USDA NRCS
Natural Resources Conservation Service

Aberdeen Plant Materials Center

2010 Annual Technical Report

United States
Department of
Agriculture

Natural Resources
Conservation Service

Aberdeen, Idaho

March 2011

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Technical Note 53 Vertical Bundles: a streambank bioengineering treatment to establish willows and dogwoods on streambanks

Plant Guides – Macfarlane's Four-o'-clock, Redtop, Spalding's Catchfly, Sand Dropseed, Water Howellia, Christs Paintbrush, Slickspot Peppergrass, RS-Hybrid Wheatgrass, Ute Ladies'-Tresses

Riparian/Wetland Project Information Series No. 26. Cluster Plantings

Evaluation of fall versus spring dormant cuttings of hardwood willow cuttings with and without soaking treatment. Native Plants Journal 10 (3): 288-294.

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 2010.

The following documents and presentations were developed during FY 2010 and may be obtained by contacting the Aberdeen Plant Materials Center:

DOCUMENTS

Waldron, B.L., K.B. Jensen, A.J. Palazzo, T.G. Robbins, M.D. Peel, D.G. Ogle, L. St. John 2010. Release Notice - 'Recovery' Western Wheatgrass. ARS Forage and Range Laboratory, NRCS Aberdeen, ID Plant Materials Center, Aberdeen, ID. December 10, 2009. 5p.

Tilley, D.J. and L. St. John 2010. Summary of Polymer Seed Coating and Soil Amendment Evaluation Studies. IDPMC, Boise, ID. 9 Feb, 2010. 4p.

Tilley, D.J. and J.C. Hoag 2010. Evaluation of fall versus spring dormant planting of hardwood willow cuttings with and without soaking treatment. Aberdeen PMC, Bloomington, IN. vol. 10 no. 3. fall 2009. 6p.

Tilley, D., Ogle, D., and L. St. John 2010. Plant Guide - MacFarlane's Four-o'clock. IDPMC, Boise, ID. 6/2/10. 3p.

Tilley, D., Ogle, D. and L. St. John 2010. Plant Guide - Redtop. IDPMC, Boise, ID. 6/2/10. 4p.

Tilley, D., Ogle, D. and L. St. John 2010. Plant Guide - Spalding's Catchfly. IDPMC, Boise, ID. 6/2/10. 3p.

Tilley, D., L. St. John, and D. Ogle 2010. Plant Guide - Sand Dropseed. IDPMC, Boise, ID. 6/2/10. 5p.

Tilley, D., D.G. Ogle and B. Cornforth 2010. Technical Note No. 35 Quick Methods to Estimate Seed Quality. IDPMC, Boise, Idaho. 6/2/10. 13p.

Tilley, D. Ogle, D. and L. St. John 2010. Plant Guide - Water Howellia. IDPMC, Boise, ID. 6/2/10. 3p.

Tilley, D. 2010. Intermountain Plant Notes 2010. IDPMC, Boise, ID. 7/23/2010. 4p.

St. John, L., D.G. Ogle, J. Cane 2010. Plants for Pollinators at the PMC. Aberdeen Plant Materials Center, Aberdeen, Idaho. March 23, 2010. 2p.

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St. John, L. and D.G. Ogle 2009. Intermountain Plant Notes - 2009. Aberdeen Plant Materials Center, Aberdeen, Idaho. Summer 2009. 4p.

St. John, L. and D.G. Ogle 2010. Plant Guide - Christs Paintbrush. Aberdeen Plant Materials Center, Aberdeen, Idaho. March 26, 2010. 3p.

St. John, L. and D.G. Ogle 2010. Plant Guide: Slickspot Peppergrass. Aberdeen Plant Materials Center, Aberdeen, Idaho. March 25, 2010. 4p.

St. John, L. and D.G. Ogle 2009. Release Brochure - 'Recovery' Western Wheatgrass. Aberdeen Plant Materials Center, Aberdeen, Idaho. October 1, 2009. 2p.

St. John, L. , K.B Jensen, D.G. Ogle, D. Tilley 2010. Plant Guide for RS-Hybrid wheatgrass. Aberdeen Plant Materials Center, Aberdeen, Idaho. July 26, 2010. 4p.

St. John, L. 2010. Grand Teton National Park - FY 2009 Annual Summary Report. Aberdeen Plant Materials Center, Aberdeen, Idaho. January 22, 2010. 3p.

St. John, L. 2009. Outstanding Plant Materials Team Award Presented to Aberdeen Plant Materials Center. Submitted to and published by Aberdeen Times, Aberdeen, Idaho. April, 2009. 2p.

St. John, L. 2009. Plant Guide - Ute Ladies'-Tresses. Aberdeen Plant Materials Center, Aberdeen, ID. October 1, 2009. 3p.

St. John, L. 2010. 'Recovery' Western Wheatgrass Cooperatively Released. Aberdeen Plant Materials Center, Aberdeen, Idaho. January 19, 2010. 2p.

St. John, L and D.G, Ogle 2009. Great Basin Native Plant Selection and Increase Project - 2009 Progress Report. Aberdeen Plant Materials Center, Aberdeen, Idaho. December 18, 2009. 6p.

St. John and D.G. Ogle 2009. Aberdeen Plant Materials Center Tribal Conservation Technical Assistance. Aberdeen Plant Materials Center, Aberdeen, Idaho. October 1, 2009. 2p.

Hoag, JC 2010. Cluster Plantings: A way to plant live unrooted cuttings in coarse soils including sands, gravels and cobbles. PMC, Aberdeen, ID. IS 26, riparian wetland project. 8p.

Hoag, JC 2010. Vertical Bundles: a streambank bioengineering treatment to establish willows and dogwoods on streambanks. Aberdeen Plant Materials Center, Aberdeen, ID. January 11, 2010. 6p.

Hoag, JC 2010. View from a wetland FY2009. PMC, Aberdeen, ID. No. 15 (2009). 4p.

compiled by L. St. John 2010. Aberdeen Plant Materials Center 2009 Annual Technical Report. Aberdeen Plant Materials Center, Aberdeen, Idaho. March 8, 2009. 167p.

Blaker, P. 2009. Foundation Seed Production at Aberdeen Plant Materials Center: 2001-2009. Aberdeen Plant Materials Center, Aberdeen, Idaho. October 5, 2009. 1p.

Palazzo, Antonio J., Susan E. Hardy, Timothy J, Cary, Kay H. Asay, Kevin B. Jensen, Daniel G. Ogle 2009. Intermountain West Military Training Lands Planting Guide. US Army Corps of Engineers, Hanover, NH. ERDC/CRREL TR-09-9; June 2009. 61p.

Ogle, Daniel G., Loren St. John, Susan R. Winslow 2009. Western Wheatgrass Plant Guide. USDA NRCS, Boise, Idaho. October 2009. 6p.

Ogle, Daniel G., Loren St. John, Mark Stannard 2009. Pasture - Species Selection and Grazing Management Guidelines. USDA-NRCS, Boise, Idaho. TN 11; December 2009. 27p.

Ogle, Daniel G., Loren St. John 2009. Timothy Plant Guide. USDA NRCS, Boise, Idaho. October 1, 2009. 4p.

Ogle, Daniel G. and Brendan Brazee 2010. ID-CPA-025 Seeding/Planting Plan - Specification. USDA NRCS, Boise, Idaho. March 2010. 2p.

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Ogle, Dan, Loren St. John, J. Scott Peterson, Derek Tilley 2009. Lewis Flax Plant Guide. USDA NRCS, Boise, Idaho. October 2009. 4p.

Ogle, Dan, Loren St. John, J. Scott Peterson, Derek J. Tilley 2009. Blue Flax Plant Guide. USDA NRCS, Boise, Idaho. October 1, 2009. 4p.

Ogle, Dan, Loren St John, Mark Stannard, Larry Holzworth 2009. Grass, Grass-Like, Forb, Legume and Woody Species for the Intermountain West. USDA NRCS, Boise, Idaho. TN 24; October 2009 - revision. 46p.

Ogle, Dan, Loren St John 2009. Plant and Seed Vendors for Idaho - Montana - Nevada - Eastern Oregon - Utah - Eastern Washington - Wyoming. USDA NRCS, Boise, Idaho. TN 33; October 2009 - revision. 25p.

