aug 06	Mickelson, NRCS	1.7 lb
9076554	ERUM	Franklin, ID	23 Aug 06	Jones, NRCS	26.19
9076555	ERHE2	Franklin, ID	23 Aug 06	Jones, NRCS	33.84
9076556 [d]	ERHE2	Franklin, ID	23 Aug 06	Jones, NRCS	--
9076557 [d]	ERUM	Franklin, ID	23 Aug 06	Jones, NRCS	--
9076558	ERHE2	Franklin, ID	23 Aug 06	Jones, NRCS	15.25
9076562	ERUM	Lake, OR	14 Aug 06	Corning, NRCS	6.16
9076563	ERHE2	Washington, ID	2002	WRPIS	10.0

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

Appendix 2. Seeds/lb

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

Buckwheat trial field map

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

*yellow =ERUM

(east)

Options and Cost Breakdown for Direct Seeding Wetlands with Baltic Rush
Study Number: IDPMC-T-0604-WE
Derek J. Tilley
October 22, 2008

Introduction

Direct seeding of wetlands species typically results in low establishment rates and is generally not recommended. Because seed from many wetland species are buoyant and also require light for germination, broadcast seeding has been unsuccessful because seed tends to float and wash away from the seeded area after flooding. Small scale direct seeding experiments evaluating other techniques have indicated however, that there may be methods available that could produce better establishment of seeded wetland species.

This trial incorporates greenhouse and small-scale test results obtained from experiments conducted from 2004 through 2007 at the Aberdeen Plant Materials Center (PMC), and tests them in a "real-life" field setting. Four seeding methods were tested: 1) Submerseed™ pellets (Aquablok 2007), 2) broadcasting seed mixed with rice hulls as an inert carrier followed by packing with a lawn roller, 3) a hydroseed application of Fertil Fibers™ hydromulch with tackifier, and 4) a second hydroseed application with the addition of straw mulch at one-half the industry rate used for lawn seedings.

Materials and Methods

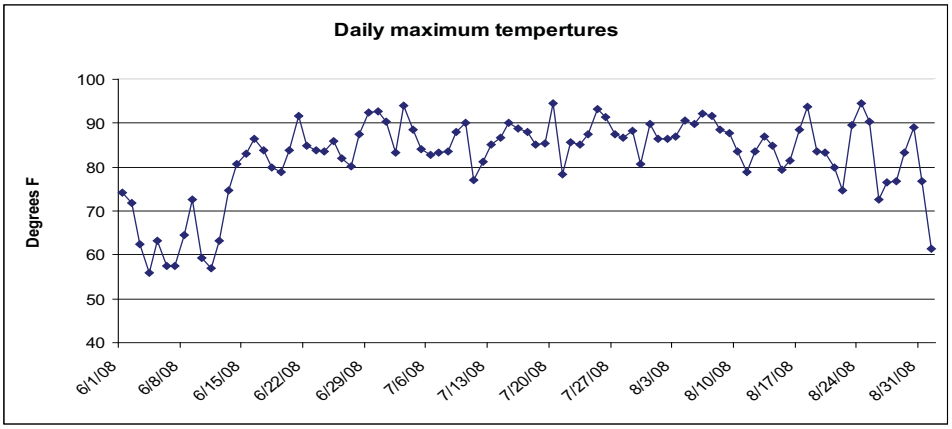
The trial was conducted at a constructed pond at the Plant Materials Center (PMC) home farm in Aberdeen, ID. The pond measured approximately 50 X 60' and was lined with a plastic liner. Weeds were controlled with multiple treatments of Roundup applied in 2007 and 2008. The soil was lightly cultivated and watered to field capacity prior to seeding. Plots were 8' x 10' arranged in a randomized complete block design with four replications.

The trial was planted on July 31, 2008 using Sterling Selection Baltic Rush (*Juncus balticus*). Hydroseed treatments were mixed and applied by Frank McClure of Mountain West Hydroseeding. Hydroseed component rates followed the industry standards (see table) with the exception of the straw mulch which was applied at one-half the normal rate. This was done due to results shown by Tilley (2007) that indicated the industry straw mulch rate was possibly too thick for wetland applications involving *Juncus*. Seed was applied at a target rate of 100 PLS/ft². Rice hulls were mixed according St. John et al. (2005).

Amounts	/ft²	/plot	/treatment	/ac
Submerseed	20 pellets	3.75lb	15lb	2000lb
Fertil Fibers	20.8g	3.7lb	14.6lb	2000lb
Tackifier	0.03g	2.5g	10.0g	3lb
Rice hulls	1.35g	0.25lb	1lb	130lb
Seed (100PLS/ft)	0.002g	0.17g	0.68g	0.19lb
Water	2gal	160gal	640gal	87120gal
Straw mulch	10.4g	1.85lb	7.3lb	1000lb

The pond was kept dry for one day following planting to allow for all hydroseed tackifier to dry and adhere to the soil surface. The pond was watered using a perforated irrigation pipe laid at the base of the first replication, so that the water flowed evenly across all four replications. The water was allowed to rise to 0.5 to 1.0 inches above the soil surface and then shut off. The pond was allowed to partially dry to field capacity and then refilled to the previous level to promote germination. This process was completed through out the length of the trial.

Daily temperatures reached the mid-nineties for approximately two weeks following planting providing good conditions for the germination of *Juncus* seedlings. The graph below shows daily maximum temperatures from June 1 through August 31, 2008. Daily high temperatures during the study ranged from 61 to 95º F, but averaged in the mid 80s. In the latter part of the study there were greater variations in daily maximum temperatures.



Results and Discussion

The trial was evaluated visually on September 5, 2008 (36 days after planting). No seedlings of *Juncus* were seen in any plot. The reasons for the failure of the trial are unknown. There are a few theories for the lack of success. First, 100 PLS/ft² may not be enough seed to establish *Juncus* and obtain visible stands. Pouring 0.68g of seed into 640 gallons of water in the hydroseeder tank seemed like an extremely small amount of seed compared to that amount of carrier. It is possible that a significant amount of seed remained stuck to the inside of the hydroseeder tank. Second, though the daily temperatures reached the 90's for several days, better establishment may have been achieved with even hotter temperatures. *Juncus* germinates readily at temperatures in excess of 100 degrees. An earlier planting date (early July) may provide more days above 90 degrees and produce germinants.

With these reasons in mind, it may be advisable to re-attempt this study with more seed and earlier in the summer when temperatures are hotter. Another idea is to broadcast the seed by hand and follow with a hydroseed application of tackifier. This would eliminate the risk of losing seed in the hydroseed equipment.

Acknowledgements
The PMC would like to thank Frank McClure and the crew of Mountain West Hydroseeding for their assistance, expertise and the donation of materials. The PMC also thanks the U.S.D.I. National Park Service for funding and cooperation on this project.

Planting images

Hydroseed application of Fertil Fibers treatment.

Hydroseed application of Fertil Fibers and straw mulch ttreatment.

Pressing the rice hull and seed broadcast mix with a lawn roller.

Rice hulls and seed pressed into soil with roller.

Submerseed pellets partially submerged at time of flooding.

Perforated irrigation pipe watering the pond.

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Aberdeen Plant Materials Center Grass Display Nursery
2008 Evaluation Report
Loren St. John, PMC Team Leader

The Aberdeen Plant Materials Center (PMC) Grass Display Nursery was planted August 14, 2007 in cooperation with the South Bingham Soil Conservation District. The purpose of the display nursery is to allow the public to view grasses used to conserve soil, provide forage for livestock and wildlife, habitat for wildlife and to improve water quality. The nursery includes 65 accessions showcasing released grasses (and some currently under testing and evaluation) of over 30 species suited for reclamation, restoration or irrigated pasture plantings in the Aberdeen PMC service area. The display is divided into three sections according to moisture needs reflecting natural precipitation ranges; 12 inches or less, 12 to 16 inches, and 16 inches or greater. Each plot is 7 feet wide by 70 feet long. Covar sheep fescue separates the precipitation regimes and the western wheatgrass plots from adjacent plots due to the rate of spread by western wheatgrass. Surrounding borders were seeded with Covar sheep fescue using a broadcast seeder. Plots are irrigated to enhance display.

Stand emergence was rated on August 30 2007, sixteen days after planting. The accompanying table summarizes the initial establishment evaluations. Plots were rated visually on a scale of 1 best and 9 worst and accessions of the same species were rated against each other.

Arlington blue wildrye, Regar meadow brome, Potomac orchardgrass, STF43 tall fescue and BG24T perennial ryegrass had the best stand emergence in the >16 inch annual precipitation block. In the 12-16 inch annual precipitation block, Bromar mountain brome, Largo tall wheatgrass, Trailhead basin wildrye, Reliant intermediate wheatgrass, Black Sheep sheep fescue, Pryor slender wheatgrass and 9076517 western wheatgrass had the best emergence. Bozoisky II Russian wildrye, SERDP Snake River wheatgrass, Goldar bluebunch wheatgrass, Hycrest II crested wheatgrass, Mountain Home Sandberg bluegrass and Toe Jam Creek bottlebrush squirreltail had the best stand emergence ratings in the < 12 inch annual precipitation block.

The plots were evaluated a second time on July 3, 2008. Stands were rated 1 best and 9 worst and accessions of the same species were rated against each other. Plant height was also recorded. Elkton blue wildrye, Cache meadow brome, Potomac orchardgrass and Arkplus tall fescue had the best stands within the > 16 inch annual precipitation block. Bromar mountain brome, Jose tall wheatgrass, Rush intermediate wheatgrass, Covar sheep fescue, Pryor slender wheatgrass and Rosana western wheatgrass had the best stands in the 12- 16 inch annual precipitation block. In the < 12 inch annual precipitation block, Bozoisky II Russian wildrye, SERDP Snake River wheatgrass, P-7 bluebunch wheatgrass, Douglas crested wheatgrass, Hycrest crested wheatgrass, Vavilov II Siberian wheatgrass, Bannock thickspike wheatgrass, High Plains Sandberg bluegrass and Toe Jam Creek bottlebrush squirreltail had the best stands. Cache meadow brome, Himag tall fescue, Bromar mountain brome and Rush intermediate wheatgrass were the tallest accessions.

Aberdeen Plant Materials Center
2007 Grass Display Nursery

VARIETY	COMMON NAME	SCIENTIFIC NAME	STAND EMERGENCE 8/30/07 [1/]	STAND RATING 7/3/08 [2/]	PLANT HEIGHT (cm)
		> 16 inches annual precipitation			
ELKTON	blue wildrye	*Elymus glaucus*	2	1	80
ARLINGTON	blue wildrye	*Elymus glaucus*	1	2	75
CACHE*	meadow brome	*Bromus biebersteinii*	2	1	100
REGAR*	meadow brome	*Bromus biebersteinii*	1	2	95
LINCOLN*	smooth brome	*Bromus inermis*	3	5	98
9092261	prairie junegrass	*Koeleria macrantha*	5	4	60
LATAR*	orchardgrass	*Dactylis glomerata*	2	2	85
POTOMAC*	orchardgrass	*Dactylis glomerata*	1	1	85
HIMAG*	tall fescue	*Festuca arundinacea*	3	2	102
ARKPLUS*	tall fescue	*Festuca arundinacea*	2	1	95
STF 43*	tall fescue	*Festuca arundinacea*	1	3	90
GARRISON*	creeping foxtail	*Alopecurus arundinaceus*	4	2	85
BG 24T*	perennial ryegrass	*Lolium perenne*	1	3	65
		12 – 16 inches annual precipitation			
BROMAR	mountain brome	*Bromus marginatus*	1	1	100
GARNET	mountain brome	*Bromus marginatus*	2	2	85
LARGO*	tall wheatgrass	*Thinopyrum ponticum*	1	2	90
JOSE*	tall wheatgrass	*Thinopyrum ponticum*	2	1	80
ALKAR*	tall wheatgrass	*Thinopyrum ponticum*	3	3	80
MUSTANG*	altai wildrye	*Leymus angustus*	2	4	70
SHOSHONE	beardless wildrye	*Leymus triticoides*	8	4	70
TRAILHEAD	basin wildrye	*Leymus cinereus*	1	3	40
MAGNAR	basin wildrye	*Leymus cinereus*	2	3	40
MANSKA*	pubescent wheatgrass	*Thinopyrum intermedium*	3	4	80
MANIFEST*	intermediate wheatgrass	*Thinopyrum intermedium*	4	3	85
RELIANT*	intermediate wheatgrass	*Thinopyrum intermedium*	1	2	90
RUSH*	intermediate wheatgrass	*Thinopyrum intermedium*	2	1	105
NEWHY*	hybrid wheatgrass	*Elymus hoffmanii*	3	3	85
PAIUTE*	orchardgrass	*Dactylis glomerata*	3	3	65
DURAR*	hard fescue	*Festuca trachyphylla*	3	3	50
BLACKSHEEP*	sheep fescue	*Festuca ovina*	1	2	55
COVAR*	sheep fescue	*Festuca ovina*	2	1	65
FIRST STRIKE	slender wheatgrass	*Elymus trachycaulus*	2	2	85
PRYOR	slender wheatgrass	*Elymus trachycaulus*	1	1	90
COPPERHEAD	slender wheatgrass	*Elymus trachycaulus*	3	3	75
SAN LUIS	slender wheatgrass	*Elymus trachycaulus*	4	4	60
SHERMAN	big bluegrass	*Poa ampla*	2	2	60
9076517	western wheatgrass	*Pascopyrum smithii*	1	3	65
ARRIBA	western wheatgrass	*Pascopyrum smithii*	3	2	75
ROSANA	western wheatgrass	*Pascopyrum smithii*	2	1	80
		< 12 inches annual precipitation			
BOZOISKY II*	Russian wildrye	*Psathrostachys juncea*	1	1	75
BOZOISKY *	Russian wildrye	*Psathrostachys juncea*	3	3	70
MANKOTA*	Russian wildrye	*Psathrostachys juncea*	2	2	70
SERDP	Snake River wheatgrass	*Elymus wawawaiensis*	1	1	80
SECAR	Snake River wheatgrass	*Elymus wawawaiensis*	2	2	75
GOLDAR	bluebunch wheatgrass	*Pseudoroegneria spicata*	1	3	65
P-7	bluebunch wheatgrass	*Pseudoroegneria spicata*	2	1	85
ANATONE	bluebunch wheatgrass	*Pseudoroegneria spicata*	3	2	70
WHITMAR	beardless wheatgrass	*Pseudoroegneria spicata*	4	4	70
EPHRAIM*	crested wheatgrass	*Agropyron cristatum*	3	3	60
FAIRWAY*	crested wheatgrass	*Agropyron cristatum*	4	4	60
DOUGLAS*	crested wheatgrass	*Agropyron desertorum*	5	1	95
ROADCREST*	crested wheatgrass	*Agropyron cristatum*	6	2	80

VARIETY	COMMON NAME	SCIENTIFIC NAME	STAND EMERGENCE 8/30/07 [1/]	STAND RATING 7/3/08 [2/]	PLANT HEIGHT (cm)
		< 12 inches annual precipitation continued			
HYCREST II*	crested wheatgrass	*Agropyron cristatum X desertorum*	1	2	60
HYCREST*	crested wheatgrass	*Agropyron cristatum X desertorum*	2	1	65
NORDAN*	crested wheatgrass	*Agropyron desertorum*	7	3	60
P-27*	Siberian wheatgrass	*Agropyron fragile*	3	3	60
VAVILOV II*	Siberian wheatgrass	*Agropyron fragile*	2	1	80
VAVILOV*	Siberian wheatgrass	*Agropyron fragile*	1	2	75
CRITANA	thickspike wheatgrass	*Elymus lanceolatus*	3	2	60
BANNOCK	thickspike wheatgrass	*Elymus lanceolatus*	1	1	75
SODAR	streambank wheatgrass	*Elymus lanceolatus*	2	3	50
MOUNTAIN HOME	Sandberg bluegrass	*Poa secunda*	1	2	25
HIGH PLAINS	Sandberg bluegrass	*Poa secunda*	2	1	40
TOE JAM CREEK	bottlebrush squirreltail	*Elymus elymoides* ssp. *californicus*	1	1	40
9019219	bottlebrush squirreltail	*Elymus elymoides* ssp. *elymoides*	2	2	35

* NON-NATIVE

[1/] Stand emergence rated 1 best, 9 worst. Accessions within a species rated against each other.

[2/] Stand rated 1 best, 9 worst. Accessions within a species rated against each other.

Summary of Regional PMC Tall Wheatgrass Bio-Fuel Feedstock Trials 2007-2008 Aberdeen PMC Summary

Summary by Jim Briggs, Plant Materials Specialist, NRCS, Portland, OR**;**

Abstract

The cultivar 'Largo' appears to be best suited to bio-fuel applications over the widest geographic area that this trial covered. Largo and 'Alkar' were the best performers among tall wheatgrass entries in both stand establishment and vigor in calendar year 2008. Significant differences in yield among tall wheatgrass entries at most locations was not evident, however Largo yields trended towards the best.. Among PMC's with different seeding rates no statistical differences in yield were evident between 20 and 40 lbs/acre seeding rates. In New York, trials yield trended higher at the 20 lb/acre seeding rate. Washington trials were installed with 6 and 12 inch row spacing. No significant differences in yield were evident. Intermediate wheatgrass produced the greatest yields in trials where included (MD, NY, MI). The Hungarian 'Szarvasi-1' "energy grass" performance was generally ranked poorer than the other tall wheatgrass entries although this may be due to seed quality. New York germination analysis indicated actual germination was well below the stated level which suggests that the received seed of 'Szarvasi-1' was of poor quality. Chemical analysis at 1 trial site indicated that 'Largo','Szarvasi-1', and 'Alkar' may have superior characteristics for bio-fuel applications among tall wheatgrass cultivars tested, however the species generally appears inferior to switchgrass and other typical biofuel crops such as poplar.

Introduction

The objective of this study is to comparatively evaluate four commercially available plant releases of tall wheatgrass (*Thinopyrum ponticum* [Podp.] Z.-W. Liu & R.-C. Wang) for potential use as a biofuel crop in the cool season grass ecosystems of the west and northeast United States. Tall wheatgrass releases included in this study are from the US and one from Hungary. This report summarizes 2008 results of the work conducted at Aberdeen, Idaho Plant Materials Center (PMC) and forage yields from the other PMC test locations.

The study was begun because of recent efforts now underway to develop grass bio-feedstocks for various biofuel applications. Much attention has been given to switchgrass (*Panicum virgatum* L.) for this effort. In the Northeast and other moist and cooler environments there is still a question about the long term competitiveness and production potential of switchgrass to other more adapted cool season grasses and weeds.

Tall wheatgrass was identified as a species of interest due to its wide range of adaptability, and reported large biomass yields, and commercially available cultivars.. Additionally a tall wheatgrass cultivar from Hungary, 'Szarvasi-1' Energy Grass, was

brought to our attention which increased our interest in this species. Synonyms for tall wheatgrass found in the Literature include: *Elytrigia elongatum* (Host) Nevski , *Elymus elongatus* (Host) Runemark, *and Agropyron elongatum* (Host) Beauv. (Plants Database, 2006). Tall wheatgrass is a perennial, decaploid (2n=70) cool-season bunchgrass from southern Europe and Asia Minor where its habitat includes areas with saline or alkaline soils (Vogel and Moore, 1998). Tall wheatgrass is a bunchgrass with a rapid growth rate with a mature height of 5 feet, and a moderate lifespan. The species is adapted to coarse, fine and medium textured soils and has low anaerobic tolerance. There are an estimated 75,320 seeds /lb. Tall wheatgrass is known for high seedling vigor and a slow rate of spread via seed. (Plants Database, 2006)

In addition to 'Szarvasi-1' The three other tall wheatgrass cultivars being evaluated are 'Alkar', from Pullman PMC, and 'Largo' and 'Jose' from the former SCS nursery in Albuquerque, NM. 'Alkar' is adapted to Plant Hardiness Zone (PHZ) 5 the others to PHZ 4. 'Alkar' was reported to be very tolerant to wet conditions and is later maturing than the other wheatgrass. A variety not in study 'Orbit' tolerates flooding for three to four weeks in spring. (Alderson and Sharp, 1994). Although it performs best in areas having >450 mm/yr precipitation, tall wheatgrass responds well to irrigation both in areas with high precipitation and in areas with low precipitation. (Lauriault et al., 2002).

Tall wheatgrass has been investigated as a vegetative wind barrier for control of wind erosion in the Northern Great Plains where it was reported "that the barriers reached height of about 1.2 m and the stems remain erect throughout the winter"(Aase and Pikul, 1995). In a study at Big Flats, New York 'Jose' tall wheatgrass and several other tall wheatgrass accessions performed very well as a vegetative barrier, remaining upright over winter. The tall wheatgrass matures later than other cool season grasses (Lauriault et al., 2002) and may be able to be harvested later allowing harvest of the yearly biomass from one cutting.