Ogle, Dan, Loren St John 2009. Plants for Saline to Sodic Conditions. USDA NRCS, Boise, Idaho. TN 9A; February 2010 - revision. 12p.

Ogle, Dan, John Englert 2009. Glossary of Terms for use in Plant Materials. USDA NRCS, Boise, Idaho. TN 28; October 2009 - revision. 50p.

Ogle, Dan, Jim Cane, Frank Fink, Loren St John, Mark Stannard, Tim Dring 2009. Plants fo Pollinators in the Intermountain West. USDA NRCS, Boise, Idaho. TN 2; October 2009 - revision. 21p.

Ogle, Dan, Frank Fink, Loren St John 2009. Threatened, Endangered, Candidate and Proposed Plant Species of Idaho. USDA NRCS, Boise, Idaho. TN 51; October 2009. 9p.

Ogle, Dan, Dana Truman, Brett Prevedel, Tony Beals 2009. Plant Materials Salinity Trials. USDA NRCS, Boise, Idaho. TN 9B; October 2009. 12p.

Ogle, Dan, Brendan Brazee 2009. Estimating Initial Stocking Rates. USDA NRCS, Boise, Idaho. TN 3; June 2009. 39p.

Ogle, Dan and Larry Holzworth 2010. Improving Sage-Grouse Habitat through Revegetation and Rangeland Management. USDA NRCS, Boise, Idaho. February 2010. 2p.

Ogle, Dan 2010. 2009 Idaho Plant Materials Evaluation Summaries - Field, Seed Increase and Demontration Plantings. USDA NRCS, Boise, Idaho. January 2010. 25p.

Ogle, Dan 2010. 2009 Utah Plant Materials Evaluation Summaries - Field, Seed Increase and Demonstration Plantings. USDA NRCS, Salt Lake City, Utah. January 2010. 9p. Page 1 of 2

Ogle, Dan 2010. Conservation Cover (327) Practice Specification. USDA NRCS Idaho, Boise, Idaho. July 2010. 4p.

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Ogle, Dan 2010. CRP Practice CP1 Factsheet. USDA NRCS, Boise, ID. June 2010. 2p.

Ogle, Dan 2010. CRP Practice CP2 Factsheet. USDA NRCS, Boise, ID. June 2010. 2p.

Ogle, Dan 2010. CRP Practice CP4D Factsheet. USDA NRCS, Boise, ID. June 2010. 2p.

Ogle, Dan 2010. Forage and Biomass Planting (512) Practice Specification. USDA NRCS Idaho, Boise, Idaho. July 2010. 3p.

Ogle, Dan 2010. Herbaceous Wind Barrier (603) Practice Specification. USDA NRCS Idaho, Boise, Idaho. July 2010. 3p.

Ogle, Dan 2010. Range Planting (550) Practice Specification. USDA NRCS Idaho, Boise, Idaho. July 2010. 3p.

Ogle, Dan 2010. Vegetative Barrier (601) Practice Specification. USDA NRCS Idaho, Boise, Idaho. July 2010. 4p.

Holzworth, Larry K., Harold E. Hunter, Susan R. Winslow 2009. Revegetation Effectiveness - Long Term Evaluation of Nine Selected Wildfire and Logging Disturbed Forestland Sites in Montana. USDA NRCS, Boise, Idaho. TN 29B; October 2009. 26p.

Franzen, Dave, Jacy Gibbs, Dan Ogle 2009. Revegetation Effectiveness - Evaluation of Four Selected Wildfire Disturbed Rangeland and Forestland Sites in Idaho and Oregon. USDA NRCS, Boise, Idaho. TN 29A; October 2009. 28p.

PRESENTATIONS

Date presented: 10/6/2009
Title: Afton Streambank Soil Bioengineering Technical Training in Afton WY
Presenter Hoag, JC and J Fripp **Location** Afton WY

Date presented: 10/8/2009
Title: Afton Streambank Soil Bioengineering Field Exercise at Crow Creek
Presenter Hoag, JC and J. Fripp **Location** Crow Creek, ID

Date presented: 10/20/2009
Title: Lewiston Streambank Soil Bioengineering Technical Training in Lewiston ID
Presenter Hoag, JC and J Fripp **Location** Lewiston, ID

Date presented: 10/22/2009
Title: Lewiston Streambank Soil Bioengineering Field Exercise at Sweetwater Creek, ID
Presenter Hoag, JC and J Fripp **Location** Sweetwater Creek, ID

Date presented: 10/27/2009
Title: Baker City Streambank Soil Bioengineering Technical Training in Baker City OR
Presenter Hoag, JC and J Fripp **Location** Baker City, OR

Date presented: 10/29/2009
Title: Powder River Streambank Soil Bioengineering Field Exercise on Powder River in OR
Presenter Hoag, JC and J Fripp **Location** Baker City, OR

Date presented: 11/2/2009
Title: Stream assessment training on Meadow Valley Marsh in Caliente NV
Presenter Hoag, JC and B Southerland **Location** Caliente, NV

Date presented: 11/16/2009
Title: Establishing Native Plant species on disturbed areas, an integrated approach workshop
Presenter Hoag, JC, D.Steinfeld, S. **Location** Portland, OR

Date presented: 12/11/2009
Title: Approval for Seed Certification of 'Recovery' western wheatgrass in Idaho
Presenter L. St. John **Location** Via compressed video

Date presented: 1/25/2010
Title: 2009 PMC Activities Update to Utah NRCS Plant Materials Committee
Presenter L. St. John **Location** Provo, Utah

Date presented: 1/26/2010
Title: Aberdeen Plant Materials Center - 2009 Activities for Great Basin Native Plant Selection and Increase Project
Presenter L. St. John **Location** Salt Lake City, UT

Date presented: 1/26/2010
Title: PMC Farm Operation Training
Presenter B. Cornforth, B. Simonson, **Location** Aberdeen, Idaho

Date presented: 2/3/2010
Title: 2009 PMC Activities Update to Idaho Plant Materials Committee
Presenter L. St. John, D. Tilley **Location** Boise, Idaho

Date presented: 2/23/2010
Title: Growing Grass and Forb Seed
Presenter B. Cornforth **Location** Ontario, OR

Date presented: 3/18/2010
Title: Overview of Aberdeen Plant Materials Center and review of cooperative work with Yellowstone National Park
Presenter L. St. John **Location** Livingston, MT

Date presented: 4/7/2010
Title: Seed and Cutting Production
Presenter Cornforth, Tilley **Location** Aberdeen Plant Materials Center

Date presented: 4/24/2010
Title: Tree Planting Demonstration
Presenter B. Cornforth **Location** Fort Hall, Idaho

Date presented: 4/27/2010
Title: IDPMC release development procedures
Presenter D. Tilley **Location** Logan, UT

Date presented: 4/28/2010
Title: Current Evaluations and recent Releases from the Aberdeen PMC
Presenter L. St. John **Location** Logan, UT

Date presented: 5/6/2010
Title: Arbor Day Tree Planting Demonstration and Training
Presenter B. Cornforth **Location** Aberdeen, Idaho

Date presented: 5/11/2010
Title: Plants and Pollinators
Presenter Derek Tilley **Location** Rockland, ID

Date presented: 5/18/2010
Title: Aberdeen Plant Materials Center - Conserving Ecosystems of the West
Presenter L. St. John, D.G. Ogle **Location** Snowbird, UT

Date presented: 5/19/2010
Title: Investigations of wetland seeding
Presenter Derek Tilley **Location** Snowbird, UT

Date presented: 5/26/2010
Title: Plants and Pollinators
Presenter Derek Tilley **Location** Aberdeen, ID

Date presented:6/1/2010
Title: Plants and Pollinators
Presenter Derek Tilley **Location** American Falls, ID

Date presented:6/24/2010
Title: Big Desert Sage Grouse Local Working Group Tour
Presenter L. St. John **Location** Big Desert, Idaho

Date presented:7/16/2010
Title:PMC overview for State Conservationist
Presenter St. John, Cornforth, Tilley, **Location** Aberdeen Plant Materials Center

Date presented:8/3/2010
Title:PMC Operations and Management Training
Presenter St. John, Tilley, Cornforth, **Location** Aberdeen Plant Materials Center

Date presented:1/25/2010
Title: Utah Plant Materials Committee Meeting
Presenter: Ogle **Location** Provo, Utah

Date presented:2/3/2010
Title: Idaho Plant Materials Committee Meeting
Presenter: Ogle **Location** Boise, Idaho

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.*

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 2002 through 2010:

Cultivar	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL POUNDS
					POUNDS PLS					
Anatone bluebunch wheatgrass	-	-	20	250	350	400	775	450	155	2400
Appar blue flax	470	65	0	848	955	150	150	200	120	2958
Bannock thickspike wheatgrass	550	25	0	1110	900	240	150	0	0	2975
Delar small burnet	75	0	1250	945	490	100	1225	0	0	4085
Ephraim crested wheatgrass	696	0	200	0	1300	300	500	605	0	3601
Goldar bluebunch wheatgrass	375	250	200	200	170	250	450	300	250	2445
Magnar basin wildrye	490	150	245	0	0	490	50	0	50	1475
Maple Grove Lewis flax	-	-	240	280	70	-	-	-	0	590
Nezpar Indian ricegrass	75	340	0	300	500	700	150	100	0	2165
P-27 Siberian wheatgrass	500	0	0	0	0	200	200	0	0	900
Penstemon "Clearwater Selection"	1	10	4	8	0	0	0	1	4	28
Penstemon "Richfield Selection"	7	6	3	11	25	6	4	11	9	82
Paiute orchardgrass	200	0	0	0	75	200	50	300	0	825
Recovery Western Wheatgrass								400	0	400
Regar meadow brome	207	50	50	0	650	50	400	0	50	1457
Rush intermediate wheatgrass	0	0	0	800	300	500	0	0	0	1600
S.R.P. fourwing saltbush	25	5	2	16	0	0	0	0	0	48
Sodar streambank wheatgrass	500	200	0	625	775	250	400	50	0	2800
Tegmar dwarf intermediate wheatgrass	0	0	200	0	0	0	0	250	250	700
Northern Cold Desert winterfat	8	3	8	20	5	4	0	0	2	50
Vavilov II	-	-	-	-	-	-	600	300	635	1535
TOTAL POUNDS	4,179	1,104	2,422	5,413	6,565	3,840	5,104	2,967	1,525	33,119

March 31, 2010

Aberdeen Plant Materials Center

2010 FIELD ANNUAL PLAN OF OPERATION
HOME FARM

Field	Acres	Crop	Operation
1	1.7	Display Nursery (2007)	Manage for display. Plant data to be collected for CEAP/ALMANAC.
2E	1.3	Sandberg Bluegrass (2009) (Yellowstone NP)	Manage for seed production.
2W	1.0	Potatoes	U of I will plant potatoes.
3	1.8	Anatone Bluebunch (2005)	Manage for Certified seed production.
4	1.4	Constructed Wetland Ponds	Establish test plots according to study plan.
5	2.4	Rush (2008)	Manage for Foundation seed production.
6	2.4	Potatoes	U of I will plant potatoes.
7	3.2	Anatone (2009)	Manage for Certified seed production.
8	3.2	Sodar (2008)	Manage for Foundation seed production.
9	3.2	Green Manure	Establish annual legume for plow down.
10	3.2	Recovery (2010)	Establish and manage for Certified seed production.
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	Fallow	fallow as needed for weed control.
14	1.2	Woody Display Nursery (1995)	Maintain display of woody conservation plants. Manage Durar/Covar cover crop.
14S	0.3	Nevada Bluegrass IEP (2010)	Establish and evaluate according to study plan.

Aberdeen Plant Materials Center

2010 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)	Evaluate according to study plan.
17	0.5	Hybrid Poplars (1998)	Manage for long term survival evaluation.
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.

Aberdeen Plant Materials Center

2010 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 corn 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	Wildlife Food Plot	Establish and maintain corn for wildlife use.
25W	1.5	Wildlife Food Plot	Establish and maintain corn 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	Wildlife Food Plot	Establish and maintain corn for wildlife use.
28W	3.3	Wildlife Food Plot	Establish and maintain corn for wildlife use.
28E	2.0	Maple Grove (2010)	Establish and manage for Certified seed production.
29W	1.3	Willows (1994)	Manage for cuttings.
29E	3.7	Alfalfa (2008)	Manage for hay production and wildlife benefits.

Aberdeen Plant Materials Center

2010 FIELD ANNUAL PLAN OF OPERATION
FISH AND GAME FARM (continued)

Field	Acres	Crop	Operation
30W	0.7	Windbreak	Maintain and irrigate as needed.
30E	4.8	Alfalfa (2010)	Establish and manage for hay and wildlife benefits.
31W	1.5	Alfalfa (2010)	Establish and manage for hay and wildlife benefits.
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	Bluebunch Wheatgrass (2009) (Yellowstone NP)	Manage for seed production.
410E	1.0	Needleandthread (2009) (Yellowstone NP)	Manage for seed production.
411	4.5	Nezpar (2007)	Manage for Foundation seed production.