Yields of tall wheatgrass have been reported typically under grazing style clipping studies, in different climates and precipitation with various fertilizer and irrigation treatments resulting in large variability in reported yields. In Bushland, TX 'Jose' yielded 11.3 Mg/ha. A second study in that location with the three varieties we are investigating only yielded 3.8 Mg/ha, however this study used much less fertilizer. In Los Lunas, NM 13.2 Mg/ha were reported for 2 to 3 harvests annually using 146 kg /ha total N., while at the same station only 4.8 Mg/ha was reported from 2 to 3 harvests with a split application of 230 kg/ha of total N. A study in Tucumcari, NM reported maximum yearly yields with irrigation and split application of 168 kg/ha of N of 4.5 Mg/ha (Lauriault et al., 2002). Yields of 13.2 Mg/ha are consistent with high management yields of other cool season grasses in the Northeast. The ability to stand up over winter and late seed maturity, (the potential improvements made with 'Szarvasi-1' Energy Grass) may make tall wheatgrass a potential bio-feedstock. Vogel and Moore (1998) determined that the genetic base of tall wheatgrass cultivars is narrow. The lineages of four of the six cultivars released in the US trace to a common accession, PI 98526 ('Alkar' not 'Jose' or 'Largo'). They evaluated 50 accessions and determined many of the accessions had equivalent yields and IVDMD equivalent or higher than the check cultivars. There has been no work in the

Northeast reported with these grasses for yield, fertilizer response, insect or disease resistance or persistence.

Presently several universities and USDA-ARS are considering reed canarygrass (*Phalaris arundinaceae* L.) for a cool season grass bio-feedstock. Potential expansion of acres dedicated to reed canarygrass is likely to be controversial due to the species generally being considered invasive as well as prohibited from use in Massachusetts and its listing as a noxious weed in Washington and Connecticut. This study may provide information on the potential of tall wheatgrass to be used in place of reed canarygrass on certain soils.

Materials and methods

Due to the high degree of variability between PMCs, any type of statistical comparison between locations is not possible. More detailed and specific analysis on a site by site basis can be found in individual PMC annual progress reports. Depending on location and local interest the following plant species and cultivars were established in trials: tall wheatgrass cultivars 'Jose', 'Szarvasi-1', 'Alkar', and 'Largo', intermediate wheatgrass, and 'Bellevue' reed canarygrass.

Trials were established at 9 plant material centers in 2007/2008. Participating PMCs were located in Arizona, Idaho, Oregon, Washington, Colorado, Montana, Michigan, Maryland, and New York. The experimental design used was a randomized complete block (RCB) with 4 replicates at AZ, CO, ID, MT, MI, OR and WA PMC's, and 6 replicates at the NY and MD PMCs.

Tall wheatgrass studies have been direct seeded at 15 (Butler and Muir, 2006) and 20 lbs/ac (Lauriault et al., 2002). Their 40 lb/ac seeding rate is considered higher than necessary so an additional seeding rate of 20 lb/ac will be used for studies in Maryland, Michigan, and New York. The recommended NRCS FOTG seeding rate of 8lbs PLS/ac is being used in western region studies.

Treatments at the western PMCs consisted of the 4 tall wheatgrass cultivars with a single seeding rate of 8 PLS lbs per acre. Eastern PMC treatments consisted of the 4 tall wheatgrass cultivars, an intermediate wheatgrass, reed canarygrass, with seeding rates of 20 and 40 PLS per acre. PMCs were asked to obtain row spacing between 6-12 inches depending on available equipment.

PMCs were asked to fertilize, maintain and evaluate plots as follows:

- Optimum level of P and K will be applied based on soil test (Record soil test levels and amount time of fertilizer application).
- Broadcast N at a rate of 100 lb/acre (112 kg/ha) as ammonium nitrate or sulfate at the 3rd leave stage in the spring (record rate, method, timing and form of N fertilization).
- Weeds will be controlled during the duration of study. Control method will be at the discretion of the cooperator (e.g. hand rouging, herbicides, cultivation) (record weeds, rate, date and herbicides applied, and/or other weed control methods).
- Irrigation water will be applied during the establishment year only. The plots will not be irrigated in subsequent years (record amount and time of application).

- Following harvesting of the center rows of plot for yield and biofuel quality analyses, remaining standing biomass will need to be clipped at the same harvest height (leaving a stubble of 2-4 inches) as the plant in the center row and removed from the study area. Border row will also need to be harvested and removed from the study area.
- Harvest treatments will consist of 1 treatment occurring at full maturity and will depend on location.
- Harvest treatments are assigned to the middle of each plot.
  Dry matter yield will be determined by harvesting 80 inches of middle each plot.
- Plot weight (wet weight) for the harvested section of the row will be weighed (record weigh and date of harvest).
- A subsample (~300g representation of the total harvest) will be taken for dry matter determination and biofuel analyses (record wet weight of the sample). FUNDING DEPENDENT
- Subsample will be dried at 55° C for 16-24 hrs. Drying time may vary depending on species and harvest treatment (record dry weight). FUNDING DEPENDENT
- Sample will be ground with a mill to pass through a 1mm screen for dry matter and elemental analysis. FUNDING DEPENDENT
  Analysis for these samples will be performed to assess gross biofuel quality and mineral removal from the field. These analyses include: those for dry matter (crude protein, acid detergent fiber, neutral detergent fiber, TDN, lignin, gross energy, total ash) and a series of mineral analysis by flame ionization (P, K, Ca, Mg, S, Fe, Mn, Zn, Cu, B) (AOAC 200) FUNDING DEPENDENT

PMC were asked to make the following evaluations:

Year 1 Evaluations:
% Stand
Digital photos from established photo points monthly (1 per entry)
Biomass production
Comments (disease, insects, nutrient problems)

Year 2-3 Evaluations:
% Stand
Biomass production
Digital photos from established photo points at harvest (1 per entry)
Comments (disease, insects, nutrient problems)

Results (Idaho PMC 2008 data and analysis)

Plots were established June 2, 2008 in a randomized complete block design with 4 replications. The trial was irrigated to approximate the equivalent of 8 inches of precipitation from the planting date to the evaluation on July 23, 2008. Percent stand data was collected and is summarized in Table 1. Percent stand for 'Alkar' was 78.5 percent and was significantly better than the other accessions evaluated.

The trial will be evaluated for biomass production in 2009. For more information contact Loren St. John, PMC Team Leader at Loren.St.John@id.usda.gov

Table 1. Percent stand July, 2008.

Randomized Complete Block AOV Table for Percent_Stand

Source	DF	SS	MS	F	P
Rep	3	676.56	225.521		
Cultivar	3	2289.06	763.021	6.13	0.0148
Error	9	1120.31	124.479		
Total	15				

Note: SS are marginal (type III) sums of squares

Grand Mean 65.313 CV 17.08

Tukey's 1 Degree of Freedom Test for Nonadditivity

Source	DF	SS	MS	F	P
Nonadditivity	1	5.34	5.344	0.04	0.8496
Remainder	8	1114.97	139.371		

Relative Efficiency, RCB 1.12

Means of Percent Stand for Cultivar

Cultivar	Mean
'Alkar'	78.750
'Jose'	59.375
'Largo'	74.375
'Szarvasi-1'	48.750

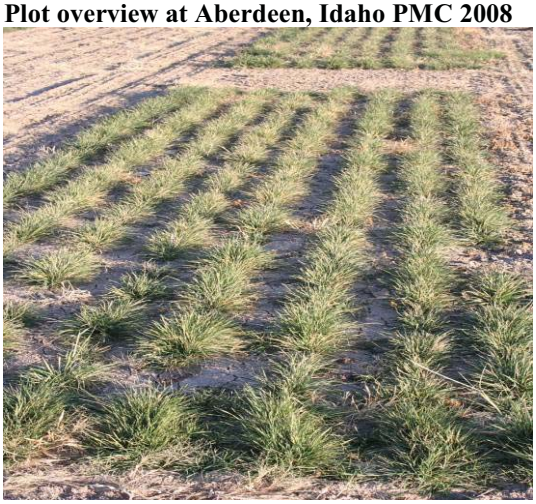
Observations per Mean 4
Standard Error of a Mean 5.5785
Std Error (Diff of 2 Means) 7.8892

LSD All-Pairwise Comparisons Test of Percent Stand for Cultivar

Cultivar	Mean	Homogeneous Groups
'Alkar'	78.750	A
'Largo'	74.375	AB
'Jose'	59.375	BC
'Szarvasi-1'	48.750	C

Alpha 0.05 Standard Error for Comparison 7.8892
Critical T Value 2.262 Critical Value for Comparison 17.847
Error term used: Rep*Cultivar, 9 DF
There are 3 groups (A, B, etc.) in which the means
are not significantly different from one another.

Plot overview at Aberdeen, Idaho PMC 2008



'Alkar' tall wheatgrass , Aberdeen, Idaho 2008

'Jose' tall wheatgrass, Aberdeen, Idaho 2008

'Largo' tall wheatgrass, Aberdeen, Idaho 2008

'Szarvasi-1' tall wheatgrass, Aberdeen, Idaho

Discussion:

First year results indicate that 'Largo' and 'Alkar' were the best performers over all the locations among tall wheatgrass entries in both stand establishment and vigor . Yield (Table 2) among tall wheatgrass entries was less clear with no tall wheatgrass entries having significantly better yields at all locations, however 'Largo' yields overall appear best. Intermediate wheatgrass produced the greatest yields in trials where included (MD, NY, MI). The Hungarian 'Szarvasi-1' "energy grass" performance was generally ranked poorer than the other tall wheatgrass entries although this may be due to seed quality.. New York germination analysis indicated actual germination was well below the level stated on the seed bag tags which suggests that the received seed of 'Szarvasi-1' was of poor quality.

Among PMCs with different seeding rates no statistical differences in yield were evident between 20 lbs/acre and 40/lbs/acre seeding rates. In New York trials the yield trended higher at the lower planting rate of 20 lb/acre. Washington trials were installed with 6 and 12 inch row spacing. No significant differences in yield were evident.
As expected the species is not adapted to the hot desert regions and is not a practical source of bio-fuel feedstock as plots in Tucson had substantial stand deterioration during the summer period, although regularly irrigated.

Wet chemistry work performed by Washington State University indicated that the cultivars 'Largo', 'Alkar', and 'Szarvasi-1' were statistically the same in lignin content, ADF, and NDF. The values were at the lower end of expected values for grasses (Linn and Martin 1999) indicating excellent forage potential, but questionable value as a biofuel-feedstock as compared to switchgrass and other conventional bio-fuel feedstocks such as poplar, oak, etc. Alkar has significantly lower % ash content than Largo and Svarsavi-1, but was not significantly lower than Jose.

Table 2. 2008 Average yield (tons/ac) of cultivars by PMC

PMC	Alkar Tons/ac	Jose Tons/ac	Largo Tons/ac	Svarazi Tons/ac	Chiefton Tons/ac	Bellevue Tons/ac	Intermediate wheatgrass Tons/ac
Arizona	.64	.61	.79	.58	NA	NA	NA
California	3.6	3.6	3.8	3.8	NA	NA	NA
Colorado	.24	.18	.52	.29	NA	NA	NA
Maryland	1.4	1.6	1.6	1.7	NA	NA	1.9
Michigan	.3	.3	.3	.3	NA	.3	1.0
Montana	No results	No results	No results	No results	NA	NA	NA
New York	4.1	3.7	5.3	4.0	4.1	4.2	5.6
Nevada	No results	No results	No results	No results	NA	NA	NA
Oregon	No results	No results	No results	No results	NA	NA	NA
Washington	No results	No results	No results	No results	NA	NA	NA

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ZEBA® Forb Seed Trial, 2009 Progress Report

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Introduction

Successful range plantings in arid environments are difficult to achieve, especially in the case of native forbs. In many cases, the most limiting requirement for success is the lack of adequate soil moisture during the establishment year. Zeba, a product produced by Absorbent Technologies, Inc (ATI) is a superabsorbent cornstarch based polymer that is used as a seed coating or soil amendment. The product is designed to hold and release water for use by plants multiple times throughout the initial growing season. Zeba is reported to be capable of absorbing up to 400 times its original weight in water and to slowly release encapsulated moisture in response to plant root suction (Zeba, 2009). The hydrogel can also rehydrate and store additional water as moisture enters the soil, a process that can be repeated numerous times before Zeba loses effectiveness. The claimed result is faster germination, quicker emergence, better plant establishment, consistent growth and higher, better-quality yields using less water. Zeba has been employed extensively in turf, nursery and other agricultural settings, but has undergone limited evaluation testing its potential in rangeland restoration projects. Preliminary observation plots established at the Coffee Point and Skull Valley Off-Center Evaluation Sites in 2007 and 2008 indicate that ZEBA coated seed may improve plant establishment under rangeland conditions (Tilley and St. John, 2007; Tilley, 2008).

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

Materials and Methods

A trial was established at the PMC home farm in Aberdeen, Idaho to compare establishment and survival of four native forbs when used with Zeba technologies versus a non-treated control. The four forbs chosen for evaluation were 'Appar' blue flax, Maple Grove Germplasm Lewis flax, Richfield Selection firecracker penstemon, and Clearwater Selection Venus penstemon. All, with the exception of Appar blue flax, are native to the Intermountain West and are used commonly in range and forest plantings in the region.

Three Zeba treatments were tested in this study: 1) seed coated with Zeba; 2) Farm, a granular soil amendment which is applied through the drill along with the seed at 3 lb/ac; and 3) a combination of seed coating plus a ½ rate (1.5 lb/ac) of Farm. A non-treated control was also used as a standard for comparison.

Seeding rates and seed per pound information was obtained from Ogle et al. (2007) with a target rate of 25 PLS/ft for the flaxes, and Richfield firecracker penstemon, and 50 PLS/ft Clearwater Venus penstemon. Non-treated Appar, Maple Grove and Richfield

were planted at 4 lbs pure live seed (PLS)/acre and Clearwater was planted at 2 lbs PLS/ac. Seeding rates for coated seed was determined by weighing out 1.0g of coated seed from each accession and washing off the coating and counting the number of seeds. This yielded 141,000 seeds/lb of Appar, 95,000 seeds/lb Maple Grove, 82,000 seeds/lb Richfield and 480,000 seeds/lb Clearwater.

After planting we observed that Appar and Maple Grove had what appeared to be significantly different seed sizes. To get a more accurate number, 500 seeds of each were counted and weighed. From this it was determined that Appar and Maple Grove contained approximately 350,000 and 205,000 seeds/lb respectively compared to 278,000 as reported in Ogle et al. (2007). As a result, we determined that the non-coated Appar plots were seeded to approximately 32 PLS/ft and Maple Grove was seeded to approximately 19 PLS/ft instead of the targeted 25 PLS/ft.

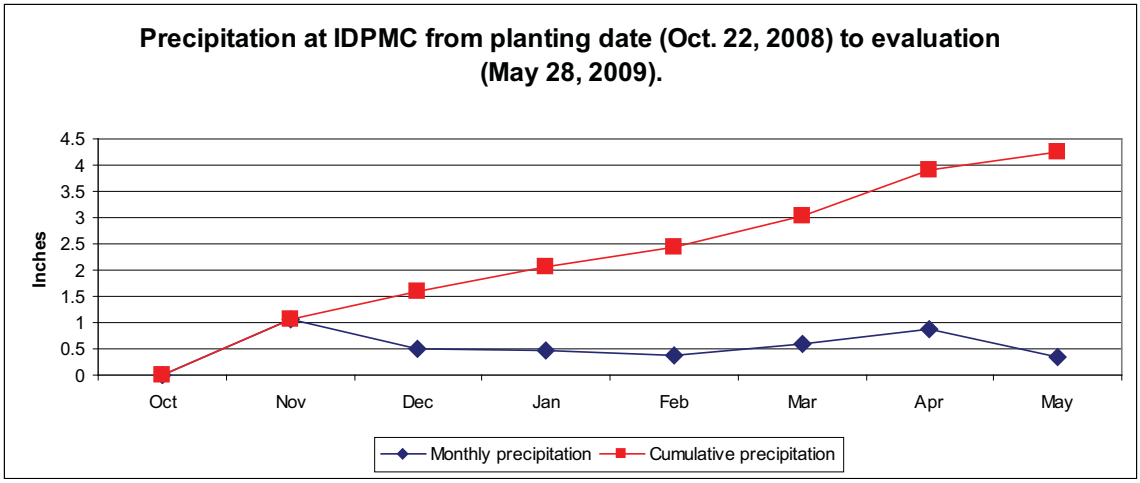
Table 1. Seed information

Accession	Seed/lb	Seeding rate (lb/ac) [a]	g/plot (PLS)	g/plot (bulk)	Seeds/ft
Appar	350,000	4	2.50	2.80	32
Maple Grove	205,000	4	2.50	2.86	19
Richfield	315,000	4	2.50	2.97	25
Clearwater	1,090,000	2	1.25	1.44	25
Appar Zeba	141,000	8	5.00	5.60	25
Maple Grove Zeba	95,000	11	6.88	7.88	25
Richfield Zeba	82,000	13	8.13	9.64	25
Clearwater Zeba	480,000	5	3.13	3.61	25
Farm SP (alone)	--	3	1.88	1.88	
Farm SP (w/ Zeba)	--	1.5	0.94	0.94	

The seedbed was prepared by disking twice followed by a roller harrow. The trial was planted on October 22, 2008 using a hand-pushed belt seeder set at 1/8 to 1/4" depth. The experiment was designed as a randomized complete block with four replications. Each plot contained a single 20' long row. Rows were placed on 3' centers. Plots were mechanically cultivated once in late May. Heavy rain during late June and early July prevented mechanical cultivation so the plots were mowed several times to control weed seed production.

Weather

Weather during the trial was typical for southeastern Idaho with high temperatures averaging near 80 - 90º F in the summer and dropping into the teens during winter months with occasional dips below zero. The plots received 4 hrs of supplemental irrigation per week (0.25 inches) between May 15 and June 15, 2009. The plots did not receive supplemental fertilization.



Evaluations

On April 23 2009 the flax plots were evaluated for emergence. Plots were given a rating of 1 through five with 1 being best and 5 being worst. The flax plots were evaluated again on May 28 for percent stand and plant density. 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 were summed and recorded as a percentage. Plant density was measured by counting seedlings found in the center one foot of row and converted to average plants/linear foot.

The evaluation of the penstemon plots was delayed due to slow emergence. By the time the plants had emerged, weed pressure had become extremely heavy making it difficult to separate penstemon seedlings from the abundant broadleaf weeds. There was also a large amount of volunteer penstemons within the plots which made accurate evaluations impossible. Interestingly, a difference in weed species was noted between the flax plots and the penstemon plots. Flax plots were dominated by blue mustard, while the penstemon plots contained mostly lambsquarter and other later emerging weeds.

Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$. Percent stand and plant densities of Appar and Maple Grove were transformed to compensate for differences in planted seeds per foot.

Results

No significant differences were detected for emergence, percent stand or plant density for Appar or Maple Grove. The best rated emergence and percent stand for Appar came from the non-treated control (1.75 and 59% respectively). The highest average plant density among the Appar plots was from the Zeba treated seed with 11.3 plants/ft. The highest emergence score in the Maple Grove treatments was from the Farm amendment (4.00). The best percent stand and plant densities were found in the non-treated plots (54% and 10.9 plants/ft respectively).

Evaluation of Appar blue flax

Accession	4/23/09 emergence	5/28/09 Stand	Density
	(1-5)	%	Plants/ft
Appar	1.75	59	9.0
Appar Farm	2.50	46	8.6
Appar Zeba	3.00	56	11.3
Apparm Farm+Zeba	3.25	55	6.8
P=	0.16	0.59	0.48

Evaluation of Maple Grove Select Lewis flax

Accession	4/23/09 emergence	5/28/09 Stand	Density
	(1-5)	%	Plants/ft
Maple Grove	4.25	54	10.9
Maple Grove Farm	4.00	44	7.8
Maple Grove Zeba	4.25	42	4.5
Maple Grove Farm+Zeba	5.00	28	3.5
P=	0.46	0.35	0.07

Discussion

Results of this study indicate no effect from the use of Zeba seed coating or Farm soil amendment when used with Maple Grove Lewis flax or Appar blue flax. Because the penstemon plots could not be adequately evaluated due to weeds and volunteers, no conclusions could be made regarding the two penstemon species evaluated. The trial will be evaluated again next year and a final report completed.

Acknowledgements

The PMC would like to thank Ed Clark of Zeba, for technical assistance and for providing Farm amendment and seed coating.

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OFF-CENTER ACTIVITIES

Coffee Point Off-Center Evaluation (2006 planting)
2009 Progress Report
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INTRODUCTION

In the fall of 2006, the Aberdeen Plant Materials Center (PMC) installed a multi-species off-center planting at the Coffee Point test site 25 miles northwest of Aberdeen, Idaho. Seed collections were assembled with the assistance of ARS Logan, UT; Bridger, MT PMC; Benson Seed Farm; University Nevada, Reno; Department of Defense; Geertson Seed Farm and Los Lunas, NM PMC. The trial contains 58 accessions of 23 species of native and introduced grasses, forbs and shrubs (appendix 1). Appendix 2 shows a plot map of the planting. The goal of this trial is to evaluate the adaptability of new conservation releases in a low precipitation environment and compare their establishment, production and longevity against traditionally used released plant materials.

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

MATERIALS AND METHODS

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

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

wheatgrass, 20% Bannock thickspike wheatgrass, 20% Magnar basin wildrye and 10% Snake River Plains fourwing saltbush was planted in the prepared areas surrounding the trial.

Establishment year evaluations were conducted on April 30 and May 1, 2007 and again on September 7, 2007 using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40X41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The first grid was laid on the rows approximately 1 ft into the plot. Counts were made of the cells that contained at least one plant. Grids were subsequently advanced one grid length in the plot and evaluated four more times giving a total of 100 evaluated cells.

Density evaluations for 2008 took place on April 28 in the same manner as 2007. In August 2008 forage samples were taken from those species blocks judged to have enough production to warrant evaluation: thickspike wheatgrass, slender wheatgrass, and the introduced grass species. A 2'x 6' metal frame was placed in the center of each plot, and all above ground biomass was hand clipped and placed in paper grocery sacks. Forage samples were air dried for two weeks and weighed. Data were then converted to lbs/acre.

In 2009, plant densities were recorded on May 19, and forage samples were taken from the introduced grasses block on August 10.

All tables have been arranged with accessions ranked from highest plant density to the lowest at the time of the first evaluation. Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$. If significance was detected, means were separated using a Tukey HSD all pairwise comparison.

ZEBA

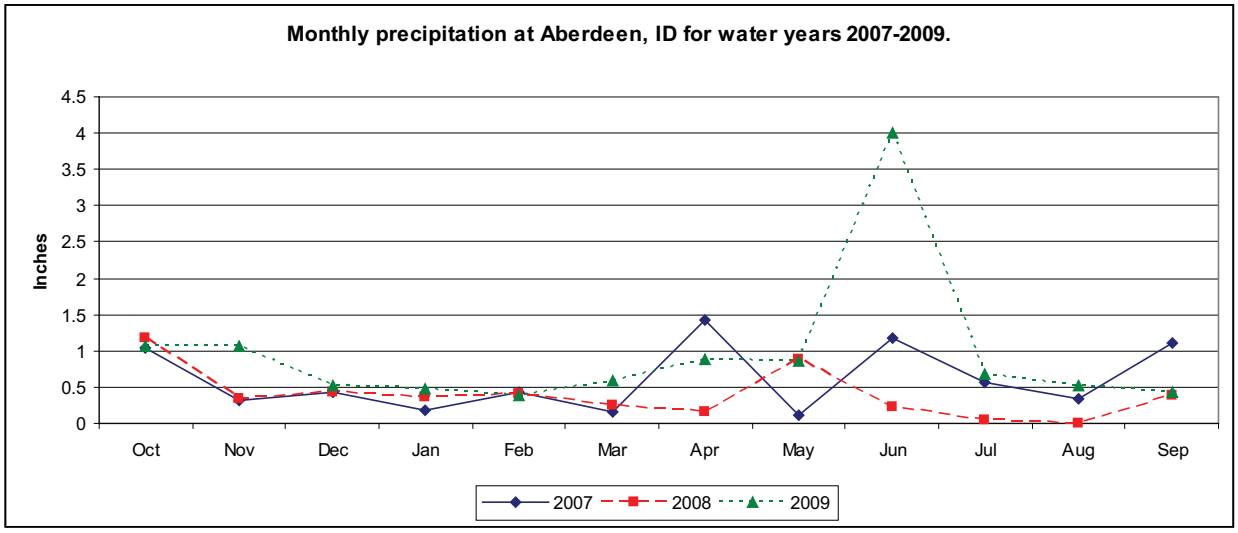
Also included in the planting are single observational plots of Appar blue flax, Goldar bluebunch wheatgrass, Magnar basin wildrye and Nezpar Indian ricegrass treated with ZEBA coating. ZEBA is a super-absorbent cornstarch based polymer. When saturated, the ZEBA molecules form a hydrogel that is able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

RESULTS

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

Rainfall during the establishment year was lower than normal. In the 2007 water year, less than 6 inches of precipitation accumulated at Aberdeen. Spring rains in April helped establishment, but

sparse summer rains caused many germinants to die by September. Water year 2008 was also lower than normal in precipitation. From October 1, 2007 through September 30, 2008, Aberdeen only received 4.68 inches of rain Water year 2009 had over 11 inches of precipitation due in large part to 4 inches of rain coming in June (Bureau of Reclamation, 2009). Hot temperatures in May, 2009 followed by 4 inches of rain in June initiated a new flush of weeds in the trial area and likely drastically increased production values of the introduced grasses.



SPECIES DISCUSSION

In the spring 2007 evaluation, basin wildrye densities ranged from 0.06 plants/ft² (Topinish and Jim Creek) to 0.24 plants/ft ² (Trailhead). Densities dropped to 0.00 to 0.06 plants/ft ² at the time of the fall evaluation. Plant densities remained low at the 2008 through the 2009 evaluations.

Basin wildrye

		Density			
Accession	PLS	5/07	9/07	4/08	5/09
	---%---	----------(plants/ft ²)----------			
Trailhead	86.6	0.24[a]	0.06 [a]	0.04 [a]	0.07 [a]
L-46	74.4	0.22	0.03	0.06	0.03
L-45	81.7	0.21	0.01	0.08	0.05
Magnar	89.6	0.15	0.01	0.03	0.02
Washoe	83.9	0.08	0.02	0.01	0.02
Gund	89.9	0.08	0.01	0.04	0.01
Jim Creek	83.6	0.06	0.01	0.01	0.04
Topinish	85.8	0.06	0.00	0.01	0.03

[a]Not significant at $p<0.05$

Although no significant differences were detected between the Sandberg bluegrass accessions, at the spring 2007 evaluation, 9081633, an accession being investigated by the Bridger, MT PMC had better overall establishment than all other accessions. 9081633 continued to have the highest density in the fall evaluation, 0.06 plants/ft ², which was significantly higher than all other accessions. In 2008 there was again no significant difference between means. High Plains Sandberg bluegrass increased from 0.00 plants/ft ² to 0.06 plants/ft ², equaling accession 9081633

for the top performer. In 2009 High Plains (0.14 plants/ft²) performed better than any other accession, differing significantly from Mountain Home and accession 9081633.

Sandberg bluegrass

		Density			
Accession	PLS	5/07	9/07	4/08	5/09
	---%---	----------(plants/ft ²)----------			
9081633	86.0	0.13 [a]	0.06 a	0.06 [a]	0.00 b
High Plains	95.0	0.07	0.00 b	0.06	0.14 a
Wallowa	83.2	0.02	0.05 b	0.02	0.04 ab
Duffy	79.0	0.05	0.00 b	0.01	0.05 ab
Mtn. Home	85.0	0.05	0.00 b	0.00	0.01 b
Critical value (0.05)			0.05		0.11
[a]Not significant at p<0.05					P=0.01

In the bluebunch wheatgrass trial no significance was detected between density means for the spring or fall evaluation during 2007. Plant densities in the spring ranged from 0.01 plant/ ft² to 0.37 plants/ft². The top performer was P-19, a test accession from the ARS (0.37 plants/ft ²). Plant densities generally stayed the same between the spring and fall evaluations indicating good adaptability of the species to the site conditions. The 2008 evaluation yielded significant differences in plant densities. P-19 had the highest density with 0.26 plants/ft ², significantly greater than P-27 with 0.06 plants/ft ². In 2009 no significant differences were detected between accessions. P-19 continued to have the highest recorded plant density at 0.08 plants/ft².

Bluebunch wheatgrass

		Density			
Accession	PLS	5/07	9/07	4/08	5/09
	---%---	----------(plants/ft ²)----------			
P-19	92.9	0.37[a]	0.37 [a]	0.26 a	0.08 [a]
Anatone	88.1	0.33	0.29	0.22 ab	0.02
P-24	91.2	0.28	0.28	0.22 ab	0.06
9081636	92.0	0.27	0.17	0.12 ab	0.06
P-22	85.3	0.24	0.28	0.20 ab	0.06
Wahluke	87.3	0.24	0.25	0.18 ab	0.07
Goldar	90.6	0.13	0.13	0.10 ab	0.02
P-27	87.4	0.11	0.09	0.06 b	0.03
P-7	89.4	0.11	0.12	0.11 ab	0.02
P-32	86.5	0.01	0.12	0.10 ab	0.02
Critical value (0.05)				0.17	
[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 during 2007. Densities decreased between the spring and fall evaluations. SERDP continued to have the highest density (0.35 plants/ft ²). In 2008 SERDP had increased slightly to 0.38 plants/ft ², but there were still no detectable significant differences between means. All densities of Snake River wheatgrass dropped from 2008 to 2009. SERDP had the highest density with 0.11 plants/ft² and did not differ significantly from the other accessions.

Snake River wheatgrass

Accession	PLS	Density 5/07	9/07	4/08	5/09
	---%---	----------plants/ft²)----------			
SERDP	90.0	0.50[a]	0.35[a]	0.38[a]	0.11[a]
E-51	91.1	0.39	0.29	0.30	0.05
E-45	94.5	0.33	0.18	0.18	0.04
E-46	96.3	0.32	0.27	0.26	0.04

[a]Not significant at p<0.05

Thickspike and streambank wheatgrass exhibited good drought tolerance and seedling vigor with establishment plant densities between 0.84 and 0.98 plants/ft² during 2007. No significant differences were detected between means. Densities remained high through the fall 2007 evaluation, with all accessions having densities between 0.66 and 0.78 plants/ft². Plant densities of thickspike and streambank wheatgrass remained high in 2008. Sodar streambank wheatgrass had the best plant density with 0.83 plants/ft ², though that did not differ significantly from the other accessions. In 2008 forage yields were measured in the thickspike and streambank wheatgrass plots. The highest yielding accession was Bannock thickspike wheatgrass with 151 lb/ac. No significant differences were detected between forage yield means. In 2009 plant densities had decreased by almost half from the previous year. Sodar had the highest density (0.45 plants/ft²) followed by Critana and Bannock with 0.32 and 0.21 plants/ft² respectively.

Thickspike and
streambank wheatgrass

Accession	PLS	Density 5/07	9/07	4/08	Forage 8/08	Density 5/09
	---%---	---------(plants/ft²)--------			---(lb/ac)---	-----(plants/ft²)-----
Sodar	96.5	0.98[a]	0.78[a]	0.83[a]	137[a]	0.45[a]
Critana	90.0	0.86	0.67	0.74	133	0.32
Bannock	94.3	0.84	0.66	0.73	151	0.21

[a]Not significant at p<0.05

Western wheatgrass is typically recommended for use in sites receiving 12 inches or more annual precipitation and is not well adapted to the conditions faced at Coffee Point. Although some plants did germinate from each of the accessions tested. Densities were very low in 2007, 0.03 to 0.05 plants/m² in the spring and slightly lower in the fall. In 2008 western wheatgrass densities remained very low with Rosana having the highest density of 0.07 plants/ft ². In 2009 the only accession with living plants in the evaluated plots was Rosana with only 0.04 plants/ft².

Western wheatgrass

Accession	PLS	Density 5/07	9/07	4/08	5/09
	---%---	----------(plants/ft²)----------			
Rosana	90.0	0.05[a]	0.02[a]	0.07[a]	0.04[a]
9076517	90.0	0.03	0.03	0.03	0.00
9081630	85.0	0.03	0.03	0.01	0.00

[a]Not significant at p<0.05

Among the slender wheatgrass accessions, First Strike slender wheatgrass from the Department of Defense and ARS had significantly greater plant densities than Copperhead from the MT PMC during 2007. First Strike was developed for superior traits in germination and establishment for use on military training grounds. The other tested accession, Pryor did not differ significantly in establishment from of the other accessions. At the fall evaluation, the ranking remained constant, although densities decreased for all accessions. In 2008 slender wheatgrass densities of accession First Strike and Pryor increased slightly to 0.45 and 0.34 0.07 plants/ft ² respectively, both significantly greater than Copperhead (0.08 plants/ft ²). In 2008 accession First Strike yielded 143 lb/ac of forage, and Pryor had an average forage yield of 75 lb/ac. By 2009 there were no living slender wheatgrass plants recorded. This was presumably due to the short-lived nature of the species and/or the summer drought of 2008.

Slender wheatgrass

		Density			Forage	Density
Accession	PLS	5/07	9/07	4/08	8/08	5/09
	---%---	---------(plants/ft²)---------			---(lb/ac)---	---(plants/ft²)---
First Strike	90.0	0.53 a	0.37 a	0.45 a	143 a	0.00 [a]
Pryor	95.9	0.46 ab	0.30 ab	0.34 a	75 ab	0.00
Copperhead	85.0	0.23 b	0.08 b	0.08 b	0 b	0.00
Critical value (0.05)		0.28	0.28	0.18	86	

[a]Not significant at p<0.05

In the bottlebrush squirreltail trial, accession 9019219, test material from the MT PMC had an establishment density of 0.65 plants/ft² during 2007and was significantly greater than the plant density of Toe Jam Creek (0.20 plants/ft²). Fall densities remained essentially the same as spring. Accession 9019219 is likely the subspecies *elymoides* and is currently being tested by Bridger PMC in Montana, while Toe Jam Creek is subspecies c*alifornicus* and was collected in a higher precipitation area near Elko, Nevada. In 2008 squirreltail density means were not separable statistically. Accession 9019219 had 0.58 plants/ft ² and Toe Jam Creek had a density of 0.20 plants/ft ². In 2009 accession 901219 had an average of 0.39 plants/ft², while Toe Jam Creek had 0.12 plants/ft².

Bottlebrush squirreltail

		Density			
Accession	PLS	5/07	9/07	4/08	5/09
	---%---	----------(plants/ft²)----------			
9019219	85.0	0.65 a	0.57 a	0.58[a]	0.39 [a]
Toe Jam Creek	92.2	0.20 b	0.15 b	0.20	0.12
Critical value (0.05)		0.32	0.37		

[a]Not significant at p<0.05

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

River Plains fourwing saltbush and Gardener's saltbush had significantly greater plant densities than the other evaluated shrubs in 2009 with 0.24 and 0.20 plants/ft² respectively.

Shrubs

Accession	PLS	Density 5/07	9/07	4/08	5/09
	---%---	----------(plants/ft²)----------			
Snake River Plains fourwing saltbush	44.5	0.17[a]	0.13 ab	0.19 a	0.24 a
Gardener's saltbush, 9016134	30.0	0.15	0.19 a	0.19 a	0.20 a
Open Range winterfat	80.8	0.02	0.04 bc	0.06 ab	0.03 b
Wytana fourwing saltbush	45.0	0.01	0.00 c	0.00 b	0.01 b
Northern Cold Desert winterfat	85.2	0.00	0.00 c	0.00 b	0.00 b
Wyoming big sagebrush	21.3	0.00	0.01 bc	0.01 b	0.01 b
Critical value (0.05)			0.13	0.15	0.15

[a]Not significant at $p<0.05$

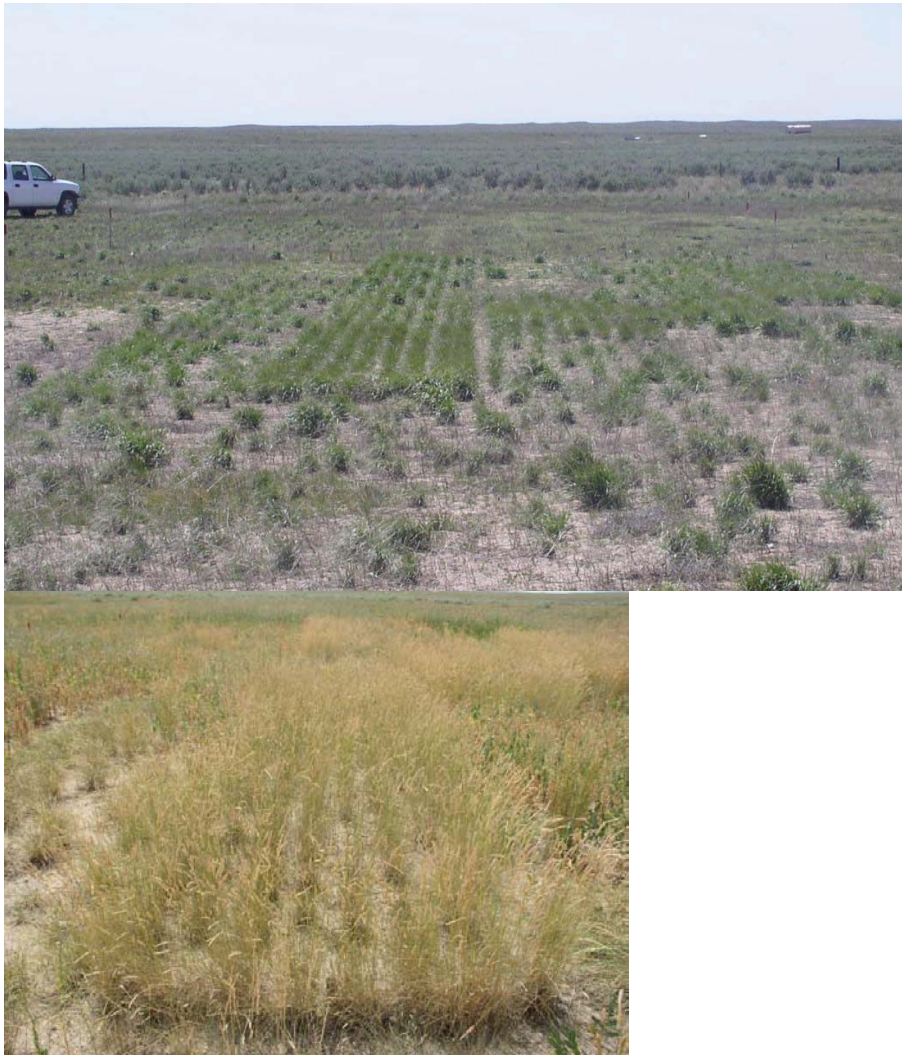
In the forb trial, only Maple Grove Lewis flax and the test accession of Phacelia, 9081632, from the MT PMC had fair establishment. Maple Grove had a plant density of 0.45 plants/ft² and was significantly greater than all other accessions with the exception of Phacelia which had a density of 0.28 plants/m² during 2007. All other accessions had essentially zero plants emerge. In the fall, Maple Grove continued to have the best density (0.20 plants/ft²). Most of the Phacelia plants had died by the fall evaluation, and Cedar Palmer penstemon had an increase in density, from 0.00 to 0.06 plants/ft². In 2008 the only forbs with surviving plants in the plots were Maple Grove Lewis flax and Great Northern western yarrow. Maple Grove had significantly better plant density than all other accessions with 0.36 plants/ft ². In 2009, only Eagle yarrow had plants visible within the evaluated plots, but only recorded 0.01 plants/ft².

Forbs

Accession	PLS	Density 5/07	9/07	4/08	5/09
	---%---	----------(plants/ft²)----------			
Maple Grove Lewis flax	93.0	0.45 a	0.20 a	0.36 a	0.00 b
Phacelia	81.8	0.28 ab	0.00 b	0.00 b	0.00 b
Great Northern w. yarrow	90.0	0.01 b	0.00 b	0.01 b	0.00 b
Cedar Palmer penstemon	95.0	0.00 b	0.06 ab	0.00 b	0.00 b
Eagle w. yarrow	90.0	0.00 b	0.01 b	0.00 b	0.01 a
Richfield firecracker penstemon	92.2	0.00 b	0.00 b	0.00 b	0.00 b
Antelope prairie clover	98.0	0.00 b	0.00 b	0.00 b	0.00 b
Old Works penstemon	95.0	0.00 b	0.00 b	0.00 b	0.00 b
Stillwater prairie coneflower	94.5	0.00 b	0.00 b	0.00 b	0.00 b
Critical value (0.05)		0.34	0.18	0.17	0.01

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

with 1.53 plants/ft ². Forage yields of Vavilov II were also significantly greater than the other tested accessions. Vavilov II yielded 1176 lb/ac of forage, while the next closest yield came from Vavilov with 528 lb/ac. In 2009 the introduced grasses continued to outperform all other species evaluated. Vavilov II again had the highest plant density with 1.32 plants/ft ² and forage yield with 2165 lb/ac.



Above: introduced grass plots, May 2009; below: Vavilov II August 2009.