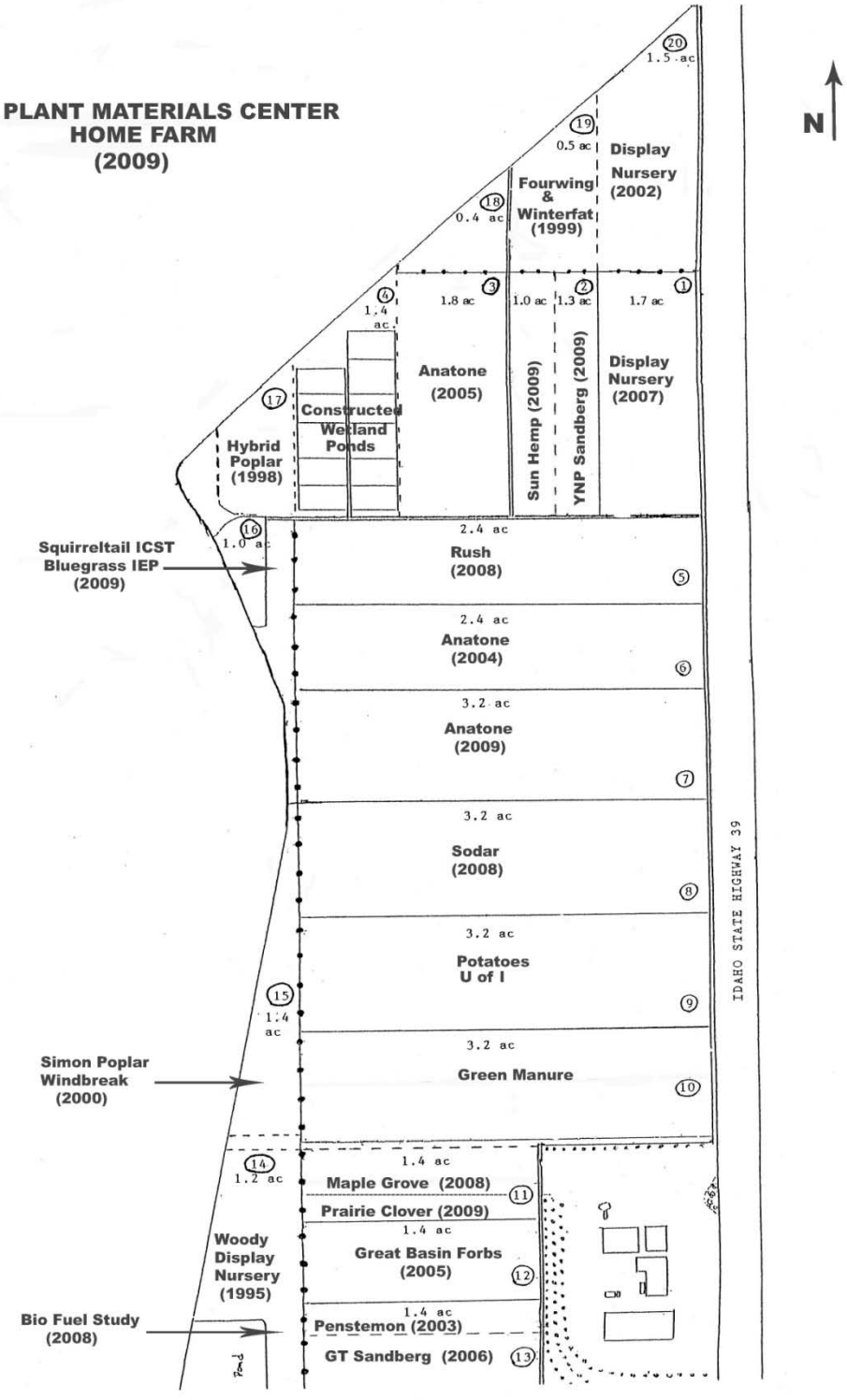
Aberdeen Plant Materials Center

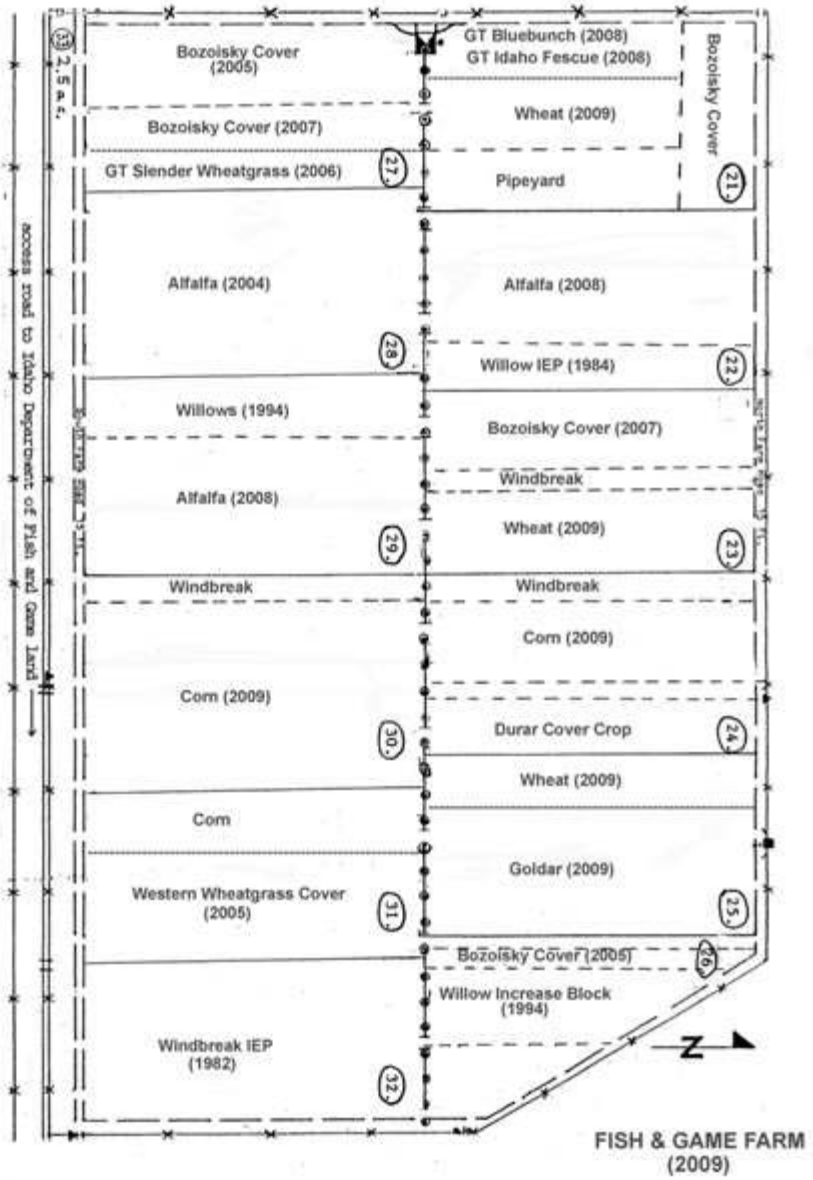
2010 FIELD ANNUAL PLAN OF OPERATION (continued)

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	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
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	Fallow	Fallow for weed control.
S6E	2.5	Goldar (2006)	Manage for Foundation seed production.
S7W	2.5	Mountain Brome (2010) (Grand Teton NP)	Establish and manage for seed production.
S7E	2.5	Fallow	Fallow for weed control.
S8	2.2	Fallow	Fallow for weed control.

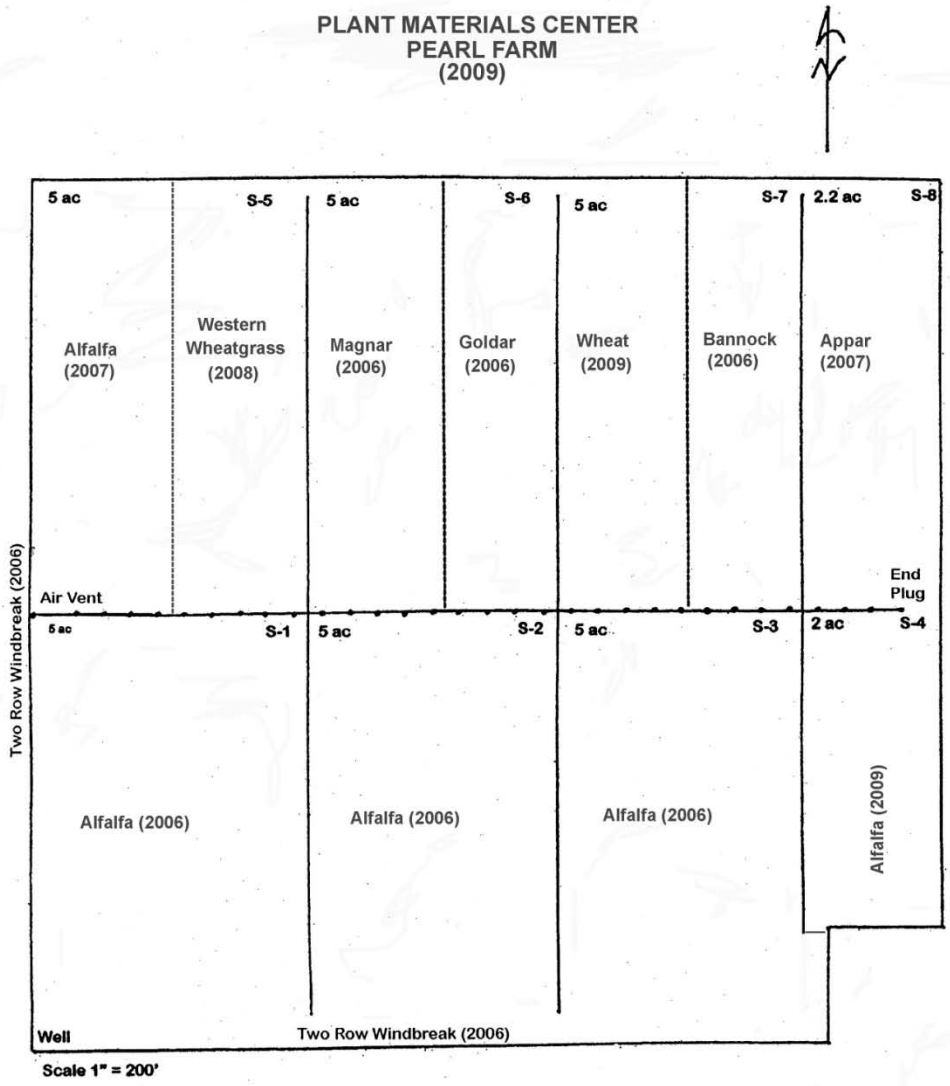
Maintain two-row windbreak (Rocky Mountain Juniper and Simon Poplar established on south and west farm borders.