Introduced grasses

		Density				Forage	
Accession	PLS	5/07	9/07	4/08	5/09	8/08	8/09
	---%---	----------(plants/ft²)----------				-----(lb/ac)-----	
Vavilov II Siberian wheatgrass	90.0	1.48 a	1.46 a	1.53 a	1.32 a	1176 a	2165 a
Vavilov Siberian wheatgrass	90.0	0.74 b	0.68 b	0.75 b	0.68 b	528 b	1505 ab
Mustang Altai wildrye	90.0	0.75 b	0.58 b	0.70 b	0.24 b	56 b	595 b
Bozoisky Select Russian wildrye	90.7	0.70 b	0.65 b	0.65 b	0.60 b	189 b	669 b
Bozoisky II Russian wildrye	90.0	0.54 b	0.59 b	0.63 b	0.58 b	168 b	799 b
Critical value (0.05)		3.70	0.42	0.39	0.45	527	1239

Zeba Initial Evaluation

We also included one plot each of Magnar basin wildrye, Goldar bluebunch wheatgrass, Appar blue flax and Nezpar Indian ricegrass which were treated with Zeba® moisture retention seed coating. Because there was only one plot of each accession, these plots could not be analyzed statistically and only general observations can be made. The treated Magnar seed had a mean density of 0.71 plants/ft² as compared with 0.15 plants/ft² achieved in the untreated plots during 2007. Likewise, the treated Goldar plot had an average plant density of 0.43 plants/ft² while the untreated plots averaged only 0.13 plants/ft². Appar and Nezpar were not included in the main trial, so a comparison cannot be made, however, the results achieved with Magnar and Goldar are favorable. In the fall evaluation, all densities had decreased with the exception of Nezpar which increased from 0.09 to 0.15 plants/ft². From 2007 to 2008 there were increases in plant densities for all accessions except Nezpar. The top plant density was recorded by Appar blue flax with 0.43 plants/ft ². In 2009 only Magnar basin wildrye and Goldar bluebunch wheatgrass still had viable plants in the evaluation with 0.11 and 0.06 plants/ft ² respectively.

Zeba®

		Density			
Accession	PLS	5/07	9/07	5/08	5/09
	---%---	----------(plants/ft²)----------			
Magnar	87.3	0.71[a]	0.24[a]	0.30[a]	0.11[a]
Goldar	92.0	0.43	0.32	0.35	0.06
Appar	91.3	0.33	0.26	0.43	0.00
Nezpar	79.3	0.09	0.15	0.04	0.00

[a] Means not separated

SUMMARY

Meager precipitation in the first two seasons provided good conditions to test the assembled accessions under extreme drought conditions. Several species and accessions proved unable to establish and survive at the Coffee Point test site. All three species of introduced grasses had good establishment and survival into the 2009 season. Native species that contained good performing accessions included thickspike and streambank wheatgrass, and bottlebrush squirreltail. Of the forbs, only Maple Grove Lewis flax had a fair stand in 2008, yet these had all but disappeared by 2009. Of the shrubs, Snake River Plains and Gardener's saltbush both appear to have established and continue to have nice looking stands through 2009.

The next evaluations will take place in 2011 (five year) and 2016 (ten year) to measure long-term persistence and forage yield.

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Appendix 1. List of species and accessions

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

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

Appendix 2. Plot map; Coffee Point, 2006

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

→ NE

Skull Valley Off-Center Evaluation
2009 Final Report
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Skull Valley test site, May 2006

Introduction

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

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

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

Materials and Methods

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

Experimental design is a randomized complete block with 3 replications. Each plot is one drill width wide (80 in) by 18 ft long. Each species was arranged into a separate block; introduced grasses, shrubs and forbs also each formed a separate block (a plot map is provided in the appendix). Seeding depths are dependent on species and are planted according to Ogle et al (2007). Species were seeded at a target rate of 20 to 30 pure live seeds (PLS) per ft^2 for large seeded species (<500,000 seeds per pound) and 40 to 50 PLS/ft^2 for smaller seeded species (>500,000 seeds/lb). PLS was determined by seed lab results or, when lab results were not available, PLS was estimated visually, or the PLS from other accessions were averaged to determine unknown PLS. All seed was mixed with rice hulls as an inert carrier to ensure better seed flow according to St. John et al (2005) with the exception of fourwing saltbush and Gardner saltbush. A cover crop mix of 50% Anatone bluebunch wheatgrass, 20% Bannock thickspike wheatgrass, 20 percent Magnar basin wildrye and 10% Snake River Plains fourwing saltbush was planted in the prepared areas surrounding the trial.

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

On August 26, 2008 the site was again evaluated as described above. However, after a visual evaluation of the site it was apparent that entire blocks of species had essentially zero living plants. Thus, the August evaluations were only conducted on those species with visible and measureable stands (introduced grasses, bluebunch wheatgrass, and Snake River wheatgrass). Similarly, only plots with visible living plants were examined during the 2009 evaluation which took place on May 19. Evaluated blocks in 2009 included the introduced grasses, Indian ricegrass and bottlebrush squirreltail.

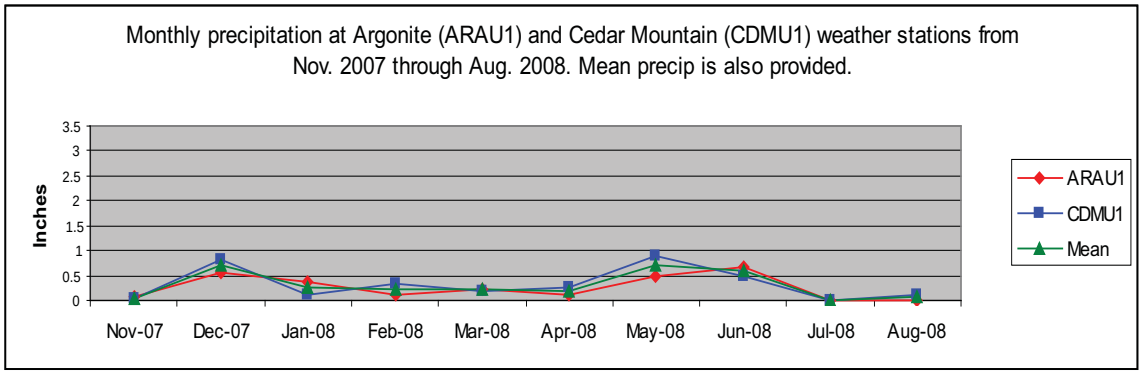
Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$. If significance was detected, means were separated using a Tukey HSD all pairwise comparison. The grass plots will be clipped the second and fourth year of establishment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

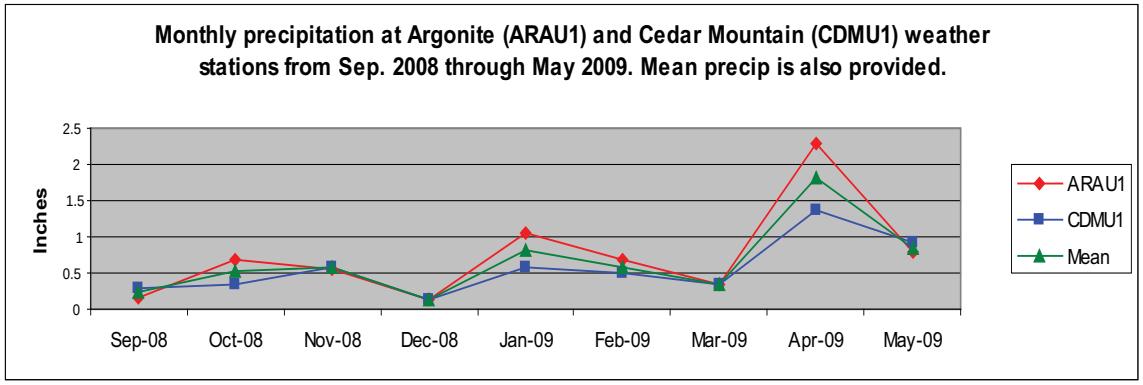
Skull Valley test site, August 2008

Weather

The two closest weather stations to the Skull Valley site are the Aragonite (ARAU1) and Cedar Mountain (CDMU1) stations. Aragonite is located 16 miles WNW of the site at 40.5983, -113.0217 degrees and 5,030' elevation. The Cedar Mountain station is approximately 15 miles S of the site at 40.3008, -112.7767 and 4,650' elevation. Because of the differences in precipitation observed between the two stations, monthly precipitation totals were taken from both sites. All weather data were obtained from MesoWest (2009).

Total estimated cumulative precipitation for the site from planting date through the August 2008 evaluation was 2.98 inches, significantly lower than average. Most of the precipitation occurred as snow falling in November, December and January. The site also may have received a fair amount of rainfall in May and June; however the meager precipitation received in March and April resulted in low plant establishment densities recorded at the May evaluation.





The second year also saw very low precipitation in the region. From September 2008 through May 2009 the site received only 5.86 inches of precipitation.

Results

Introduced grasses

The introduced grasses showed a greater ability to germinate and establish in the dry conditions encountered at the Skull Valley test site than the vast majority of the native accessions. The best initial establishment density came from Nordan crested wheatgrass (0.69 plants/ft²) followed by Vavilov II with 0.65 plants/ft². Vavilov II however appeared to have greater drought resistance after establishment by having the highest average plant density at the August evaluation with 0.40 plants/ft² compared to 0.22 plants/ft² from Nordan. In 2009 Ephraim crested wheatgrass surprisingly increased from 0.06 plants/ft² to 0.30 plants/ft². This was the highest recorded density followed by Vavilov and Vavilov II, both with 0.14 plants/ft².

Introduced grasses

	Plants/ft²		
Accession	5/08	8/08	5/09
Nordan	0.69	0.22	0.02
Vavilov II	0.65	0.40	0.14
Vavilov	0.50	0.18	0.14
CD II	0.43	0.18	0.05
Roadcrest	0.36	0.19	0.01
Ephraim	0.27	0.06	0.30
Bozoisky II	0.24	0.05	0.00
Mustang	0.20	0.01	0.01
Bozoisky	0.11	0.01	0.01
P=	0.08	0.07	0.07

Native grasses

Bluebunch wheatgrass

The bluebunch wheatgrass accessions had much lower stand density values than those of the introduced grass species. The highest establishment densities of bluebunch wheatgrass came from Anatone (0.25 plants/ft²) and Goldar (0.21 plants/ft²). Anatone again had the best density at the time of the August evaluation with 0.11 plants/ft², while Goldar had essentially dropped to zero remaining plants (0.01 plants/ft²). In 2009 there were no visible surviving plants.

Bluebunch wheatgrass

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

Snake River wheatgrass

Mean densities of Snake River wheatgrass accessions were slightly better than those of bluebunch wheatgrass. E46 had an initial density of 0.43 plants/ft² in May and dropped to 0.18 plants/ft² at the August evaluation. Discovery also performed relatively well with 0.25 plants/ft² in May and 0.15 plants/ft² in August. No plants were observed in the 2009 evaluation.

Snake River wheatgrass

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

Indian ricegrass

The Indian ricegrass accessions had poor establishment, the best density being 0.09 plants/ft² from Nezpar. No evaluation was conducted in August because no plants were observed in the plots. In 2009 a few plants were detected and the plots were evaluated. Accessions 9024739 and 9024741 both had 0.01 plants/ft².

Indian ricegrass

	Plants/ft²	
Accession	5/2008	5/09
Nezpar	0.09	0.00
9024739	0.07	0.01
9024741	0.07	0.01
CSU-10	0.06	0.00
Rimrock	0.03	0.00
P=	0.59	0.42

Bottlebrush squirreltail

The two bottlebrush squirreltail accessions had fair establishment densities with 0.32 plants/ft² and 0.24 plants/ft² from accession 9019219 and Toe Jam Creek respectively. The walk through evaluation in August yielded no plants. In 2009 a single living plant was found in the 9019219 plots.

Bottlebrush squirreltail

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

Basin wildrye

Basin wildrye establishment was low with all accessions having mean plant densities of 0.10 plants/ft² or less. No evaluation was conducted in August 2008 or May 2009.

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

Slender wheatgrass

Slender wheatgrass appeared to be poorly suited to the conditions at Skull Valley. The highest establishment density was 0.03 plants/ft² from First Strike. No plants were observed in August 2008 or May 2009.

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

Thickspike wheatgrass

Critana thickspike wheatgrass had fair establishment with 0.25 plants/ft². No evaluations were conducted in August 2008 or May 2009.

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

Western wheatgrass
All western wheatgrass accessions did poorly with Rosana obtaining the highest average density at 0.09 plants/ft². No plants were observed in the plots following the initial establishment evaluation.

Western wheatgrass

Accession	Plants/ft² 5/2008
Rosana	0.09
Arriba	0.04
DOD (Recovery)	0.02
9081630	0.01
P=	0.35

Forbs
None of the forbs evaluated at Skull Valley were sufficiently drought tolerant to produce any sort of stand. A few plants were detected in the Phacelia, Maple Grove Lewis flax and Antelope prairie clover in the May evaluation, but none had persisted into the summer, nor were any live plants observed in 2009.

Forbs

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

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

Discussion
Skull Valley faced well below average precipitation during the establishment phase of the study which severely limited germination. All species had very low establishment rates in the spring followed by even lower stand survival in late-summer. The best stand during the May evaluation came from Nordan crested wheatgrass with 0.69 plants/ft² followed by Vavilov II and Vavilov Siberian wheatgrass with 0.65 and 0.50 plants/ft² respectively.

The best performers of the native accessions were obtained by E46 Snake River wheatgrass (0.43 plants/ft²) and bottlebrush squirreltail accession 9019219 with 0.32

plants/ft². Many accessions, including entire blocks of shrubs, Sandberg bluegrass and the warm season grasses had zero germinants.

By August 2008 we could not find enough plants in several blocks to justify evaluating with the density grids, and only the introduced grasses, bluebunch wheatgrass and Snake River wheatgrass plots were evaluated. Stands in these plots were as a rule greatly reduced, though in no case were the plants completely eliminated. No plant density means in any evaluation group could be separated statistically at $p \leq 0.05$.

In 2009, only the introduced grasses, Indian ricegrass and bottlebrush squirreltail plots contained live plants. The best plant density at this time was 0.30 plants/ft² by Ephraim crested wheatgrass.

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

Due to the poor establishment and survival, this study will not be continued and this represents the final report.

References

MesoWest. 2009. University of Utah. SLC, UT. http://www.met.utah.edu/mesowest/. Accessed December 21, 2009.

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

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

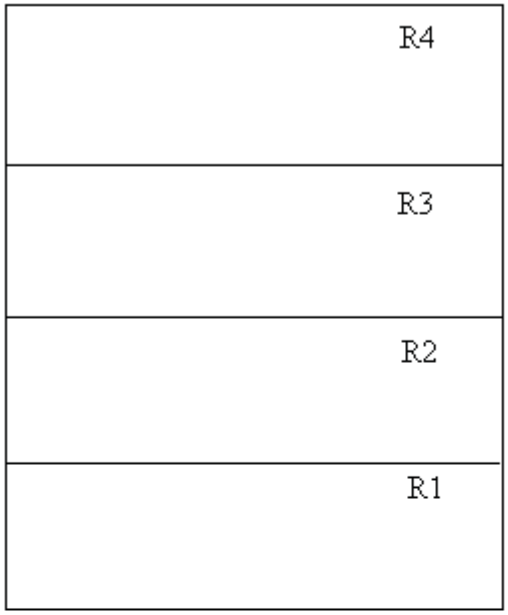
Vogel, K.P. and R.A. Masters. 2001. Frequency grid-a simple tool for measuring grassland establishment. Journal of Range Management 54(6): 653-655.

List of species and accessions

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

Squirreltail	Toe Jam Creek	ARS Logan
Western WG	DOD (Recovery)	ID PMC
Western WG	Rosana	MT PMC
Western WG	9081630	MT PMC
Western WG	Arriba	CO PMC
Introduced Grasses	CD II	ARS Logan
Introduced Grasses	Roadcrest CWG	ARS Logan
Introduced Grasses	Ephraim CWG	ID PMC
Introduced Grasses	Nordan CWG	ND PMC
Introduced Grasses	Bozoisky Russian WR	ARS Logan
Introduced Grasses	Mustang Altai WR	ARS Logan
Introduced Grasses	Vavilov Siberian WG	ARS Logan
Introduced Grasses	Vavilov II Siberian WG	ID PMC
Introduced Grasses	Bozoisky II Russian WR	ARS Logan
Shrubs	Wytana Fourwing Saltbush	MT PMC
Shrubs	Open Range Winterfat	MT PMC
Shrubs	Wyoming big sagebrush	Commercial
Shrubs	SRP Fourwing Saltbush	ID PMC
Shrubs	NCD Winterfat	ID PMC
Forbs	Old Works Penstemon	MT PMC
Forbs	Maple Grove Lewis Flax	ID PMC
Forbs	Appar Blue Flax	ID PMC
Forbs	Richfield Eaton’s Penstemon	ID PMC
Forbs	Cedar Palmer Penstemon	NM PMC
Forbs	Phacelia	MT PMC
Forbs	Antelope Prairie Clover	MT PMC
Forbs	Stillwater Prairie Coneflower	MT PMC
Forbs	Eagle Western Yarrow	Geertson Seed Farms
Forbs	Great Northern WesternYarrow	MT PMC

Skull Valley, UT
14 Nov, 2007



Forbs			Shrubs	Introduced grasses	
Western WG	ELEL	Thickspike	Sandberg bluegrass	Warm season	Indian ricegrass
Slender WG	Snake River WG		Bluebunch WG	Basin wildrye	

Skull Valley, UT Plot Map, 2007

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

row Stake row Stake row Stake row Stake row Stake row Stake

Gate

N

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

Zeba® Seed Coating and Soil Amendment Product Evaluation

Study Number: IDPMC-T-0801-RA
Final Report, January 15, 2010
Derek J. Tilley, Range Scientist
Loren St. John, PMC Team Leader

Introduction

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

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

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

Materials and Methods

For this study two grass species native to the site were utilized. They included Anatone Germplasm bluebunch wheatgrass and 'Nezpar' Indian ricegrass. Three Zeba treatments were tested in this study; two treatments were different formulations of seed coating, Zeba standard and Zeba plus an experimental compound. The third treatment was Farm, a granular soil amendment which is applied through the drill along with the seed.

For the coated seed treatments, 400 coated seeds were counted and weighed to find the number of seeds/per pound. In both coating treatments for each species there were approximately 40,000- 45,000 seeds/lb. From this it was determined that 25 lb coated seed per acre yielded approximately 25 seeds/ft^2. One cup of seed from each treatment

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

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

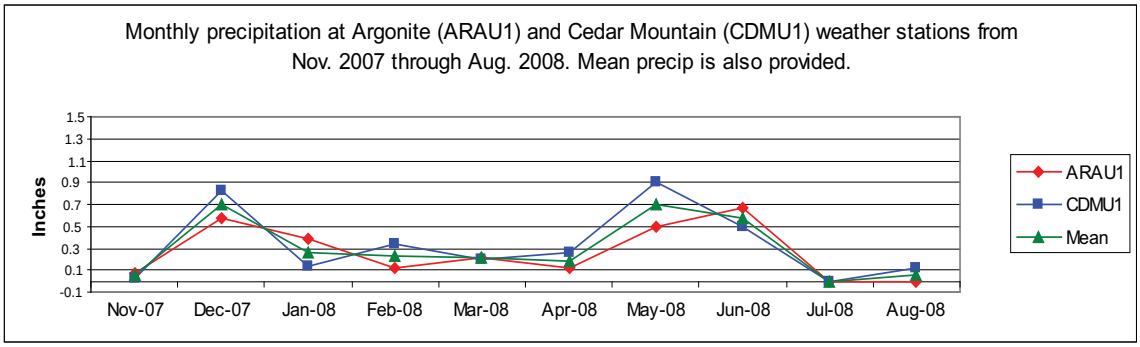
Plots were planted on November 14, 2007 into 7 x 20 foot plots in a randomized complete block design with four replications. Plots were seeded with 10 inch row spacing using a modified Tye drill. Bluebunch wheatgrass was seeded to a depth of about 0.5 inch and Indian ricegrass was seeded to a depth of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

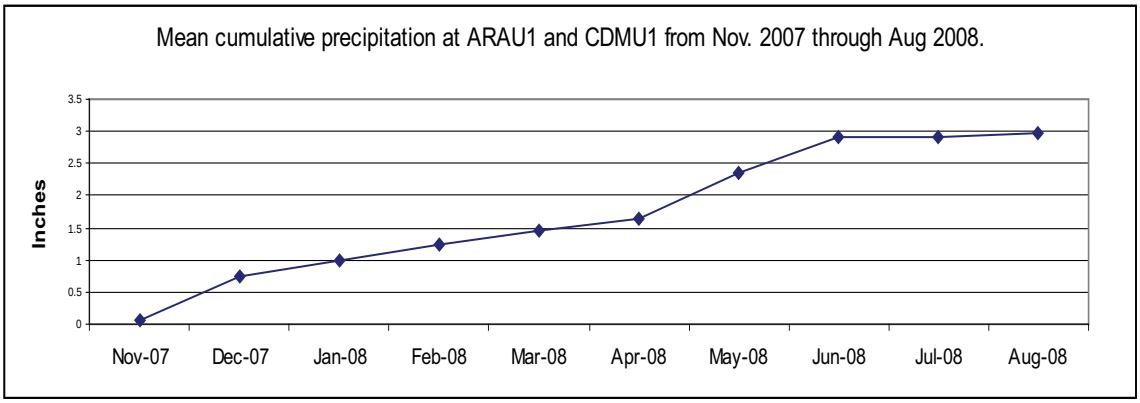
The plots were evaluated for initial establishment on May 21, 2008 and again on August 26, 2008 to determine season long persistence. The final evaluation took place on May 19, 2009 to compare plant survival after a full year. Evaluations were conducted using a frequency grid as described by Vogel and Masters (2001). The grid measured approximately 40 x 41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The grid was placed five times within the plot giving a total of 100 evaluated cells. Counts were made of the cells that contained at least one plant. Decrease in stand densities was conducted on a per plot basis. Plots which contained zero plants in the spring and had zero plants in the fall were omitted from the data set, and not counted as “no change in density.” Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$.