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
2
1.0 ac
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



FISH & GAME FARM
(2009)

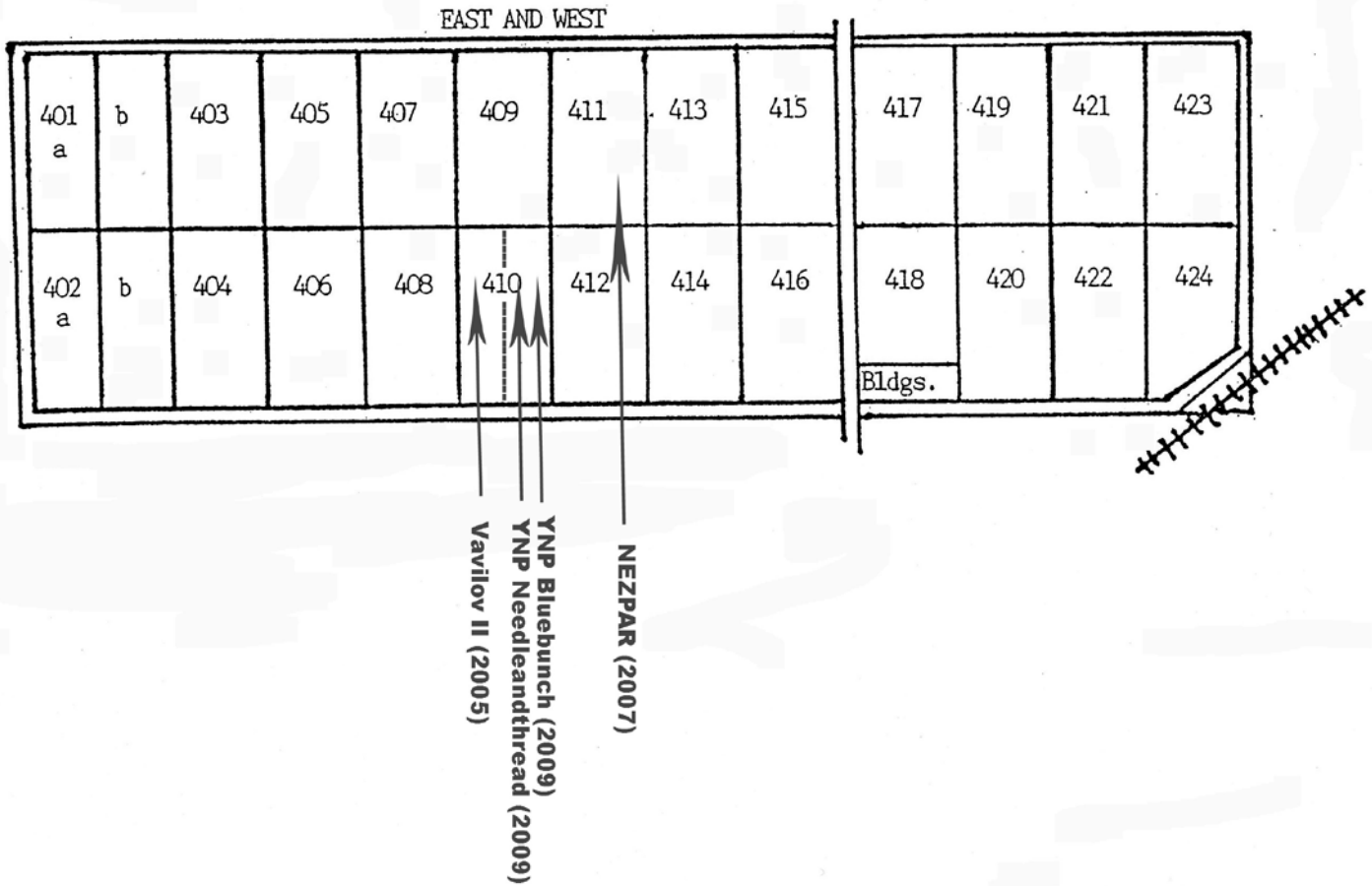
PLANT MATERIALS CENTER
PEARL FARM
(2009)



Scale 1" = 200'

UNIVERSITY OF IDAHO

BREWINGTON FARM (2009)



Project Title:

- Establishment and Maintenance of Certified Generation 1 (G1) Seed
- Propagation of Native Forbs
- Develop Technology to Improve the Diversity of Introduced Grass Stands
- Equipment and Strategies to Enhance the Post-Wildfire Establishment and Persistence of Great Basin Native Plants

Location: NRCS Aberdeen, ID Plant Materials Center

Principal Investigators and Contact Information:

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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. 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 7.4 acres are in production. Estimated seed yield from 2009 seed crop is 280 pounds. Shipped 450 pounds of Generation 2 Certified seed to commercial growers in 2009.

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. Estimated seed production from 2009 crop is 200 pounds.

Snake River Plains Germplasm fourwing saltbush – Estimated seed yield from 2009 crop is 10 pounds. No seed was requested by commercial growers in 2009.

Northern Cold Desert Germplasm winterfat – A hard windstorm in October detached seed prior to harvest resulting in no seed harvest in 2009. No seed was requested by commercial growers in 2009.

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 provided 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 provided to cooperators. All plants that were successfully propagated in the PMC greenhouse were transplanted into seed production/observation 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.

Weeds were controlled by hand during 2009. ERUM was harvested mostly by combine but was followed up by hand harvest. The remaining plots were harvested by hand. LODI and LOGR finally produced seed in 2009, the fourth year of establishment. PESP is the only penstemon accession left, the others being short-lived. The following table shows harvest date and seed yield for the accessions that were harvested in 2009:

Species	Harvest Date	Clean seed estimate (pounds)
ERUM	8/4	11.3
LODI	7/1	1.3
LOGR	7/1	0.9
LOTR	7/1	4.5
PEAC	NA	NA
PEDE	NA	NA
PESP	8/8	0.4

By early July, the *Lomatium* species were completely dormant. In early October 2009 the dormant *Lomatium* plots were treated with a spray application of Roundup to control weeds that were still green.

The Rocky Mountain Research Station in Boise, Idaho cleaned the ERUM seed that was harvested from the plots. Some of the seed was utilized for the seeding trial planted near

Aberdeen, Idaho ID in November, 2009 for the study to improve the diversity of introduced grass stands. The other accessions will be processed and provided to cooperators for seeding trials as requested.

Develop Technology to Improve the Diversity of Introduced Grass Stands

In 2005, the PMC began providing assistance for this study by assisting Brigham Young University (BYU) Provo, Utah and the Agricultural Research Service (ARS) Burns, Oregon 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, Nevada 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, Nevada in cooperation with the University of Nevada Extension Service and near Aberdeen, Idaho (Grandview site) in cooperation with the ARS Sheep Experiment Station.

The second year of seeding trials was completed at the Grandview site in cooperation with the ARS Sheep Experiment Station in 2009. The following seed mixes were prepared and the plots were planted November 2-3.

Grandview, ID
Broadcast Mix
12.90 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Maple Grove Lewis flax	0.40	0.44
Mtn. Home Sandberg bluegrass	0.20	0.22
Royal Penstemon	0.40	0.50
Wyoming big sagebrush	0.05	0.25
Rubber rabbitbrush	0.15	1.20
Rice Hulls		7.11

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	0.85
Bannock thickspike wheatgrass	0.60	0.67
Thurber's needlegrass	0.60	0.94
Rice Hulls		6.40

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 made modifications to the Kemmerer drill by replacing the existing drop tubes with aluminum 3 inch diameter irrigation pipe to improve 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 species requiring deeper planting were drill seeded in alternating rows.

The PMC mixed the seed and rice hull mixtures and calibrated the drills prior to seeding. Wildfire sites near Mountain Home, Idaho and Burns, Oregon were seeded in fall 2007 and a wildfire site near Snowville, Utah was seeded in 2008. Due to lower than normal wildfire frequency in 2009, no suitable sites were found and no seeding occurred for this study in 2009.

Relevant 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. 2008. 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., and D. Ogle. 2009. Great Basin Native Plant Selection and Increase Project - 2008 Annual Report. Aberdeen Plant Materials Center, Aberdeen, Idaho. February 27, 2009. 15p.

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.

Tilley, D.J. and L. St. John 2006. Orchard Display Nursery Evaluation Summary (2005-2008) Final Report. 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.