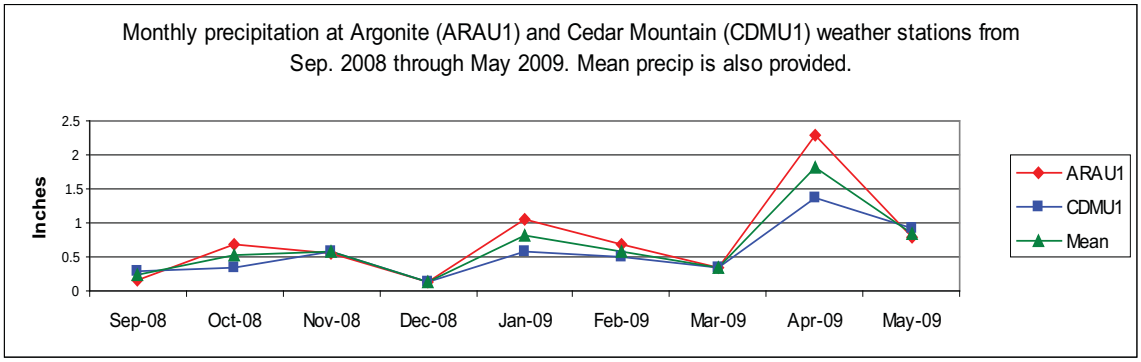
Weather

The two closest weather stations to the Skull Valley site are the Aragonite (ARAU1) and Cedar Mountain (CDMU1) stations. Aragonite is located 16 miles WNW of the site at 40.5983, -113.0217 degrees and 5,030’ elevation. The Cedar Mountain station is approximately 15 miles S of the site at 40.3008, -112.7767 and 4,650’ elevation. Because of the differences in precipitation observed between the two stations, monthly precipitation totals were taken from both sites. All weather data were obtained from MesoWest (2009).

Total estimated cumulative precipitation for the site from planting date through the August 2008 evaluation was 2.98 inches, significantly lower than average. Most of the precipitation occurred as snow falling in December. The site also may have received a fair amount of rainfall in May and June; however the meager precipitation received in March and April resulted in low plant establishment densities recorded at the May evaluation. The 2009 water year again had low precipitation measurements, especially during the winter months; however that year did have a good spring with an average of 1.7 inches of precipitation in April and 0.9 inches in May.







Results

Indian ricegrass

In the initial establishment evaluation all Zeba treatments provided greater mean plant densities than the control in the Indian ricegrass plots, however, no significant differences could be detected (p=0.27). The Zeba treatment gave the highest densities in the Indian ricegrass plots with 0.46 plants/ft² (table 1), which was 3.5 times greater density than the control plots (0.13 plants/ft²). Zeba plus compound had the second highest density (0.39 plants/ft²), then the Farm amendment followed by control with 0.25 and 0.13 plants/ft² respectively. Two of the four plots in the Zeba plus compound treatments had essentially no seedlings, while the other two replications had very high densities. This added a large amount of error to the statistical analysis, not allowing means to be separated.

The August evaluation again revealed no statistical significance (p=0.63), but all treatments still had higher plant densities than the control. The greatest density came from the Farm treatment with 0.13 plants/ft². The Zeba plus compound and Zeba treatments had densities of 0.12 and 0.09 plants/ft² respectively, while the control had only 0.04 plants/ft².

All treatments decreased in stand densities between the spring and fall evaluation, however no significant differences were detected between treatments (p=0.0.26). The control and Zeba plots had a decrease of 80% or greater. The Zeba plus compound had a decrease of 63% and the Farm treated plots had a 51% decrease.

Very few plants were observed in the 2009 evaluation. A single plant was found in the Zeba and Zeba plus compound plots. No significance between treatments could be detected (p=0.59) (data not shown).

Table 1. Indian ricegrass

	Plant density (plants/ft²)		
Treatment	May 08	Aug 08	% decrease
Control	0.13	0.04	80
Farm	0.25	0.13	51
Zeba + compound	0.39	0.12	63
Zeba	0.46	0.09	81
P=	0.27	0.63	0.26

Bluebunch wheatgrass

In the bluebunch wheatgrass trial there was again no statistical significance between treatments in the May or August evaluation (p=0.16 and 0.17 respectively). The two seed coating treatments had greater average establishment densities than the control in the spring evaluation (table 2). The Zeba plus compound treatment had slightly better average densities than Zeba (0.70 plants/ft² versus 0.66 plants/ft²). The control plots had an average plant density of 0.50 plants/ft², while the Farm amendment had a mean density of 0.38 plants/ft².

In the fall evaluation the Zeba plus compound and Zeba treatments still had the highest plant densities with 0.36 and 0.35 plants/ft² respectively. The control and Farm amendment plots each had a mean density of 0.20 and 0.17 plants/ft².

As with the Indian ricegrass trail, all bluebunch wheatgrass densities decreased between May and August. The greatest decrease in density was observed in the control plots (62%). The smallest decrease came from the Zeba plus compound treatment with 42% decrease from spring to fall. The Zeba and Farm treatments had similar decreases with 47 and 48% decrease respectively. No significant differences in percent decrease were detected between treatments (p=0.66).

In 2009 the stands were essentially gone. Two plants were found in one of the Zeba plots and 1 plant was counted in a Zeba plus compound plot. The remaining plots had zero plants. No significant differences were detected between treatments (p=0.56) (data not shown).

Table 2. Bluebunch wheatgrass

	Plant density		
Treatment	May 08	Aug 08	% decrease
Control	0.50	0.20	62
Farm	0.38	0.17	48
Zeba + compound	0.70	0.36	42
Zeba	0.66	0.35	47
P=	0.16	0.17	0.66

Discussion

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

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

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

References

MesoWest. 2009. University of Utah. SLC, UT. http://www.met.utah.edu/mesowest/. Accessed December 21, 2009.

Ogle, D., St. John, L., Stannard, M. and L. Holzworth. 2006. Technical Note 24: Grass, grass-like, forb, legume and woody species for the Intermountain West. USDA-NRCS, Boise, ID; Bozeman, MT and Spokane, WA. ID-TN 24. 41p.

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

USDA NRCS
Aberdeen, Idaho, Plant Materials Center
Progress Report
September 2008

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

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

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

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

Cover Crop Mix
24.3 acres

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

Drill Mix

80.0 acres

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

Mountain Home 10X Broadcast Mix

5 acres

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

Mountain Home 5X Broadcast Mix

30 acres

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

Mountain Home Standard Broadcast Mix

5 acres

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

Burns 10X Broadcast Mix

5 acres

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

Burns 5X Broadcast Mix

30 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.45	1.54
Rubber rabbitbrush	0.50	1.85
Hotrock penstemon	0.09	0.16
Mtn. Home Sandberg bluegrass	0.40	0.48
Rice Hulls		6.62

Burns Standard Broadcast Mix

5 acres

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

PMC personnel also assisted with the evaluation of the plots at Mountain Home during the week of June 2, 2008.

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

Publications

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

St. John, L, Cornforth, B., Simonson, B., Ogle, D. and D. Tilley. 2007. Technical Note 20: Calibrating the Truax Rough Rider Drill for Restoration Plantings. USDA NRCS Aberdeen Plant Materials Center, Aberdeen, ID. April, 2008. December 10, 2007. 15p.

Kemmerer drill with modified drop tubes and jack stands for safety.

Truax Rough Rider drill with modifications by Aberdeen Plant Materials Center.

FIELD PLANTING, DEMONSTRATION AND DISTRICT SEED INCREASE EVALUATION SUMMARIES

PLANT MATERIALS

2009

IDAHO EVALUATION SUMMARIES

FIELD, DSI and DEMONSTRATION PLANTINGS

IDAHO DIVISION I
PLANT MATERIALS PLANTINGS

FIELD OFFICE: BONNERS FERRY

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

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. FY09 no evaluation.

ID04002 Dave Wattenburger Field Planting. Delar small burnet ordered August 19, 2003. Planting seeded fall 2004. No evaluation FY05 - FY09.

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- FY09 no evaluations.

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- FY09 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. FY08 this planting initially suffered from very hot dry summers and plant did not appear to be doing well. Following a number of years of root system establishment, this planting is doing somewhat better. The Lind ecotype is doing much better than the Yakima ecotype. The Lind ecotype could probably be recommended on sites where we would normally only recommend ponderosa pine. **Next evaluation 2011.**

ID04009 Carl Skyrman demonstration planting. Anatone bluebunch wheatgrass and Secar Snake River wheatgrass. Seed ordered March 8, 2004. Site characteristics: Chard sandy loam soil, northwest aspect, 1820 feet elevation, 16-22 inch precipitation, non-irrigated, T26N R1E NW1/4 Section 13. FY04 – Secar and Anatone were planted side by side in the spring of 2004. Good stands for each with > 5 plants per square foot establishing and it is hard to differentiate between plantings. Anatone plants were a bit more robust than Secar plants during evaluation 7/22/04. FY05 no evaluation. FY06 (4/25/06) good established stand, Carl will spray with Sencore for cheatgrass and ventenata control. FY08 pictures of planting indicate good establishment of most seeded species. FY09 no evaluation.

ID05003 Steve Hunter – starthistle control project. Rush intermediate wheatgrass, Tegmar intermediate wheatgrass and Newhy hybrid wheatgrass were ordered February 4, 2005. Site characteristics: 3 acres, MLRA B9, Bluesprin skeletal loam soil, 20 percent slopes, southwest aspect, elevation 2700 feet, 18 inch precipitation zone, non-irrigated, T30, R3, NW ¼ section 36. FY05 not planted. FY06 planted May 22, 2006 into poorly prepared seedbed. Fair stand establishing with about 0.25 plants/ft2 and fair vigor. FY08 Rush poor stand with 15 percent survival and fair vigor; Tegmar fair stand with 40 percent survival and fair vigor; Newhy poor stand with 25 survival and fair vigor. Plants on site are very stunted. Starthistle plants have been significantly reduced on the site. However, there has been an invasion of ventenata, annual fescue, medusahead and cheatgrass on the site and they are stressing the planted perennial grasses. FY09 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 soon to conduct a complete evaluation of stand. FY08 Anatone fair stand with fair vigor; Magnar poor stand with very poor vigor; Nezpar poor stand with poor vigor; High Plains very poor stand; Rosana good stand with good vigor; Sherman good stand with good vigor; Snake River Plains good stand with good vigor; Northern Cold Desert good stand with good vigor. Anatone and Rosana are the grasses doing the best on this very difficult eroded low fertility site. Both Snake River Plains fourwing saltbush and Northern Cold Desert winterfat are doing very well. **Next evaluation 2011.**

ID05006 Gary Crea (combined with ID04008) – Feedlot species adaptation trial. (1st planting P27 Siberian wheatgrass, Sodar streambank wheatgrass, Topar pubescent wheatgrass, Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, Rosana western wheatgrass, Durar hard fescue and Alkar tall wheatgrass) (2nd planting Newhy hybrid wheatgrass, Critana thickspike wheatgrass, and Rosana western wheatgrass) Seed was ordered on February 4, 2005. Site characteristics: 0.5 acres, MLRA B9, Ferdinand-Flybow-Riggins soil complex, 2-8 percent slopes, west to southwest aspect, 20-24 inch precipitation, non-irrigated, T31N, R1E, SW of SW ¼ of section 27. FY04 overall the stand establishment is excellent due to good rainfall this year. Stand establishment exceeds 2 plants per square foot for all species except Alkar. The grasses are suppressing weeds in the feedlot. FY05 stand is spotty possibly due to excessive weed competition during establishment. FY06- FY09 no evaluations.

ID05007 Les Killgore – field planting. Covar sheep fescue, Durar hard fescue, Bannock thickspike wheatgrass and Rosana western wheatgrass seed was ordered on February 4, 2005. Site characteristics: 1.5 acres, MLRA E43a, loamy skeletal soil, 10 percent slopes, east aspect, elevation 2200 feet, 18 inch precipitation, non-irrigated, T28N, R1E NE ¼ section 33. FY05- FY06 not planted. FY07- FY09 no evaluations.

ID06005 Tony Carlson – Field planting of Rush intermediate wheatgrass, Bozoisky Russian wildrye, Magnar basin wildrye, Nezpar Indian ricegrass, and Sherman big bluegrass. Seed ordered February 21, 2006. Site characteristics: silt loam soil, 2 percent slopes, east aspect, 2100 feet elevation, 14-15 inch precipitation, non-irrigated, T28N R1E NE 1//4 Section 12. **FY06** seeded spring of 2006 (4/25/06) excellent stand establishing and seeding will be sprayed for broadleaf weed control. FY07- FY09 no evaluations.

ID07009 Daryl Mullinix Ventenata Study. Demonstration planting seed ordered February 14, 2007. Site was prepared for planting in fall of 2006 and spring of 2007. Site was planted on May 8, 2007. Layout-(south end) 1. Delar small burnet; 2. Pryor slender wheatgrass; 3. Secar Snake river wheatgrass; 4. Union Flat blue wildrye; 5. Regar meadow brome; 6. Covar sheep fescue; 7. Latar orchardgrass; 8. Bromar mountain brome; 9. Alkar tall wheatgrass; 10. Durar hard fescue; 11. Sherman big bluegrass; 12. Winchester Idaho fescue; 13. Foothills Canada bluegrass; 14. Bozoisky-Select Russian wildrye; 15. Rush intermediate wheatgrass; 16. Tuscany tall fescue; 17. Rosana western wheatgrass; 18. Sodar streambank wheatgrass; 19. Vavilov Siberian wheatgrass; 20. Lutana cicer milkvetch; 21. Syn-1 alfalfa (north end). FY07 Mark Stannard visited the plots on 7/27/07. The weeds were not bad but he mowed the plots to keep the weeds from going to seed. The grasses were doing fairly well. Vavilov was the best performing grass and alfalfa, cicer milkvetch, and small burnet were also doing very well. The ground was very hard and very dry. A lot of the plants were totally dormant. FY08 Mark spoke with Dr. Prather, Univ. of Idaho, and he indicated that he didn't have funding to do ventenata work. Mark prefers that plots not be sprayed. Sandlund talked with Daryl in early March and asked him not to spray the plots and to give them a 20-30 feet buffer strip around the plots not sprayed. The plots have a heavy infestation of ventenata and meadow foxtail. Rich Gribble and Bob Sandlund mowed the plot in late July. Species doing best include: Delar, Tuscanny II, Vavilov, Alkar, and Syn-1 alfalfa (getting hammered by deer). All other species are struggling. They recommend that plots be wick with Roundup in 2009 to control meadow foxtail. Spraying plots with sencor and diuron should also be considered. FY09 no evaluation.

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

percent survival with fair vigor; coyote willow 13 percent survival with fair vigor; First year leader growth is about 3- 4 inches. FY09 no evaluation.

ID08006 Debbie Hatter – riparian field planting. Laurel willow, coyote willow, peachleaf willow and black cottonwood cuttings were ordered March 10, 2008 for delivery in late March. FY08 Laurel willow 82 percent survival with excellent vigor; coyote willow 74 percent survival with fair vigor; Peachleaf willow 96 percent survival with fair vigor; black cottonwood 89 percent survival with fair vigor. FY09 no evaluation.

ID08008 Sydney Yuncevich Spirit sweetgrass adaptation planting. Sprigs were ordered on March 11, 2008 for shipping sometime in mid April. FY08 excellent stand with good vigor – sprigs were planted in pots, kept outside and watered occasionally. All survived and they will be planted out next spring. FY09 no evaluation.

ID08013A East of Grangeville Area demonstration plots. Packets of Anatone Germplasm bluebunch wheatgrass, Goldar bluebunch wheatgrass, 9076517 western wheatgrass, Bannock thickspike wheatgrass, P7 bluebunch wheatgrass, Bonilla big bluestem, Bison big bluestem, Forestburg switchgrass, Tomahawk Indiangrass, Critana thickspike wheatgrass, Rosana western wheatgrass, Foothills Germ. Canada bluegrass, 905439 switchgrass, Spirit sweetgrass (10 sprigs), PI-232247 California oatgrass, 9056244 California brome, Cave-In-Rock switchgrass, Salado alkali sacaton, Blackwell switchgrass, Kanlow switchgrass and 9080250 blue wildrye were ordered 3/20/08. FY08 plantings completed in late spring. FY09 no evaluation.

ID08013B White Bird Area demonstration plots. Packets of Anatone Germplasm bluebunch wheatgrass, Goldar bluebunch wheatgrass, 9076517 western wheatgrass, Bannock thickspike wheatgrass, P7 bluebunch wheatgrass, Bonilla big bluestem, Bison big bluestem, Forestburg switchgrass, Tomahawk Indiangrass, Critana thickspike wheatgrass, Rosana western wheatgrass, Foothills Germ. Canada bluegrass, 905439 switchgrass, Spirit sweetgrass (10 sprigs), PI-232247 California oatgrass, 9056244 California brome, Cave-In-Rock switchgrass, Salado alkali sacaton, Blackwell switchgrass, Kanlow switchgrass and 9080250 blue wildrye were ordered 3/20/08. FY08 plantings completed in late spring. FY09 no evaluation.

ID09008 Daryl Mullinix field planting. 9076516 western wheatgrass was ordered February 2009. Purpose: adaptation and competition with the weed Ventenata. Site Characteristics: MLRA 9B, Chard sandy loam soil, 5- 8 percent slope, north aspect, 1800 feet elevation, 14- 16 inch rainfall, non-irrigated, T27N R1E NW1/4 Section 23. FY09 no evaluation.

ID09010 Jeff Goldman field planting. 9076516 western wheatgrass seed ordered February 2009. Purpose: adaptation and competition with the weed Ventenata. Site Characteristics: MLRA 43A, Ferninand silt loam soil, 8- 12 percent slope, east aspect, 3500 feet elevation, 20- 22 inch rainfall, non-irrigated, T30N R3E NW1/4 Section 12. FY09 no evaluation.

FIELD OFFICE: LEWISTON

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

FIELD OFFICE: MOSCOW

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

willow 68 percent survival with good vigor and 36 inch height; Silvar coyote willow 22 percent survival with good vigor and 60 inch height. FY09 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. FY08 Cheney redosier dogwood 1 percent survival with poor vigor; St Maries Lewis Mockorange 2 percent survival with poor vigor; Okanogan snowberry 68 percent survival with good vigor and 6- 12 inch height; Blanchard blue elderberry 10 percent survival with fair vigor. FY09 no evaluation.

FIELD OFFICE: NEZPERCE
ID08011 David Mosman – Anatone bluebunch wheatgrass seed increase. Seed shipped August 31, 2006. FY07 due to drought conditions, this seed was not planted. Additional seed was shipped March 18, 2008. FY08 not seeded – plans to chemical fallow fields this year and will plant Anatone this fall. FY09 no evaluation.

ID08012 David Mosman – Vavilov II Siberian wheatgrass seed increase. Seed shipped March 18, 2008. FY08 not seeded – plans to chemical fallow fields this year and will plant Vavilov II this fall. FY09 no evaluation.

ID09006 _____ Nezperce Field Office. coyote willow, Laurel willow, golden willow and white willow cuttings were ordered February 2009 from Aberdeen PMC. University of Idaho Nursery provided thinleaf alder, redosier dogwood, Lewis mockorange (syringe), Drummond willow, Mackenzie willow, bittercherry, aspen and black cherry for this project. Plants were stored in a cooler prior to planting. Planting was scheduled for mid April 2009. FY09 no evaluation.

FIELD OFFICE: OROFINO
ID04011 Clearwater County Riparian Project. 9067541 peachleaf willow, 9067546 peachleaf willow, 9067 549 peachleaf willow, 9067568 black cottonwood, 9067569 black cottonwood, 9023 733 redosier dogwood, 9023739 redosier dogwood, 9023740 redosier dogwood and Okanogan snowberry. Cuttings ordered March 5, 2004. Site characteristics: Cobbly soil, flat aspect, 1100 feet elevation, 26 inch precipitation, non-irrigated. FY04 – FY06 no evaluations. **FY07** 9067541 peachleaf willow -30% survival with good vigor, 9067546 peachleaf willow -30% survival with good vigor, 9067549 peachleaf willow -20% survival with good vigor, 9067568 black cottonwood - failed, 9067569 black cottonwood - failed, 9023 733 redosier dogwood - failed, 9023739 redosier dogwood - failed, 9023740 redosier dogwood - failed and Okanogan snowberry - failed. FY08 and FY09 no evaluation.

IDAHO DIVISION III
PLANT MATERIALS PLANTINGS

FIELD OFFICE: CALDWELL
ID99006 Jacy Gibbs for demo plots. Site characteristics: very warm dry summers, Cencove fine sandy loam soil, 0-2 percent slopes, about 2200 feet elevation, 8-10 inch precipitation, T3N R5W NE1/4 Section 10. Seed ordered February 24, 1999. Aberdeen accessions: Bannock thickspike wheatgrass, Sodar streambank wheatgrass, Goldar bluebunch wheatgrass, Appar blue flax, Magnar basin wildrye, Nezpar Indian ricegrass, Richfield Selection firecracker penstemon, Clearwater Selection alpine penstemon, Snake River Plain fourwing saltbush. Bridger accessions: Trailhead basin wildrye, Rimrock Indian ricegrass, M1 Nevada bluegrass, PI434231 plains bluegrass, 9005460 alpine bluegrass, High Plains Sandberg bluegrass, Shoshone beardless wildrye, 9019219 bottlebrush squirreltail, Critana thickspike wheatgrass, Wytana fourwing saltbush. Meeker accessions: Summit Louisiana sagewort, Timp Utah sweetvetch, Bandera Rocky Mountain penstemon, 9040187-bottlebrush squirreltail, 9040189 bottlebrush squirreltail, 9043501 Salina wildrye, Maybell antelope bitterbrush. Pullman accessions Secar Snake River wheatgrass, Covar sheep fescue, Canbar Canby bluegrass, Sherman big bluegrass, Whitmar beardless wheatgrass, and Schwendimar thickspike wheatgrass. FY99 no evaluation. FY00 Nezpar has excellent seedling vigor, easy to transplant, remains green, and is an attractive landscape plant. Schwendimar is best thickspike wheatgrass, remains green longer, best regrowth, responds well after mowing, good dryland and limit irrigation. Goldar and Whitman stands are very poor due to cheatgrass competition. Basin wildrye, Sherman, Secar mix good weed competition. Basin wildrye, Sherman, Covar, Secar are all good landscape plants. Using Covar along one side of property for firebreak – it will be excellent. Penstemon species are very slow growing, remain green and will be good landscape plants. Appar can be a nuisance and is not very shade

tolerant. Maybell is slow growing. Timp is a preferred species by rabbits resulting in difficulty establishing stand. Summary of best plants – Grasses: Secar Snake River wheatgrass, Magnar basin wildrye, Sherman big bluegrass, Nezpar Indian ricegrass, Covar sheep fescue, sand dropseed, Bannock thickspike wheatgrass, and Schwendimar thickspike wheatgrass. Forbs: western yarrow, Drummond phlox, white evening primrose, scarlet globemallow, silky lupine, Louisiana sagewort, Rocky Mountain iris, and Appar blue flax. Shrubs: native fourwing saltbush, native basin big sagebrush, Maybell bitterbrush, curlleaf mountain mahogany, Saskatoon serviceberry, Woods rose, almond, and Drummond willow. Trees: Idaho hybrid poplar, and Rocky Mountain juniper. FY01 - FY04 no evaluations. FY05 all plants are under some type of supplemental irrigation. Both the basin wildrye accessions are doing fine and are good landscape plants. The Secar bluebunch wheatgrass is doing well and is a good landscape plant. Covar sheep fescue has done well near the edges of walks and driveways where a little additional moisture is available and the soils are deep. It did poorly in an area that had topsoil removed and the soil may be somewhat compacted and is a good xeriscape plant. The accessions of Indian ricegrass that germinated and survived are doing well. There was poor germination and survival in general. They are good xeriscape plants. Appar Lewis flax is doing well with partial irrigation and is a good xeriscape plant. Scarlet globemallow seed was collected by cooperator and seeded. It did well for a couple of years, but died after 3-4 years. A good looking xeriscape plant. All accessions of penstemon, mostly Eaton or firecracker have done well under partial irrigation and are good xeriscape plants. The curlleaf mountain mahogany has done well and is a good landscaping plant. It receives some extra water. Serviceberry is doing well and is near full irrigation. Utah sweetvetch came up well, but received heavy use from rabbits and only one plant has survived. It is doing well. Golden current came into our yard through birds. Where it has volunteered, it is doing well and is a good xeriscape shrub. It needs to be pruned to make it denser since it is pretty leggy without pruning. It receives some additional water. I planted 3 or 4 silver buffaloberry shrubs and they have been slow in developing and are still quite small. They may do ok. The Maybell bitterbrush is doing fine. It receives some additional water and is a good xeriscape plant. Western yarrow was planted. It receives some additional run-on water where it was planted. It has spread readily to other areas with partial irrigation and some areas of full irrigation. In many ways this is a weed at my house. Rocky mountain iris has done fair in a place that I can fully irrigate and with no competition. Woods rose has done well and is a good landscaping plant. It is under full irrigation and should be pruned, similar to other roses to keep it under control. Western clematis started very slowly. This was from seed and not from Pullman PMC. Once it got going, after about 3 years, it has grown quite well and in fact needs to be controlled for spread. The almond we harvested near Brownlee reservoir has done very well under full irrigation. It has very good vigor, has good shape and in favorable springs has produced good seed crops. It is a medium sized tree, about 20 ft. high now. Herbaceous sagewort or Louisiana sage was planted from seed and receives partial irrigation. It does very well where it was planted and if the water was spread to a larger area, it would expand from rhizomes into that area. Mulberry trees volunteered through the help of birds to our yard. They do very well here and are good looking medium sized trees. They get partial to full irrigation and are not producing seed yet at 3 years old and 18 ft. tall. The ones down near the river do produce seed. **Cancel**

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

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

been added and disced in to increase organic matter and hopefully retain soil moisture. Seeding will occur around the 1st of November. FY08 manure was applied in April 2007. Manure and weeds were disced three times in April 2007 and again twice more in November 2007, with rubber tired roller behind to pack seedbed and prevent wind erosion. Grass seed drill was rented and field was drilled 11/28/07. The seeding was not very successful, as the field is over run with weeds. However this is the third attempt at this seeding, and I believe we need to manage for what we did get as there is evidence of plants from previous seedings. Unbelievably there are some large plants that escaped being disced 5 times and have rebounded from being mowed and are still surviving. Which leads me to believe maybe we need to be patient and see what comes up from the current seeding, because there are some plants that have established from the seeding, mainly Siberian WG. Need to stay on top of mowing and spraying. With no fourwing saltbush present, I would advise using broadleaf control chemicals. Another option would be to work with Andy Ogden, who has a strip seeder and drill into this field. But I would advise against any more discing. It is only bringing up more weeds and losing organic matter. **Stand failed cancel.**

ID07001 Wayne Newbill (Ada County) field planting. Regar meadow brome and Cache meadow brome irrigated forages trial. Seed ordered August 10, 2006. Seed will be planted in late summer – early fall and surface irrigated (furrows) for establishment. Seed was delivered on 8/18/06. **FY06** weed control using 2 pints Roundup per acre was applied on 8/30/06 followed by discing, corrugating, pre-irrigation, harrowing, seeding with drill – 7 inch spacing on 9/9/06 and final corrugation. Regar is located in west field and Cache is located in east field. Fields were irrigated following planting. Initial evaluation in later fall 2006 indicated best stand establishment was Regar accession. **FY07** Regar - excellent stand, excellent vigor, 18 inch height and 3 plus plants per foot squared. Cache - excellent stand, excellent vigor, 12 inch height and 3 plus plants per foot squared. Cooperators rates Regar good to excellent and Cache good during establishment year. FY08 Both fields looked very good and had only mild weed issues. There was one cutting of hay and one period of grazing. Yield was reduced due to fact that it took Wayne awhile to find someone to hay the field and it should have been harvested 3 weeks prior to when it was cut and during that time it was not irrigated. Reduced available water did have an effect most notably on the Regar and patches of it did not recover from it as well as hoped. Appears to have gone dormant, I think it will come back in the spring.
FY08 Regar: Excellent stand on South end, as you get further down to the end where Wayne land leveled the quality decreases and there are some patches of weeds and lowered yields. There are also a few areas where the grass has gone prematurely dormant, probably due to lack of water during first cutting of hay. Field was grazed for two weeks continuously with 6 young horses. Grazing was fairly short when finished, but plants have recovered nicely. 6 horses x 1.25 Au x .5 Mth = 3.75 AUM's 3.75/ 1.2 Ac = 3.1 AUM's/ac 1 AUM = 915 lbs 915 x 3.1 = 2,836/2000= 1.4 Tons 1.4 + 4.2 tons of hay = 5.6 Tons/ Ac Yield. **FY09 Regar:** stand quality has decreased since last year with patches dying off – it is believed the hardpan (salt- calcium deposits) on this property at relatively shallow depths is affecting the stand. **FY08 Cache:** Excellent stand throughout even down to North end where the soil is less than desirable, surprising because the soil in this field is very shallow and of poorer quality than the other field. The field seems to have suffered no ill effects from the lack of moisture that affected the West field. It was grazed for one week continuously with 6 young horses. 6 horses x 1.25 Au x .25 Mth = 1.88 AUM's 1.88 / 1ac = 1.9 AUM's/Ac 915 x 1.9 = .9 Tons .9 + 4.2 = 5.1 tons/ Ac yield. **FY09 Cache:** stand quality has decreased since last year with patches dying off – it is believed the hardpan (salt- calcium deposits) on this property at relatively shallow depths is affecting the stand. The Regar stand is more effected by this die off than the Cache stand. Newhy hybrid wheatgrass (a very salt tolerant species) will be planted into the patches to determine if stand can be salvaged.

ID07002 Doug Austin (Ada County) field planting. Regar meadow brome, orchardgrass and alfalfa field planting. Seed ordered August 28, 2006. Seed was planted in late summer – early fall and irrigated for establishment. Site characteristics: silt loam soil, 0-2 percent slope, 2800 feet elevation and irrigated. Seed was planted in early September 2006 and irrigated for establishment. FY07 stand 75% Potomac orchardgrass, 10% Regar meadow brome and 15% alfalfa – cooperator took 3 cuttings of hay (1st 0.6 ton/ac; 2nd 0.9 ton/ac and 3rd 1.5 ton/ac = 3 ton/ac for first year). FY08 Field had excellent utilization, no species being avoided. Some small 10 feet diameter spots with discolored foliage. Was unclear if this was a excess moisture issue as the soil was slightly muddy and trampled and had more weeds than surrounding areas. However, areas were minimal and overall had excellent weed control. Yielded 47 tons total on 12 acres and then began grazing. Yielded 17 AUM's on 12 acres. May yield some additional AUM"s as weather seems to be holding and grass is still up. FY09 excellent stand of all species with approximately 6 tons of production this year from 4 cuttings. Following haying, fall grazing is planned. Alfalfa has decreased from about 15 percent of stand to 5- 10 percent of stand.

ID08014 Jim Classen WHIP field planting. Garrison creeping foxtail seed (18 pounds) ordered April 3, 2008.FY08 Garrison good stand with 4 plants per square foot and excellent vigor. Despite difficulties in planting late (see attached assistance notes from 6/6/08 through 9/3/08) and difficulties in watering due to water seeping into neighbors field the stand is emerging with a good density. Majority of plants are very small around 6 inches, but have developed some seed heads. There are some areas where plants achieved full height and are about 2 feet. The stand is somewhat patchy, but that is largely due to water regime. In areas that received too much water at bottom of pond. There is no Garrison Creeping Foxtail, however yellow nutsedge, barnyard grass and smartweed are growing, which although weeds are excellent duck and wildlife food. Other areas where it was too dry along the berm have a heavy weed infestation problem mainly Kochia. The bulk of the area is intermittent with mustard and cocklebur. However there is enough grass underneath that I believe next year will largely crowd out weeds. Field was flood irrigated several times over the season for several days. More irrigation was not possible due to flooding neighbor's alfalfa field. When last cutting of hay is removed the pond will be flooded for fall months. That will test the Creeping Foxtail and determine its suitability. FY09 this is an excellent stand of Garrison creeping foxtail, plants are robust and healthy. Some weeds are still present in thinner areas of the planting. On berms where Siberian wheatgrass was planting, a thick stand of kochia exists.

ID09003 Forest Clifton erosion control field planting. Vavilov and Vavilov II Siberian wheatgrass seed was ordered October 30, 2008. Site characteristics: 4 acres; purpose - soil erosion, conservation cover, fire reduction, weed control; soil - Lankbush sandy loam; slope- 30%; aspect - south; elevation – 2600 ft; precipitation - 10"; irrigation – no; T5N R2W Qrtr Section NW ¼ of SE Section 32. Seed will be broadcast planted in November and then rolled to press seed into seedbed. FY09 it is too early to determine stand establishment. It appears that more plants are establishing in the Vavilov II side of planting than on the Vavilov side of planting.

ID10005 Wayne Newbill (Ada County) field planting. Newhy hybrid wheatgrass trial. Seed ordered October 7, 2009. Seed will be planted in late November through February and surface irrigated (furrows) in spring for establishment. Site Characteristics: silt loam soil, 3800 feet, irrigated. Newhy hybrid wheatgrass (a very salt tolerant species) will be planted into the patches in Regar and Cache stands to determine if stand can be salvaged in winter/spring of 2010.

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- FY09 no evaluations.

ID07007 V Dot Ranch – Jim Little field planting. Seed ordered 1/10/07. Seed mix 1: Anatone bluebunch wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Sherman big bluegrass, Snake River Plains fourwing saltbush; Seed mix 2: Goldar bluebunch wheatgrass, Bannock thickspike wheatgrass, Washoe basin wildrye, High plains Sandberg bluegrass, Wytana fourwing saltbush. Site characteristics: wildfire burn 2006, stony clay loam soil, 3000 feet elevation, 12-16 inch precipitation, ESD – Stony Loam 12-16 bluebunch wheatgrass, basin big sagebrush, bitterbrush, Sandberg bluegrass. Mixtures (one acre each) will be broadcast planted in mid to late winter and where possible using ATV dragged-raked to incorporate seed. FY07- FY09 no evaluations.

ID07008 _____ - _____ field planting. Peachleaf willow (accessions 9067541 and 9067546) and black cottonwood (accessions 9067537 and 9067569) extra long cuttings were delivered to Field Office on February 13, 2007. Planting to be completed using backhoe to dig holes to perennial water table – 2-3 cuttings will be placed in each hole. FY07- FY09 no evaluations.

ID08002 Randy Heffner field planting. Bozoisky Russian wildrye and Syn – A Russian wildrye fall and winter forage trial. Seed ordered October 12, 2007. Site Characteristics: Boise County, MLRA B10, 6 acres, dormant fall planting, Brownlee sandy clay loam, 5-10 percent slope, south aspect, 2800 feet elevation, 14-16 inch rainfall, irrigated, T7N R2E NE1/4 Section 2. FY08 no evaluation. FY09 planting failed. **Cancel**

ID09009 Richard Zamzow WRP upland field planting. Vavilov II Siberian wheatgrass. Seed ordered February 2009. Site characteristics: fine sandy loam soil, 2100 feet elevation, 10-12 inch precipitation, aspect-flat. Planting planned for spring 2009. FY09 no evaluation.

ID10002 Randy Heffner field planting. Bozoisky Russian wildrye and Manifest intermediate wheatgrass fall and winter forage trial. Seed ordered September 2, 2009. 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 PLANTINGS MANAGED BY MERIDIAN CONSERVATIONIST
ID08010 Heidi Patterson – Dry Creek field planting. Durar hard fescue, Sherman big bluegrass, Bannock thickspike wheatgrass, Sodar streambank wheatgrass, Richfield firecracker penstemon and Appar blue flax seed ordered March 17, 2008. Site: Goose Creek loam soil, 0-2 percent slopes, 2800 feet elevation, 11- 12 inch rainfall zone, irrigated for establishment, T5N R1E NW ¼ Section 35. Planting planned for dormant fall 2008. FY09 no evaluation.

OTHER PLANTINGS MANAGED BY PLANT MATERIALS SPECIALIST
ID06003 Rebecca Laramie Field Planting. Roadcrest crested wheatgrass and Ephraim crested wheatgrass low moisture lawn trial. Seed shipped March 2005. Seedbed preparation included roto-tilling and hand raking. Lawn was seeded on September 1, 2005. Seed was broadcast at about 600 seeds per square foot, lightly raked and the entire area was mulched with dry grass clippings and then watered. Irrigation the first month was 3 times per week. On September 7, 2005 seedlings could be seen coming through the mulch. On September 25, 2005, no noticeable difference could be seen between Roadcrest and Ephraim establishment. FY06 - the grass seeding is looking good, did spot seeding in a few spots where stand wasn't too thick. **FY08** - planting was looking pretty good in September 2008. There are a few spots that are thin. FY09 no evaluation.

FIELD OFFICE: MOUNTAIN HOME
None

FIELD OFFICE: PAYETTE
ID07018 Oregon Trail Rest Area plots - three sets of plots. **Site preparation and seeding**: Seeded: 4/11/07. Plots were pre-sprayed with glyphosate 3/23/07 to kill existing weeds and grass; rototilled, hand raked, hand-seeded, light raked, rolled with water filled drum. These are irrigated plots. Two sets of plots were very successful, although infested with broad leaf weeds, saltgrass, and bristlegrass. The third set of plots was heavily infested with kochia, was not watered as frequently, and did not get cultivated as deeply due to malfunction of cultivator during site prep. Cooperator was treating successful plots with "Quicksilver," a broadleaf herbicide for new grass seedings. Plots were mowed in fall. FY08 All plots are well established. Covar sheep fescue, Roadcrest crested wheatgrass and Vavilov Siberian wheatgrass are performing the best for ground cover and also weed control. FY08 Three sets of plots. One of three plots:
north exit of rest area - abandoned because of poor establishment and intense infestation of kochia weed. Still surprise result in these plots was clear establishment of 'Vavilov' Siberian wheatgrass, despite the relative lack of irrigation and competition with kochia and other weed species in 2008.
eastern side of the rest area – plots are establishing with the benefit of supplemental irrigation, but compaction from maintenance equipment is having a significant detrimental impact of these plots (see attached pictures.) NRCS did not rate these plots, but a very subjective evaluation shows "Parks" Kentucky bluegrass, followed by "Covar" sheep fescue were the most tolerant of growing conditions in these plots. "Rosana" western wheatgrass and "Roadcrest" crested wheatgrass were also among the top performers in this group of plots.
south entrance of the rest area – plots were clearly the most attractive and successfully established plots, all though the other two sets of plots have merit for future evaluation and consideration relative to the harshness of their growing conditions: (1) north exit= abandonment, high weed infestation, poor seed bed for establishment, minimal irrigation; and (2) east side beds= high compaction and pet traffic.
That said, an evaluation by Dan Ogle, NRCS Plant Materials Specialist in Boise, shows all of the grasses except "Parks" Kentucky bluegrass with high rates of establishment (80-100% compared to 50% for the bluegrass.) Weed exclusion appears to be most successful with the 'Cover' sheep fescue, 'Hycrest' crested wheatgrass, 'Roadcrest' crested wheatgrass, 'Manchar' smooth brome, and 'Vavilov' Siberian wheatgrass.
Aesthetic value is truly in the eye of the beholder. 'Covar' sheep fescue is a lush fine texture grass that was very appealing, but subjective evaluations by University of Idaho Extension students showed a lot of variability in choices

related to color, texture, clumpiness, and overall establishment of plots. Most these evaluations were also done earlier in the growing season, so these could change over time.
Drought tolerance was not tested, or at least not quantified. This is the final evaluation **Cancel**.