Presentations

Date: 3/31/2009

Title: Aberdeen PMC report of Activities 2008: Great Basin Native Plant Selection and Increase project

Presenter: Loren St. John

Location: Boise, ID

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 penstemon, sagebrush penstemon and sharpleaf penstemon can be commercially grown, at least with the use of weed barrier fabric. Lomatium species appear to require a number of years (3 - 4) to mature to reproductive stage under the climatic conditions at Aberdeen, Idaho and may not be conducive to commercial production because of the long period to reach reproductive capability.

3. The Truax Rough Rider drill performs well in seeding studies and should be used for large scale seedings.

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 that were produced from the propagation studies were planted in the seed mixtures for the study to improve the diversity of introduced grass stands. Seed of the *Lomatium* species and *Penstemon speciousus* is available to cooperators for seeding trials.

3. Plant Guides are available for Royal penstemon, Hotrock penstemon and Sharpleaf penstemon.

GRAND TETON NATIONAL PARK
FY2009 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

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 of slender wheatgrass (*Elymus trachycaulus*), sandberg bluegrass (*Poa secunda*), blue wildrye (*Elymus glaucus*) and mountain brome (*Bromus marginatus*) 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 were harvested in 2009 and will be harvested again in 2010. GTNP requested that seed production continue in 2009 from the slender wheatgrass and Sandberg bluegrass fields that were established in 2006.

ACCOMPLISHMENTS

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 Fish and Game Farm is Declo silt loam with pH of 7.4 to 8.4. 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. The Idaho fescue and bluebunch wheatgrass fields had fair establishment. Substantial effort continued to rogue Kentucky bluegrass (*Poa pratensis*) out of the Sandberg bluegrass field.

The following table lists the species, field acreage and seed yields from 2009 harvest and seed shipped to GTNP in 2009:

Species	Scientific Name	Acres	Clean seed (lbs)	lbs Shipped
Idaho fescue	*Festuca idahonensis*	0.3	11.0	
Bluebunch wheatgrass	*Pseudoroegneria spicata*	0.17	0.5	
Slender wheatgrass	*Elymus trachycaulus*	1.0	450.0	45
Sandberg bluegrass	*Poa secunda*	0.25	6.5	9
Blue wildrye	*Elymus glaucus*			200
Mountain brome	*Bromus marginatus*			163

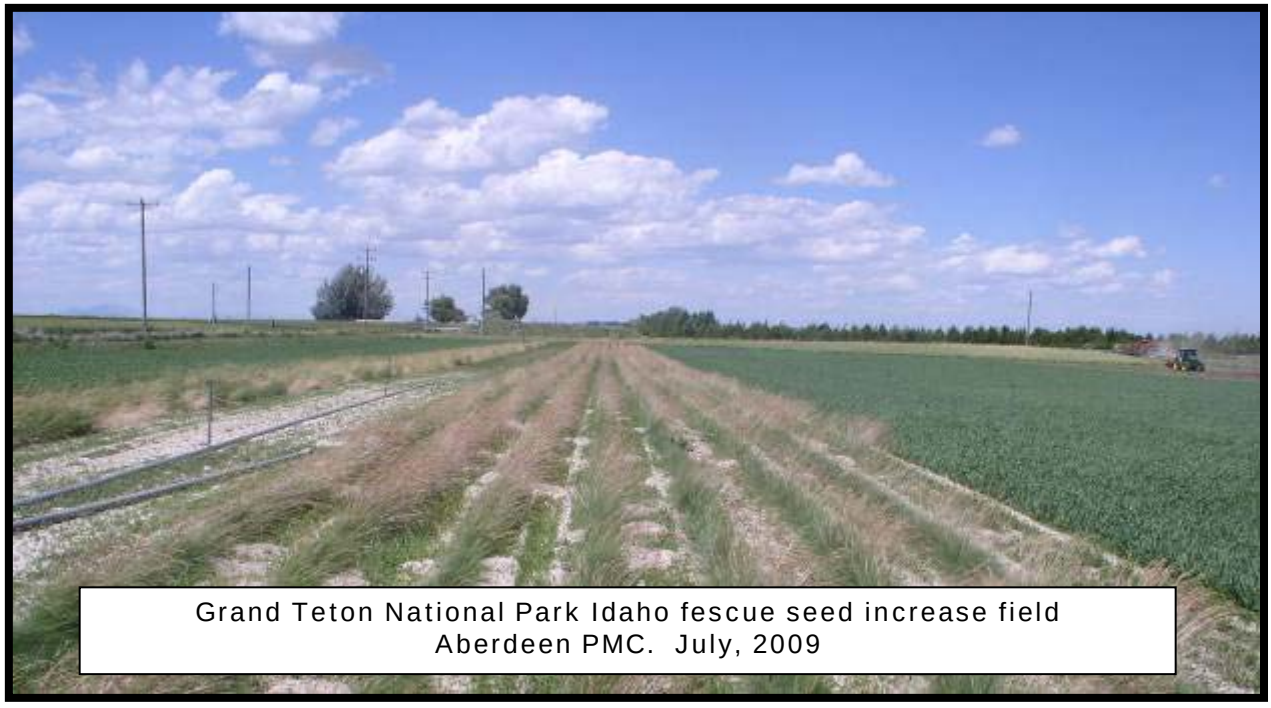
Seed samples from each lot were submitted to the Idaho State Seed Laboratory for purity and viability testing (results pending).

DIGITAL PHOTOS

Grand Teton National Park Bluebunch wheatgrass seed increase field
Aberdeen PMC. April, 2009

Grand Teton National Park Idaho fescue seed increase field
Aberdeen PMC. April, 2009

Grand Teton National Park Bluebunch wheatgrass seed increase field
Aberdeen PMC. July, 2009



Grand Teton National Park Idaho fescue seed increase field
Aberdeen PMC. July, 2009

YELLOWSTONE NATIONAL PARK – WETLAND PLANT PROPAGATION

FY2009 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) entered into an interagency agreement with the National Park Service (NPS), Yellowstone National Park (YNP) to propagate and deliver approximately 35,000 wetland plants in 10 cubic inch conetainers. 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*. Seed for propagation was provided from YNP collections stored at the Bridger, Montana PMC.

ACCOMPLISHMENTS – Due to delays in road construction, the number of plants requested was lowered to 5000 for the first delivery of plants in 2009. The following table outlines the species, greenhouse planting date, survival and final numbers delivered to YNP:

Species	# Requested	# Planted	Planting Date	# Alive	% Survival	# Delivered
Deschampsia caespitosa	1000	1568	5/27/09	1334	85	1334
Carex aquatilis	1000	392	6/22/09	227	58	227
Juncus mertensianus [1]	2000	2352	5/26/09	2300	98	1026
Carex utriculata	1000	1568	6/23/09	1456	93	1456
Carex rostrata [2]		1176	6/23/09	468	40	468
Total	5000			5785		4511

[1] Species identity is questionable.
[2] *Carex rostrata* was substituted for *Carex aquatilis* because of lack of seed to propagate desired amounts.

1,274 Juncus plants are being held over at the PMC for delivery in the spring of 2010.

TECHNOLOGY DEVELOPMENT – *Deschampsia caeaspitosa* was direct seeded into conetainers with no pre-treatment of the seed. The *Juncus* and *Carex* seed was stratified in a "sphagnum moss tea" under a constant temperature of 5º C for 14 days and 40 days respectively prior to planting. All seed was surface planted, covered with a thin layer of perlite, and pressed to maximize seed to soil contact. Irrigation was by overhead spray with water applied 3 minutes every hour from 8 am to 6 pm daily with a weekly application of 45 minutes to help flush any salt buildup out of the conetainers. Supplemental lighting was provided from 8 pm to 8 am each day. Plants were fertilized with liquid Miracle Grow® once weekly from July 24 – September 11. Heating temperature in the greenhouse was 80º F and cooling temperature was 100º F. Greenhouse heating temperature was lowered to 40º F approximately 4 weeks before delivery (October 7) to allow the plants to harden for field transplant.

DIGITAL PHOTOS

Carex aquatilis August, 2009

Carex utriculata August, 2009

Deschampsia caespitosa August, 2009

Carex rostrata August, 2009

Juncus mertensianus August, 2009

YNP plants in Aberdeen PMC Greenhouse July, 2009.