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. **Evaluate in 2010.**

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

reduced this year due to two years of extreme drought. FY02 good stand, and vigor with greatly reduced production this drought year for all accessions. Produced 0.5-0.7 AUM/Acre for each accession, less than 50% of the normal precipitation year. Grazing is slowing spread of these species. FY04 – good stands with good vigor for all species. Production was approximately 0.7 AUMs per acre. **Evaluate in 2010.**

ID02010 Hugh Pangman - New Meadows Riparian Planting. 9067541 Peachleaf willow - Baker source and Golden willow. 50 cuttings ordered February 11, 2002 for shipment in early May 2002. To be planted with waterjet stinger. FY02 willows were planted through cobbly site using a backhoe to watertable located at 5-6 feet depth. 95 survival of each species. Peachleaf willows are 18-20 inches tall and Golden willows are 24 inches tall. Golden willows are more vigorous with more stem growth. FY03 Peachleaf willow 95 percent survival with 36-48 inch height. Golden willow local cuttings also have 95 percent survival with 48 inch plus height. Producer is please with this planting. FY04 no evaluation. FY05 end of 4th growing season - peachleaf willow 90% survival with excellent vigor, 15 feet plant height, 10 feet crown width, 3 inch DBH. Golden willow 90% survival with very good vigor, 10 feet plant height, 6 feet crown width and 2 inch DBH. Peachleaf plants are more vigorous than golden willow, but in a slightly better site based on soil and moisture availability. Plants are protected from grazing by domestic livestock. FY06 evaluation – peachleaf willow 90 percent survival, excellent vigor, 22-25 feet tall, 15 feet crown width; golden willow 90 percent survival, good vigor, 11-12 feet tall, 8 feet crown widths. Evaluate again in 2007 to document a good record of the success of planting and growth rates. **Evaluate in 2010.**

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 - FY08 no evaluations. **Evaluate in 2010.**

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 2010.**

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 2010.**

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 2010.**

FIELD OFFICE: GOODING/FAIRFIELD

ID01007 Spring Cove Ranch – Butler demonstration plantings of Magnar basin wildrye, Snake River Plain fourwing saltbush, and Northern Cold Desert winterfat. Seed ordered March 16, 2001. Site characteristics: Planting 1. Vertisol soil, 11-inch rainfall, irrigated, 3300 feet elevation, south of Pioneer Reservoir. Planting 2. Sodic soil, 12-inch rainfall, irrigated, 3500 feet elevation, near Clover Creek – Hill City Road – southern base of Bennett Mountain foothills. FY01 - FY04 seed not planted due to extreme drought. Cooperator plans to plant fall 2004. FY05 Planting Site 1: Seed again not planted. Dan said he still wants to drill the Magnar next spring (2006) in the planned site (Planting Site 1). Said site in 2005 was too dry. As of 1/10/06 site is under flood waters. Moisture should be good for spring 2006 planting. He said he will drill seed in spring 2006. FY07 Dan has not planted the Magnar yet on account of other farming activities, but still wants to keep the seed and says he will try to get it planted this fall (2007). FY08 Spring Cove Ranch, called Dan last week, he said he did get the Magnar in the ground (about 3 acres or something, small seeding) last fall (fall 2007). He said he disked the ground twice and broadcast the Magnar and left as is. He felt he had enough seed coverage due to the soil condition after working and did not harrow or follow up for seed coverage. He did not take a close look after this growing season but believed he needed another year before making a judgement as not much apparently came. FY09 no evaluation.

Little Wood River Farm: 1) beaver select Bur-oak trees even when other food trees are present; We lost 5 in one area to beaver, the trees were getting in the 9-10 foot height arena and really starting to grow. All oak trees are now chicken wired; 2) I removed all sea buckthorn (Hippophae rhamoides) plants from my shelterbelts last fall. My experiment with the species was completed. The plants flourished, and were starting to flourish a little too-well. I decided just knowing that they would grow so well was knowledge enough. Ecologically they provided no advantages/niches in my shelterbelts than what our farm-favorite silver buffaloberry are already providing. For snow management criterion in dry and cold environs, the sea buckthorn may shine brilliantly, provided the suckering habit is acceptable to the manager. Basically, I view sea buckthorn as a wide amplitude Russian olive; 3) Blooming box elder trees provide a

strong draw for bees early in the spring, in case anybody is interested in stretching their colony's field season; 4) Firs (genus Abies) exhibit zero growth in the too-hot Gooding sun; 5) Siouxland poplars, on the other hand, are the all-time winners in growth on our farm, but still can't outrun beaver. FY09 no evaluation.

FIELD OFFICE: JEROME/ SHOSHONE/HAILEY
None

ID10004 John Sandy Field Planting - Critical Area Planting near Stanley. Bromar mountain brome, Durar hard fescue, Sherman big bluegrass, First Strike slender wheatgrass and Anatone bluebunch wheatgrass seed ordered September 28, 2009. Cooperator also plans to plant potted shrubby cinquefoil plants on site. Seeding planned for dormant fall November 2009.

FIELD OFFICE: RUPERT
None

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

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. FY08 **Irrigated** – Sherman fair stand with good vigor; Talon good stand with good vigor; Foothills good stand with good vigor; Durar fair stand with good vigor; **Semi-irrigated** – Covar good stand excellent vigor; Quatro good stand with good vigor; Newhy failed; Roadcrest poor stand with poor vigor; Ephraim good stand with good vigor; Sodar stand destroyed; Paiute stand destroyed; Nursery has expanded and irrigation is no longer available; **Dryland species** - Vavilov good stand with good vigor; Bozoisky good stand with

good vigor; Sherman good stand with good vigor; Rosana excellent stand with good vigor. **Data will be maintained but evaluations will longer be collected for these plantings.**

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

Recommendations based on evaluation years
Irrigated – Talon Canada bluegrass and Foothills Canada bluegrass are best fully irrigated choices
Semi-irrigated – Ephraim crested wheatgrass and the good dryland species Vavilov, Rosana, or Bozoisky
Dryland – Vavilov Siberian wheatgrass mixed with Rosana western wheatgrass or Bozoisky Russian wildrye

ID04003 Steve Schuyler field planting – windbreak. Siouxland poplar, Carolina poplar, Golden willow and Laurel willow cuttings. Cuttings ordered January 12, 2004. Site characteristics: 0-1 percent slope, north aspect, 8-10 inch precipitation zone, irrigated-gravity, Portneuf silt loam soil. Planted April 10, 2004 – weed barrier fabric was installed – planting protected with snow fence along west edge. FY04 survival and height - 91 percent – 35 inches Laurel willow, 42 percent – 6 inches Carolina poplar, 82 percent – 42 inches Golden willow, 0 percent Siouxland poplar. FY05 replacements ordered February 22nd 10 golden willow, 25 Carolina poplar, and 5 Laurel willow. Evaluation August 11, 2005- Laurel willow 94% survival with excellent vigor, 8 feet height and 5 feet crown width; Carolina poplar 58% survival with excellent vigor, 9.3 feet height and 7.5 feet crown width; Golden willow 82% survival with excellent vigor, 9.5 feet height and 11 feet crown width.; Siouxland poplar failed. FY08 Laurel willow 89 percent survival with good vigor and 15.5 feet height; golden willow 82 percent survival with excellent vigor and 20 feet height; Carolina poplar 58 percent survival with excellent vigor and 28 feet height. FY09 Laurel willow 89 percent survival with yellowing leaves possibly iron clorosis; Golden willow 82 percent survival; Poplar 58 percent survival.

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

survival, excellent vigor, 4 feet height and 2 feet crown width; Siberian peashrub 12% survival, very poor vigor; Coyote willow 33% survival, good vigor, 5 feet height and 0.5 feet crown width; Golden willow 90% survival, excellent vigor, and 6 feet height; chokecherry 27% survival, fair vigor and 4.4 feet height; blue spruce 73% survival, fair vigor and 4.5 feet height; Austrian pine 100% survival, excellent vigor and 4.6 feet height; Rocky Mountain juniper 100% survival, excellent vigor and 14 inch height; Skunkbush sumac 80% survival, good vigor and 2 feet height. FY08 Laurel willow 100 percent survival with excellent vigor and 15 feet height; coyote willow failed; Peachleaf willow 80 percent survival with fair vigor and 15 feet height; Simom poplar failed; Carolina poplar failed; Firecracker penstemon failed.

ID05002 Perinne Coulee 319 Project riparian planting. Redosier dogwood (accessions 9023733, 9023739 and 9023740), Laurel willow and Peachleaf willow (accessions (9067375, 9067376, 9067541, 9067546, 9067549 and 9067560) cuttings were ordered February 4, 2005. Planted spring 2005. Survival and identification difficult in 2005. FY07 Peachleaf willow 50 percent survival with good vigor and 10 feet height; Laurel willow and red-osier dogwood failed. FY08 58 percent survival with good vigor and 11 feet height; Laurel 14 percent survival with poor vigor and 2.5 feet height (affected by saline soil conditions. FY09 Peachleaf 25 surviving with 12 feet height and 12 feet crown width; Laurel 11 surviving with feet height.

ID08007 Twin Falls Canal Company riparian project. Laurel willow, peachleaf willow accessions 9067546 and 9067376 and black cottonwood accession 9067538 were ordered March 10, 2008 for delivery in late March. FY08 Peachleaf willow 55 percent survival with fair vigor and 2 feet height; Black cottonwood failed; Laurel willow 37 percent survival with fair vigor and 15 inch height. FY09 Peachleaf 7 surviving with 6 feet height; black cottonwood 1 surviving with 1 foot height; Laurel 7 surviving with 5 feet height.

ID09004 Guerry Ranch Inc. Crtitical Area Planting – snowdrift locations for erosion control. 9076517 western wheatgrass and Rosana western wheatgrass seed ordered February 5, 2009 for delivery on or about April 1, 2009. Site Characteristics: MLRA 25, Kavon loam, 5- 35 percent slopes, east aspect, elevation approximately 7000 feet, 20- 25 inch precipitation, rangeland, T16S R13E SE1/4 of Section 17. FY09 planting completed in fall 2009.

ID09007 Twin Falls Britt Pond Riparian Planting. 9076375 peachleaf willow (10 cuttings) and 9076376 peachleaf willow (50 cuttings) cuttings ordered February 2009. Planted on May 8, 2009. FY09 Peachleaf 23 surviving; Laurel 7 surviving.

ID09012 Twin Falls East Perrine Riparian Planting. 9076375 peachleaf willow (40 cuttings) ordered February 2009. Planted on May 8, 2009.

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- FY09 no evaluations.

FIELD OFFICE: BLACKFOOT
ID02006 Paul Ricks Demonstration Planting. Seed ordered February 11, 2002 for shipment to Aberdeen PMC by March 4, 2002. FY02 Planting completed in May 2002. August 27, 2002 initial evaluation indicated at least some establishment of all seed plots. FY03 evaluated 12/9/03. FY04 evaluated and clipped 6/23/04. FY05 - FY08 no evaluations. See attached tables at end of this section. FY09 this planting was destroyed **cancel.**

FIELD OFFICE: FORT HALL
ID03002 Shoshone-Bannock Tribe Demonstration Planting. Nezpar Indian ricegrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Sodar streambank wheatgrass, High Plains Sandberg bluegrass, and Sherman big bluegrass seed was ordered September 30, 2002. Planting completed early November 2002. FY03 no evaluation. FY04 Nezpar Indian ricegrass excellent stand and vigor with 24 inch height. Goldar bluebunch wheatgrass excellent stand and vigor with 24 inch height. Magnar basin wildrye excellent stand with good vigor and 36 inch height. Sodar streambank wheatgrass excellent stand and vigor with 30 inch height. Sherman big bluegrass good stand with good vigor and 30 inch height. Very poor stand and vigor with 8 inch height (only 3 plants came up – seed may have been

buried too deep). FY05 evaluation June 15, 2005. Magnar excellent stand, 98% survival, excellent vigor and 48 inch height; Nezpar good stand, 90% survival, good vigor and 36 inch height; Goldar good stand, 95% survival, good vigor and 42 inch height; Sodar excellent stand, 98% survival, excellent vigor and 42 inch height; Sherman excellent stand, 98% survival, excellent vigor and 38 inch height; High Plains failed and will be replanted next year and irrigated for establishment. FY06 excellent stands of Goldar bluebunch wheatgrass and Magnar basin wildrye, good stands of Sodar streambank wheatgrass, and Sherman big bluegrass, fair stand of Nezpar Indian ricegrass and High Plains Sandberg bluegrass failed. FY07 no evaluation. FY08 common camas excellent stand with 90 percent survival and excellent vigor. Demo plots – Magnar basin wildrye 98 percent survival with excellent vigor and 48 to 60 inch height; Nezpar Indian ricegrass very poor stand with 10 percent survival and poor vigor; Goldar bluebunch wheatgrass fair stand with 70 percent survival and good vigor; Sodar streambank wheatgrass excellent stand with 80 percent stand and good vigor; Sherman big bluegrass good stand with 60 percent stand and good vigor; High Plains Sandberg bluegrass failed. FY10 Clearwater Venus penstemon, Snake River Plains fourwing saltbush and Opportunity Nevada bluegrass seed ordered to add to demonstration plots.

FIELD OFFICE: MALAD
None

FIELD OFFICE: MONTPELIER
None

FIELD OFFICE: POCATELLO
None

FIELD OFFICE: PRESTON
None

FIELD OFFICE: SODA SPRINGS
ID05001 Michael Tingey – Irrigated forages Demonstration Plots. Latar orchardgrass, Regar meadow brome, Cache meadow brome, Paiute orchardgrass, Garrison creeping foxtail, Rush intermediate wheatgrass, Bozoisky Russian wildrye, 905439 switchgrass, Blackwell switchgrass and Lutana cicer milkvetch seed was ordered February 4, 2005. SCD/Cooperator Supplies the following: Paddock meadow brome, Forager alfalfa, Kemal festolium, Potomic orchardgrass, Rebound meadow brome, Fuego tall fescue, Tekapo orchardgrass, Mara perennial ryegrass, Barliza timothy, Pradel meadow fescue, Barloex tall fescue, Bariane tall, fescue, Barcell tall fescue, Baridana orchardgrass, Hakari Alaska brome, Birdsfoot trefoil, Sainfoin, Sorgam, Grazing corn, Lakota prairie brome and Alice white clover. Site characteristics: 0.8 acres, MLRA B13, Rexburg-Ririe silit loam soil complex, 1-4 percent slopes, north aspect, elevation 5140 feet, 12-14 inch precipitation, irrigated, T11S R41E SW ¼ section 19. Planted in late spring 2005 due to persistent rainfall that did not allow earlier final land preparation and planting. FY06- FY09 no evaluations.

Species	Percent Stand			Vigor			Height		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Kura Clover	0			0			0		
Forager alfalfa	exc.			good			24”		
Lutana cicer milkvetch	good			good			6”		
Alice white clover	poor			fair			4-6”		
Birdsfoot trefoil	fair			good			3”		
Eski sainfoin	good			good			12”		
Baridana orchardgrass	poor			good			16”		
Tekapo orchardgrass	fair			good			12”		
Paiute orchardgrass	poor			fair			12”		
Latar orchardgrass	poor			fair			12”		
Potomic orchardgrass	fair			good			12”		
Satin orchardgrass	poor			good			8”		
Renagade orchardgrass	fair			good			18”		
Rebound meadow brome	good			good			24”		
Cache meadow brome	fair			good			30”		

Regar meadow brome	fair	good	12”
Lakota prairie brome	good	exc.	36”
Hakari Alaska brome	85	exc.	12”
Seine tall fescue	30	good	24”
Johnstone tall fescue	20	good	18”
Bronson tall fescue	50	good	24”
Bariane tall fescue	35	good	12”
Dovy tall fescue	50	good	18”
Pradel tall fescue	50	good	12”
Garrison creeping foxtail	10	fair	12”
Rush intermediate whtgrs	40	fair	6”
Bozoisky Russian wildrye	35	poor	4”
Kemal festolium	90	exc.	24”
Mara perennial ryegrass	85	good	8”
Barliza timothy	5	poor	4”
Outlaw timothy	5	poor	8”
Blackwell switchgrass	15	fair	18”
9005439(MT) switchgrass	5	fair	8”
Garrison sorgum-sudan	90	good	54”

ID05012 Don Ayers – herbaceous windbreak field planting. Magnar basin wildrye seed ordered March 15, 2005. Site Characteristics: Lantonia-Chinahat silt loam soil, 1-4 percent slopes, 5983 feet elevation, 14-16 inch precipitation, non-irrigated, T8S R41E NW ¼ Section 24. FY05 Two of the four rows had good emergence and two rows had very poor emergence. Ground preparation was much better in rows that the best emergence. Plants that emerged have grown well and look very healthy - fair stand with 4 plants/ft^2, good vigor and 4 inch height. Several more plants emerged in the fall. FY06 planting was accidentally tilled and destroyed – cooperator plans to replant. FY07- FY09 no evaluations.

ID09002 _____ - Recovery western wheatgrass field planting. Seed shipped September 29, 2008. FY09 no evaluation.

ID09005 Alan Rasmussen – riparian field planting. Laurel willow, white willow, coyote willow, golden willow, 9076375 peachleaf willow, 9067538 peachleaf willow cuttings ordered February 2009. Site characteristics: MRLA 13, 4 acres, Iphil silt loam soil, 0- 2 percent slopes, northwest aspect, 5230 feet elevation, 14-16 inch rainfall, irrigated, T11S R40E NW¼ Section 11. FY09 no evaluation.

ID10001 Curtis Reed field planting. Magnar basin wildrye seed ordered August 30, 2009. Seeding planned for late October 2009. Purpose: vegetative filter strip (dust control). Site characteristics: MLRA 13; silt loam soil; 0-1 percent slope; east aspect; elevation 6240; 18- 20 inch precipitation; non-irrigated; T8S R41E sections 5 and 6.

IDAHO DIVISION VI
PLANT MATERIALS PLANTINGS

FIELD OFFICE: ARCO

ID03003 Hill-Freeman Snake River Plain fourwing saltbush field planting. Seed ordered October 18, 2002. FY03 one half pound of Snake River Plains fourwing saltbush was included in a five acre marginal pastureland seeding adjacent to Warm Springs Creek on Barton Flat (South Custer County). The entire seeding area of 13.3 acres included a three and a half acre stand of decadent crested wheatgrass. A seed mix of Vavilov Siberian wheatgrass (1.2 lbs/ac), Bannock thickspike wheatgrass (2.0 lbs/ac), Bozoisky Russian wildrye (1.2 lbs/ac), Rincon fourwing saltbush (0.25 lbs/ac), and Bighorn skunkbush sumac (0.25 lbs/ac) was broadcast over the seeding area. The area was then rolled to obtain seed to soil contact on a firm weed free seedbed. FY04- FY06 no evaluations. FY07 Vavilov Siberian wheatgrass good stand with good vigor - 2 plants per feet squared; Bannock thickspike wheatgrass good stand with good vigor - 2 plants per feet squared; Bozoisky Russian wildrye poor stand with fair vigor - trace plants per feet squared; Snake River Plains fourwing saltbush failed; Bighorn skunkbush sumac – failed. FY08- FY09 no evaluation.

FIELD OFFICE: DRIGGS

None

FIELD OFFICE: IDAHO FALLS

ID95046 Winterfeld Venus penstemon and Firecracker penstemon District Seed Increase. Seed sent 8/95. FY95 planted fall 1995. FY96 poor stand establishing for Alpine and no emergence for Firecracker, no seed production. FY97 Alpine slow establisher and susceptible to frost, no seed production. FY98 fair stand of both Firecracker and Alpine penstemon (1 plant per foot 2). Stands for both species are getting better each year. FY99 fair stands in unfavorable moisture year and no seed production. FY00 Firecracker penstemon died due to drought and short-lived character. Alpine penstemon has good stand with good vigor and stands 24 inches tall. Seed production was unknown at evaluation date. FY01 firecracker penstemon came back, excellent stands and vigor for both species. Seed production estimated at 600 pound per acre bulk. FY02 - Venus - fair stand with excellent vigor, 24 inch height, and 100 pounds per acre bulk production. Firecracker - fair stand with excellent vigor, but slower establishment, 24 inch height, and 100 pounds per acre bulk production. FY03 Firecracker penstemon stand is going out – no production. Venus penstemon produced 80 pounds of seed. FY04 – excellent stand and vigor for each accession. No seed production reported. FY05 Venus penstemon – good stand and good vigor – no seed production reported. Firecracker penstemon stand was plowed out. FY06 excellent stand and vigor. FY07 Richfield firecracker penstemon - fair stand with fair vigor – no seed production; Clearwater Venus penstemon – excellent stand with excellent vigor – 75 pounds per acre cleaned. FY08 Richfield firecracker penstemon – established plants have good vigor, but no seed production. This is probably an issue with lack of an appropriate pollinator. Clearwater Venus penstemon – seed production 80 pounds cleaned. FY09 no evaluation.

ID03007 Winterfeld Fuzzytongue penstemon - Demonstration planting. Seed ordered February 10, 2003. Seed shipped February 18, 2003. FY03 not planted. FY04 planted with poor stand establishing. FY05 replanted October 26, 2005. FY06 fair stand establishing with 2 plants/ft2. FY07 fair stand with fair vigor – still establishing with primarily rosettes this year - no seed production. FY08 fair stand with good survival and good vigor. FY09 no evaluation.