YELLOWSTONE NATIONAL PARK – GRASS SEED PRODUCTION

FY2009 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 produce seed of Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and needleandthread (*Hesperostipa comata* ssp. *comata*) for use on restoration sites at YNP. Seed will be harvested from these fields in 2010 and 2011 with possible extension to 2012.

ACCOMPLISHMENTS – The needleandthread and bluebunch wheatgrass fields were planted on June 9, 2009 and the Sandberg bluegrass field was planted on June 26, 2009. The seeding rate to plant these seed production fields were 4.3, 4.5 and 2.5 pounds respectively. The late planting of Sandberg bluegrass was due to heavy rains during the month of June which prevented earlier planting.

Sandberg bluegrass was planted in field 2E at the PMC Home Farm and the bluebunch wheatgrass and needleandthread were planted in field 410E at the University of Idaho Brewington Farm. Each field is approximately 1 acre.

Soils at the PMC Home Farm are Declo silt loam with pH of 7.4 to 8.4. Soils at the Brewington Farm are classified as Declo loam but these soils have a high percentage of sand.

Average annual precipitation is 9.39 inches and seed fields are sprinkler irrigated to supplement natural precipitation to approximate 16 to 24 inches total annual precipitation.

Standard cultural practices for stand establishment for seed production were used and weeds were controlled as needed during the growing season. Establishment of the seed production fields are rated fair to good, considering that the stock seed is from wildland collections with no history of performance.

DIGITAL PHOTOS

Yellowstone National Park bluebunch wheatgrass seed increase field
Aberdeen PMC – September, 2009

Yellowstone National Park needleandthread seed increase field
Aberdeen PMC - September, 2009

Yellowstone National Park Sandberg bluegrass seed increase field
Aberdeen PMC - September, 2009

Native Buckwheat Initial Evaluation Planting

2010 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

Sulphurflower buckwheat (*Eriogonum umbellatum*) (left) and whorled buckwheat (*E. heracleoides*) (right). Photos by Derek Tilley.

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. Buckwheat species have been identified as top priority half-shrub species which increases insect populations that are critical for sage grouse chick survival. Buckwheat species are also utilized in the xeriscaping market and have potential for roadside beautification and diversification projects. The goal of this study is to identify one or more superior sulphurflower (*Eriogonum umbellatum*) and/or whorled (*E. heracleoides*) buckwheat accessions adapted for use in the Aberdeen PMC service area.

Materials and Methods

The Aberdeen, Idaho Plant Materials Center (IDPMC) assembled 39 collections of buckwheat, *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

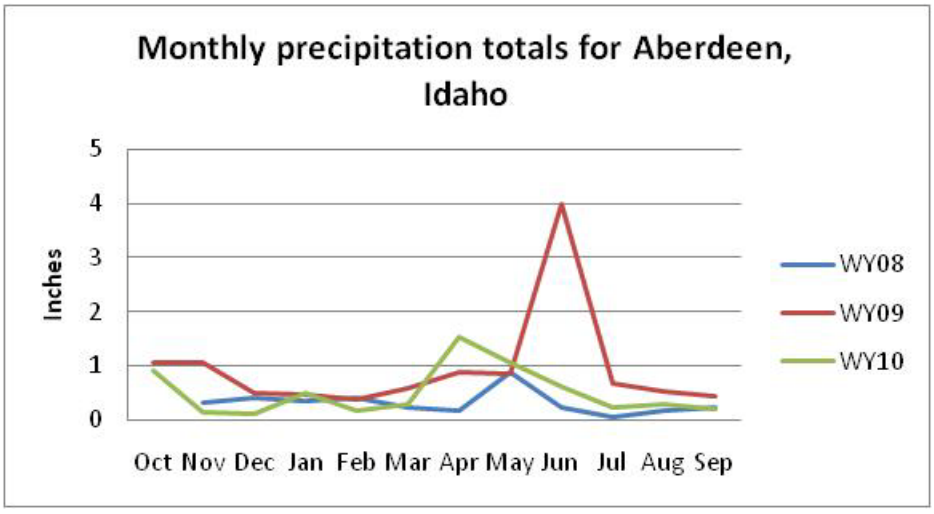
National Monument and Preserve (USDI - NPS), Bridger Teton National Forest (USDA - FS), Rocky Mountain Research Station (USDA - FS), Western Regional Plant Introduction Station and one private seed company (Comstock Seed, Gardnerville, Nevada). Of the 39 accessions, 21 were included in the 2007 IEP based on the quality and quantity of the seed provided. These included 16 accessions of whorled buckwheat and five accessions of sulphurflower buckwheat. All collections were cleaned with an air screen cleaner to approximately 90% purity, but seed purity and viability were not assessed prior to planting

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.

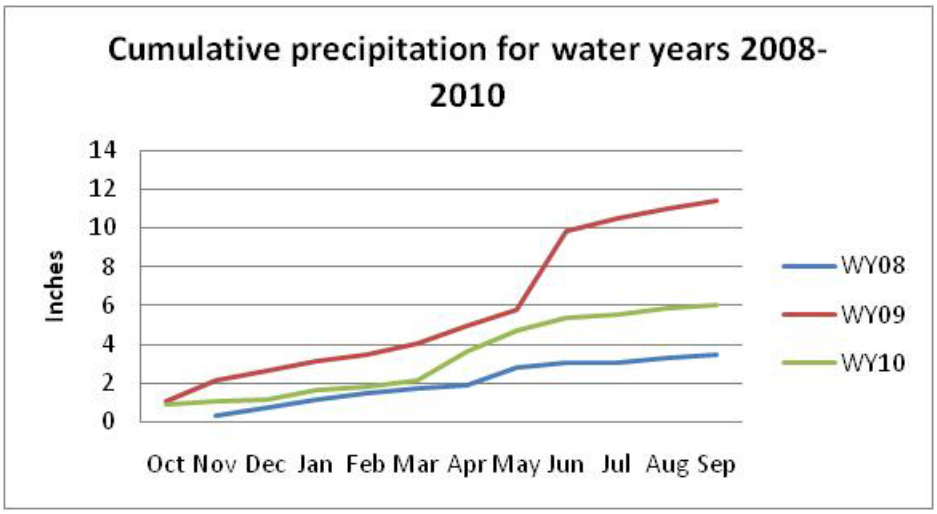
The study was designed as a randomized complete block in a single row of six foot wide weed barrier fabric in field 12 at the PMC Home Farm. The study included four replications beginning with the first replication on the west end of the field. Holes were burned into the fabric using an oxy-propane torch 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 study 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. No additional water was applied following emergence.

Precipitation for water year 2008 was lower than average, with Aberdeen receiving only 3.49 inches for the year (USDI-BOR, 2010). Little moisture was received during the establishment phase from April to June, followed by an extremely dry summer. 2009 had higher than average precipitation thanks to an abnormal 3.82 inches of rain during the month of June for a total of 11.45 inches during the water year. 2010 was again lower than average with 6.06 inches of precipitation received during the water year.



Monthly precipitation totals for Aberdeen, Idaho for water years 2008 through 2010.



Cumulative precipitation amounts for Aberdeen, Idaho for water years 2008 through 2010.

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. In 2010 the plots were evaluated on June 15 for percent stand, and again on June 23 for vigor, height, and width. Seed harvests were made by hand from June 15 through August 16. Seed was cleaned with an air screen cleaner, and then weighed to extrapolate lb/acre values. By 2010, plots of several accessions had zero plants. Data were not analyzed in those cases where plants were absent in 3 or more replications, and those accessions were removed from the evaluation. In 2010, none of the accessions identified as sulphurflower buckwheat had persisted with enough plants to merit evaluation, so only evaluations of whorled buckwheat accessions are reported.

Data were analyzed with Statistix 8.2 software using an Analysis of Variance to determine significance (α=0.05), and a Tukey's test or LSD test was used to separate means when significance was detected. Plant diameters were not tested for significance in 2008.

Results

At the time of the first evaluation in 2008, no significant differences were detected between stand means for either species (tables 1 and 2). 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 buckwheat accessions 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 in 2009 for all sulphurflower buckwheat accessions. The best vigor rating belonged to accession 9076549 (6.0), and the top average flower producer was accession 9076550 with 6.3.