ID05015 Winterfeld Pryor slender wheatgrass for seed increase. Seed shipped May 2, 2005. FY05 no evaluation. FY06 excellent stand with excellent vigor - seed production not reported. FY07 excellent stand with excellent vigor – 320 pounds per acre cleaned seed production. FY08 320 pounds of cleaned seed production per acre and 0.75 tons per acre hay. FY09 no evaluation.

ID07003 Winterfeld Appar blue flax for seed increase. Seed shipped September 26, 2006. FY07 excellent stand with excellent vigor – establishment year – no seed production – clipped weed 3 times this season. FY08 330 pounds of cleaned seed production per acre plus 0.75 tons per acre hay. FY09 no evaluation.

ID07012 Winterfeld Regar meadow brome for seed increase. Seed shipped March 1, 2007. FY07 excellent stand with excellent vigor – establishment year – no seed production. FY08 8 pounds per acre seed production due to poor moisture year. FY09 no evaluation.

ID07014 Winterfeld Goldar bluebunch wheatgrass for seed increase. Seed shipped March 1, 2007. FY07 did not plant. FY08 planted June 5, 2008. FY09 no evaluation.

ID08003 Winterfeld Bannock thickspike wheatgrass seed increase. Seed shipped February 28, 2008. FY08 planted June 5, 2008. FY09 no evaluation.

ID08004 Winterfeld Vavilov II Siberian wheatgrass seed increase. Seed shipped February 28, 2008. FY08 planted June 5, 2008. FY09 no evaluation.

ID09001 Winterfeld Richfield firecracker penstemon seed increase. Seed shipped September 24, 2008. FY09 no evaluation.

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 2010.**

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 2010.**

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 2010.**

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 2010**.

FIELD OFFICE: RIGBY/TERRETON

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

ID09011 Carl Ball – Hamer Farms Field Planting – vegetative cross wind strips demo plantings. Rush intermediate wheatgrass, Manifest 9092056 int. wheatgrass, Bozoisky Russian wildrye, Mankota Russian wildrye, Luna pubescent wheatgrass, Largo tall wheatgrass and Alkar tall wheatgrass seed ordered April 15, 2009. Site Characteristics: MLRA 11; Corassy Butte loamy sand soil; 2- 4 percent slopes; SW aspect; 4800- 4900 feet elevation; full irrigation; T7N R36E Sections 13 and 14. FY09 strips were planted on June 8, 2009.

FIELD OFFICE: SALMON/CHALLIS

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

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

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

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

Accession	Stand	Plants/ft2	Vigor	Comments
B1574 crested wheatgrass	50%	0.5	good	
P27 Siberian wheatgrass	60%	0.75	excellent	
Sodar streambank wheatgrass	80%	1.25	excellent	

AB447 crested wheatgrass	65%	0.5	good-exc.	
Secar Snake River wheatgrass	50%	0.25	good-exc.	High residue problems
AB764 winterfat	20%	0.15	poor	
AB585 winterfat	1%	<0.1	very poor	
AB922 fourwing saltbush	3%	0.1	very poor	
AB942 fourwing saltbush	2%	<0.1	very poor	
Immigrant forage kochia	3%	0.1	fair-good	
Bozoisky Russian wildrye	70%	0.5	excellent	
Vinall Russian wildrye	70%	0.7	excellent	

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

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

Accession	Stand	Plants/ft2	Vigor	Comments
GP52 alfalfa	10%	0.1	fair-good	
BC79 alfalfa	3%	0.05	fair	
RS1 wheatgrass cross	25%	0.5	good	
RS2 wheatgrass cross	15%	0.25	fair	
Newhy hybrid wheatgrass	75%	1.0	good	
Scarlet globemallow	1%	<0.1	fair-good	
Ephraim crested wheatgrass	85%	1.25	fair-good	
Barton western wheatgrass	5%	0.25	poor-fair	
Topar pubescent wheatgrass	1%	<0.1	very poor	
Whitmar beardless wheatgrass	25%	0.25	fair-good	
Goldar bluebunch wheatgrass	25%	0.5	fair-good	
Secar Snake River wheatgrass	50%	0.75	fair-good	
Vinall Russian wildrye	60%	0.75	good-exc.	
Bozoisky Russian wildrye	45%	0.25	excellent	
U7881 alfalfa	1%	<0.1	very poor	
Nordan crested wheatgrass	70%	0.75	good	

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

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

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

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

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

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

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

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

Accession	Stand	Plants/ft2	Vigor	Comments
RS1 wheatgrass cross	1%	<0.1	fair	
RS2 wheatgrass cross	1%	<0.1	fair	
Immigrant forage kochia	2%	<0.1	fair-good	
Scarlet globemallow	1%	<0.1	fair	
Nordan crested wheatgrass	70%	1.0	good	
P27 Siberian wheatgrass	70%	1.0	good-exc.	
Vinall Russian wildrye	30%	0.5	good	
Bozoisky Russian wildrye	75%	1.5	excellent	
Nordan crested wheatgrass	60%	1.0	fair-good	

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

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

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

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

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

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

> **FY07 Spruce** – survival is poor with approximately 20% survival overall. Top growth die back is common with approximately half of the surviving plants green near base, but dead above. These are expected to die. Approximately 15 plants throughout entire WRP site show fair to good bud growth. Winter was open and plants were exposed most of winter – this may have resulted in top growth injury. Spring moisture since March has been very poor resulting in drought injury. Spruce is doing best in sites with saturated conditions. On sites that are drier and better drained, spruce is struggling.
>
> **FY07 Aspen** – survival is good with approximately 50% survival overall. Top growth die back is common with approximately half of the surviving plants leafing along stem and about half sprouting from the base. Winter was open and plants were exposed most of winter – this may have resulted in top growth injury. Spring moisture since March has been very poor resulting in drought injury. Aspen is doing best in sites with very good soil moisture to saturated conditions. On site that are drier and better drained, aspen is struggling.
> Site 1 birm near pond - was the only location where wildlife use was evident – probably moose.
> Site 2 birm near pond
> Site 3 wetland near road junction – aspen are in nearly standing water (water table within 6 inches of surface)
> Site 4 upland just across bridge on right side of road
> Site 5 upland to east of ponds on south end of property
> Site 6 wetlands near ponds on south end of property

PLANT MATERIALS

2009

UTAH EVALUATION SUMMARIES

FIELD, DSI and DEMONSTRATION PLANTINGS

UTAH AREA 1
PLANT MATERIALS PLANTINGS

UT05002 John and Kyle Potter field plantings – 2 mixes. Mix 1: Anatone bluebunch wheatgrass, Nezpar Indian ricegrass, Maple Grove Lewis flax, Bandera Rocky Mountain penstemon, Magnar basin wildrye, Timp Utah sweetvetch, western yarrow and Maybell antelope bitterbrush; Mix 2: Goldar bluebunch wheatgrass, Rimrock Indian ricegrass, Appar blue flax, Bandera Rocky Mountain penstemon, Trailhead basin wildrye, Timp Utah sweetvetch, and Maybell antelope bitterbrush. Seed ordered February 4, 2005. FY05 not planted. FY06 planted October 19, 2005 – 2 mixes were planted on 0.5 acres each – each plantings was broadcast planted and then half of each planting was harrowed (thus four plots total). FY06 Mix 1 – no evidence of Anatone, Nezpar, Magnar or Maybell; good stand of western yarrow with 2-3 plants/ft2 and good vigor; fair to poor stand of Maple Grove, Bandera and Timp with less than 1 plant/ft2 and fair to good vigor. Mix 2 – no evidence of Goldar, Rimrock, Trailhead or Maybell; poor to fair stand of Appar, Bandera and Timp with less than 1 plant/ft2 and fair to good vigor. No difference between broadcast and broadcast/harrow for either planting. FY08 Anatone, Nezpar, Magnar, Timp, Goldar, Rimrock, Trailhead and Maybell failed. Appar, Maple Grove, Bandera and Western Yarrow fair to good stands with good vigor. Yarrow and penstemon plants were found in areas that were harrowed. Appar and Maple Grove plants were found on both harrowed and non-harrowed locations. FY09 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. FY08 all dogwood accessions and the elderberry failed. All Peachleaf willow accessions had some survival with accession 9067375 36% survival, 9067376 28% survival, 90673741 4% survival, 9067346 72% survival, 9067349 60% survival and 9067560 24% survival. Accessions range from 24 to 36 inches in height. Quackgrass and Reed canarygrass competition is severe so any Peachleaf survival is impressive. FY09 no evaluation.

UT07004C Zan Harris Logan Field Office. 9067549 and 9067560 Peachleaf willow accessions and coyote willow cuttings were shipped April 4, 2007. FY08 30 percent survival of 9067549 and 9067560 and 20% survival of coyote willow. Site is heavily infested with Reed canarygrass. FY09 no evaluation.

UT09003_____ Tremonton Field Office adaptation trial. 10 plants of 9008027 silver buffaloberry were ordered February 2009 for delivery in late March. FY09 no evaluation.

UT10001 Basque Cross Ranch Tremonton Field Office field planting. Vavilov II Siberian wheatgrass seed was ordered September 3, 2009 for shipment on October 13, 2009. Site Characteristics: MLRA 28A; 5 acres; gravelly loam soil; 6- 10 percent slope; south aspect; 5600 feet elevation; 10- 12 inch precipitation; non-irrigated; T13N R12W SE1/4 Section 30

UTAH AREA 2
PLANT MATERIALS PLANTINGS

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

UT03001 Merlin Webb – Cedar City FO. Seed shipped February 2003. Rimrock Indian ricegrass, Critana thickspike wheatgrass, Trailhead basin wildrye, Volga mammoth wildrye , Nezpar Indian ricegrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Vavilov Siberian wheatgrass, P-27 Siberian wheatgrass, Snake River Plains fourwing saltbush broadcast seeded into good seedbed on February 22, 2003 - rained soon after planting. FY03 no evaluation. FY04 stand/survival – Planting # 1 P27 fair/100%, Bannock fair/100%, Nezpar fair/100%, Mesa alfalfa fair/100% and Volga failed. Planting # 2 Vavilov fair/100%, Nezpar fair/100%, Bannock fair/100%, Magnar poor/25%, Volga failed, and Snake River Plains failed. FY05 Planting # 1 P27 fair stand with ½ plant/ft2 – Bannock fair stand with ¼ plant/ft2 – Nezpar poor stand with 1/10 plant/ft2 – alfalfa poor stand with 1/10 plant/ft2 – Volga failed. Mix has about 1 plant/ft2. Planting # 2 Vavilov good stand with 4 plants/ft2 - Nezpar poor stand with 1/10 plant/ft2 – Bannock fair stand with ½ plant/ft2 – Magnar and Volga failed – Snake River Plains fourwing saltbush fair stand with ¼ plant/ft2. Mix has 4.9 plants/ft2. Vavilov had the best survival of all plants in this trial and thus was able to respond to better moisture conditions that occurred this year. FY08 Plot 1 - Volga fair stand, Nezpar poor stand, P27, Bannock and alfalfa failed. Plot2 - SRP fourwing saltbush good stand, Magnar and Volga fair stand, Bannock and Vavilov poor stand and Nezpar very poor stand. FY09 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- 09 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 In the spring of 2007 6.5 acres of Northern Cold Desert Germplasm Winterfat was planted. The seeding rate was approximately 2 lbs per acre in rows five feet apart using a ten foot double disk grain drill with all but three of the drops taped shut. Row spacing was 5 feet. Soil had been prepared in the fall of 2006 with no tillage in the spring and soils were firm. On 3/20/07 seed was placed in a groove 1/4 to1/2 inch deep, but there was no packing wheel. The actual seeding rate was less due to adding too many rice hulls with the seed and occasional plugging. There were very harsh spring conditions for germination because there was no rain. It rained the second week in June and some winterfat germinated, but there was no rain again for four weeks. About 30 plants survived. They grew a foot tall by fall of 2007 and had heavy seed production. FY08 in fall of 2007 part of the winterfat field was replanted using left-over seed. The DWR cone seeder with 1/4 inch depth bands was used for this planting. In spring of 2008 the field was tilled for several reasons: no new seedlings were observed; the stand was too thin for production; and a significant encroachment of squarrose knapweed was observed. Landowner is holding back a half acre of this land where there were about 30 winterfat plants that grew where he spilled some seed cleaning the drill. These plants were hand-transplanted to a five foot spacing and will be sprinkle irrigated because he believes winterfat responds well to mid summer moisture. In fall of 2008 or spring of 2009 additional winterfat seed will be planted into weed barrier material. The other 6 acres have been spot sprayed with Milestone, sprayed with glyphosate first week of June, tilled twice in June, and sprayed with glyphosate and 2,4-D July 12. Some weed seed will persist next year, but weeds that have sprouted are gone. FY09 no evaluation.

UT07005 Niels Hansen seed increase planting Bozoisky II Russian wildrye. In the spring of 2007 cooperator planted 6 acres of Bozoisky II Russian wildrye after fall tillage and spring application of glyphosate. A ten foot grain drill with all but four drops taped closed was used for planting. There were no packer wheels and site was sprinkled. Row spacing was 35 inches. This was sprinkle irrigated every two weeks, with some being irrigated every four weeks. This was not adequate irrigation scheduling for sprouting seed, but was mandated by the irrigation company since it was a short water year. Weeds (prostrate knotweed) were sprayed once with 2,4-D in June and again with Weedmaster in July. The spring planted Russian wildrye established well, though with the cool soil temperatures at 6000 feet it didn't sprout significantly until the last of May. It was planted in March. Four ton/acre of turkey manure was applied to field in August 2007 and then 67 lbs/acre Urea was applied in May of 2008 after a soil test showed low N levels. Site was irrigated with subsurface drip on four of the 6 acres. FY09 no evaluation.

UT07006 Niels Hansen seed increase planting Gooseberry Leaf Globemallow. In April 2007 1/2 acre of Gooseberry Leaf Globemallow was planted in 30 rows using the DWR cone seeder at 1/4 inch depth. It was planted after 1 quart per acre application of glyphosate. No emergence occurred until late May. Due to early planting, weed pressure was too high; kochia and Russian thistle dominated the stand. A weed wick was used for weed control in June, mowed between rows and cooperator also did a lot of hand weeding. A significant number of plants survived. In the spring of 2008 landscape fabric was laid and plants were pulled through to control weeds and facilitate seed collection. FY09 no evaluation.

UT08001 Lee Madison (ARS) Demonstration Plots – Fillmore FO planting planned for late November 2007. FY09 no evaluation.

UT08009 Stuart Johnson – Richfield FO field planting. Rush intermediate wheatgrass and Regar meadow brome seed ordered May 27, 2008. Planting scheduled for July- August. Location is a mountain sage site, loamy soil, 2-3 percent slopes, north aspect, 7000+ feet elevation, 16 inch rainfall, T22S R3W NE ¼ Section 33. FY08 The seed was delivered to Stuart on June 30th. He plans to planted the seed by the end of July. 2009 will be the first growing season for evaluations. FY09 no evaluation.

UT09001 Niels Hansen seed increase planting Vavilov II Siberian wheatgrass. Cooperator intends to plant Vavilov II Siberian wheatgrass in a dormant fall planting in 2008 or spring of 2009 after treatment of glyphosate for weed control of knapweed. FY09 no evaluation.

UT10002 Niels Hansen seed increase planting Vavilov II Siberian wheatgrass. 50 PLS of Foundation seed shipped 11/12/09.

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. FY09 no evaluation.

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. FY09 no evaluation.

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

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

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

UT02001 Pete Pickup – Roosevelt FO. Field planting Rush intermediate wheatgrass (3 acres) - Topar pubescent wheatgrass (5 acres) – Paiute orchardgrass (2 acres). Site information: MLRA D34, Turzo silt loam soil, 8 inch precipitation zone, irrigated, 4800 feet elevation, 2% slope, south exposure, T7S R2E Section 16. Seed ordered April 19, 2002. FY03 fair stand of Rush producing about 1 AUM/ac with fair vigor. Fair stand of Topar producing about .75 AUM/ac with fair vigor. Weeds are a problem in both stands of grass. FY04 good stands and vigor for both species. The plantings were hayed this year – Rush = 1.25 tons/acre and Topar = 1.0 ton/acre. Regrowth was grazed – estimate 0.25 AUMs/acre. FY05 - FY09 no evaluation.

UT05004 Mike Wilcox – Monticello FO field planting. This is a dormant spring or fall planting of Topar pubescent wheatgrass and Rush intermediate wheatgrass. Barnam loam soil, 3 percent slopes, south aspect, 6000 feet elevation, 14 inch precipitation, non-irrigated, T31N R26E Section 8. Seed ordered March 3, 2005. FY05 planted as a dormant fall planting. FY06 not planted – cooperator plans to plant in spring of 2007. FY07 planting was drill seeded in late September 2007. FY09 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 drill planting completed August 19, 2006 – plants germinated and looked good on evaluation date. FY07 During the evaluation, it was difficult to find established plants from the seeding but we did find a few which was encouraging. It was discussed that the plants that were observed did appear to have grown enough to make it until next year. It was also noted that there had been some effects from prairie dogs and rabbits. The planting area had a lot of weeds which could be expected in new seeding. This site will continue to be monitored and evaluated. Cooperator is concerned about the viability of the seedlings because it was grazed so heavily. In addition cheatgrass came in very strong by late fall. FY09 no evaluation.

UT06001 Carol Vansteeter - Monticello FO field planting. Seed of Alma blue grama, Appar blue flax and Richfield Selection firecracker penstemon was ordered on May 23, 2006. FY06 broadcast and rake planting completed on November 15, 2006. Two days following seeding site was snow covered. FY07 did not notice any plant establishment. There was a bad rabbit problem and the planting could be limited by rabbit use. FY08 and FY09 no evaluation.

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. FY09 no evaluation.

UT08002 Sam E. Jones (Reservation) Demonstration Plots. Nezpar Indian ricegrass, Vavilov Siberian wheatgrass, Vavilov II Siberian wheatgrass, 9076517 western wheatgrass, Rimrock Indian ricegrass, Rosana western wheatgrass, Paloma Indian ricegrass , Alma blue grama, Hachita blue grama, Grants cane bluestem and Westwater alkali muhly seed was ordered Jan. 14, 2008. Site Characteristics: sandy clay loam soil, 0-3% slope, 5000 feet elevation, 8-10" rainfall zone. FY09 no evaluation.

UT08003 Mike Roring field planting. Vavilov Siberian wheatgrass, Vavilov II Siberian wheatgrass, Bozoisky Russian wildrye, 9076517 western wheatgrass and Rosana western wheatgrass seed ordered Jan. 14, 2008. Site Characteristics: silty clay loam soil, 0-3% slope, 6800 feet elevation, 10-12" rainfall zone. FY09 no evaluation.

UT08004 Kyle Wheeler irrigated forages field planting. Rush intermediate wheatgrass, Tegmar intermediate wheatgrass, Regar meadow brome, Cache meadow brome and Paiute orchardgrass seed ordered Jan. 14, 2008. Site Characteristics: silty clay loam soil, 0-3% slope, 7000 feet elevation, 10-12" rainfall zone and irrigated. FY09 no evaluation.

UT08005 City of Monticello (Sewage Treatment Plant) – Chris Baird Erosion Control Planting. Rush intermediate wheatgrass, Tegmar intermediate wheatgrass, 9076517 western wheatgrass , Hycrest crested wheatgrass, Hycrest II (CD-II) crested wheatgrass, Douglas crested wheatgrass, Roadcrest crested wheatgrass and Ephraim crested wheatgrass seed ordered Jan. 14, 2008. Site Characteristics: loamy clay soil, 0-30% slope, 7000 feet elevation, 12-14" rainfall zone and irrigated. FY09 no evaluation.

UT09002 Moab Salt Cedar Control Reseeding Project. Seed ordered October 9, 2008. Species include: Tegmar intermediate wheatgrass, Rush intermediate wheatgrass, Bannock thickspike wheatgrass, 9076517 western wheatgrass, Arriba western wheatgrass, Alma blue grama, Hachita blue grama, Grants cane bluestem, Westwater alkali muhly, P-27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Vavilov II Siberian wheatgrass and a Seed Mix of Nezpar Indian ricegrass, Bannock thickspike wheatgrass, Magnar basin wildrye and Snake River Plains fourwing saltbush. FY09 no evaluation.

UT09004 Cody Holyoak - Price FO (Green River) field planting. Seed of Forestburg switchgrass, Cave in Rock switchgrass, Regar meadow brome and Paiute orchardgrass was ordered March 16, 2009. Seed will be planted in late spring to summer of 2009. Site characteristics: MLRA 34B; Minchey-Steat soil complex; 1-3 percent slopes; south aspect; 4100 feet elevation; 7-9 inch rainfall; full irrigation; T20S R16E NW1/4 Section 9. FY09 no evaluation.