Table 1. Sulphurflower buckwheat evaluations for 2008 and 2009.

	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 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 for 2008 and 2009.

	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
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

In 2010 there were not enough plants of sulphurflower buckwheat to evaluate. Whorled buckwheat stands generally stayed near the same level as 2009, but those accessions missing plants in 3 or more replications were discontinued from evaluation (accessions 9076532, 9076558, 9076529, 9076547, 9076539, and 9076555). Percent stand rankings in 2010 were the same as those from 2009. The best stand being achieved by accession 9076543 with 45.8% (table 3). Accession 9076543 also tied with accession 9076546 for the best vigor rating (2.25). Accession 9076543 had the largest plants in the evaluation with an average height of 46.36 cm and average plant width of 49.53 cm. However, accession 9076543 had poor seed yields averaging only 36 lbs/acre. Best seed yields came from accessions 9076546 and 9076553 with averages of 113 and 110 lbs/acre. Seed yields varied greatly between replications, however, and no significant differences could be detected between accessions.

Table 3. ERHE 2010

	Jun 15, 2010		Jun 23, 2010		
Accession No.	Stand	Vigor	Height	Width	Seed yield[1]
	%	(1-9)	cm	cm	Lb/ac
9076543	45.8 a	2.25 a	46.36 a	49.53 a	36
9076540	37.5 a-b	5.00 b-d	29.21 b-c	32.39 b	17
9076538	29.0 a-d	5.00 b-d	39.28 a-b	37.71 a-b	59
9076536	25.0 a-e	4.22 a-d	36.45 a-c	40.24 a-b	34
9076561	33.3 a-c	6.00 c-d	25.40 c	32.39 b	6
9076546	33.5 a-c	2.25 a	42.55 a	38.10 a-b	113
9076553	29.0 a-d	3.25 a-b	42.55 a	40.01 a-b	110
9076548	21.0 b-f	2.67 a	41.82 a	39.40 a-b	15
9076533	21.0 b-f	7.00 d	28.58 b-c	28.58 b	3
9076542	29.25 a-d	3.00 a-b	44.77 a	46.36 a	65
9076532	NA	NA	NA	NA	NA
9076558	NA	NA	NA	NA	NA
9076529	NA	NA	NA	NA	NA
9076547	NA	NA	NA	NA	NA
9076539	NA	NA	NA	NA	NA
9076555	NA	NA	NA	NA	NA
Critical value (0.05)=	Varies	Varies	Varies	Varies	NA

[1] No significant difference

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, 2009, it would seem that the plots received sufficient, if not too much moisture.

In 2009, whorled buckwheat accession 9076543 appeared 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. In 2010, 9076543 had the best stand, highest vigor/attractiveness, best height and width. However, based on seed yield data obtained in 2010, this accession may not be worth consideration for release.

Based on the data from three years of evaluations, the top accessions worth considering for release would be 9076546 and 9076553. Despite poor establishment numbers, the plants of these accessions performed relatively well, and were excellent seed producers. It may be possible to improve establishment percentages with better pre-planting seed processing. Having better information regarding seed purity and viability might increase establishment to acceptable levels.

Accession 9076546 came from the Caribou National Forest in Caribou County, Idaho on Trail Creek Road, approximately 6 miles northeast of Soda Springs, Idaho. The site is an open field with mountain big sagebrush, Sandberg bluegrass, and Thurber's needlegrass at approximately 7,000 feet elevation.

Accession 9076553 comes from extreme northeast Madison County, Idaho on the south side of the Teton River near Linderman Dam at approximately 5,600 ft elevation.

Evaluations will continue through 2011. Additional seed collections of promising accessions will also be made in 2011 from their original stands for potential seed increase plantings.

References

Bureau of Reclamation. 2009. Agrimet weather data. [Online] accessed Oct. 27, 2010 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)

Douglas' Dustymaiden Initial Evaluation Planting

Progress Report, 2010
Study Number: IDPMC-P-0901-RA
Derek Tilley, Range Scientist
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 for use in revegetation efforts throughout western North America. Native forbs are important for increasing biodiversity, improving wildlife habitat and providing food for numerous birds and mammals. Douglas' dustymaiden (*Chaenactis douglasii*) (Hook.) Hook. & Arn. has been identified as a forb that may be suitable for use in rangeland reclamation and restoration in the Intermountain West. Seed is not readily available commercially, and there are no officially released accessions of this species. The goal of this trial is to identify one or more superior Douglas' dustymaiden accessions adapted for use in the Aberdeen Plant Materials Center service area.

Dustymaiden is a biennial, or short-lived perennial forb, developing from a basal rosette of grayish multi-lobed leaves. Flowering stems generally reach 30 to 60 cm (8 to 25 in) tall and are topped with white to pinkish composite flowers. The fruit is a golden to black achene, approximately 8 mm (0.3 in) long with 10 to 16 membranous pappus scales (Welsh et al. 2003). This species is highly diverse morphologically and has been treated by taxonomists as a single species, or as up to ten different species with six varieties. The PLANTS database currently recognizes one species with two varieties, *douglasii* and *alpina* (USDA, 2009).

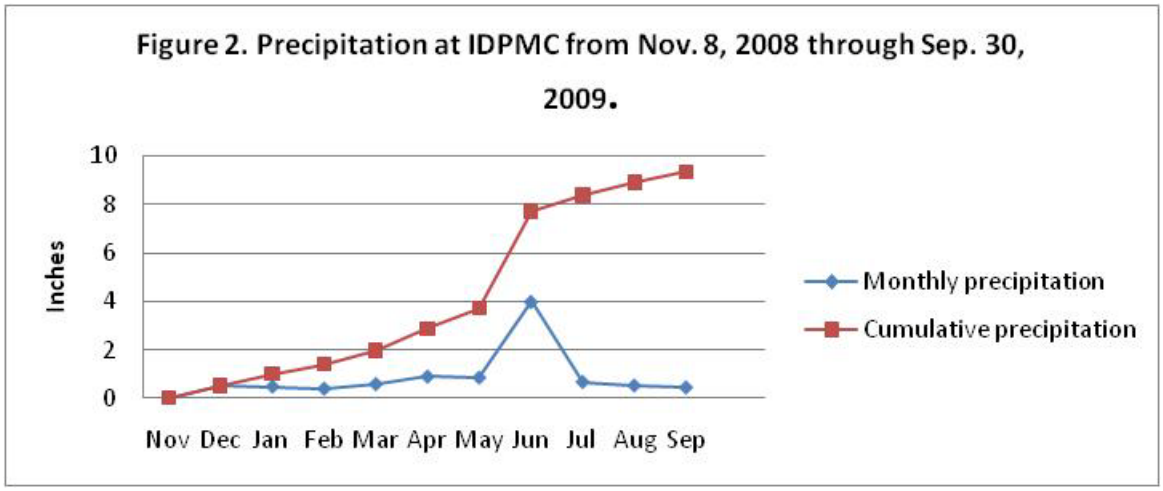
Douglas' dustymaiden is adapted to medium to coarse textured soils with a pH of 4.2 to 8.0 (Borden and Black, 2005), and a minimum 10 inch (25 cm) rooting depth (USDA-NRCS, 2009). Dustymaiden occurs throughout western North America at elevations near sea level to 3,000 m (10,000 ft), from British Columbia to Arizona, ranging as far east as South Dakota. The species can be found in a variety of plant communities in the Intermountain West including shadscale, sagebrush, pinyon-juniper, mountain brush and pine-fir forests in areas receiving 25 to 150 cm (10 to 60 in) annual precipitation (USDA, 2009). Douglas' dustymaiden is also a common colonizer of waste rock surfaces and may be useful in reclamation programs in the semiarid Intermountain West (Borden and Black, 2005). Dustymaiden appears to compete well against invasive knapweed species (*Centaurea* spp.) which are known to use an alelopathic chemical called (±)-catechin to inhibit germination and root development of competing or adjacent plants (Perry et al., 2005). Observations of Douglas' dustymaiden in association with knapweed species may suggest a resistance to these chemicals.

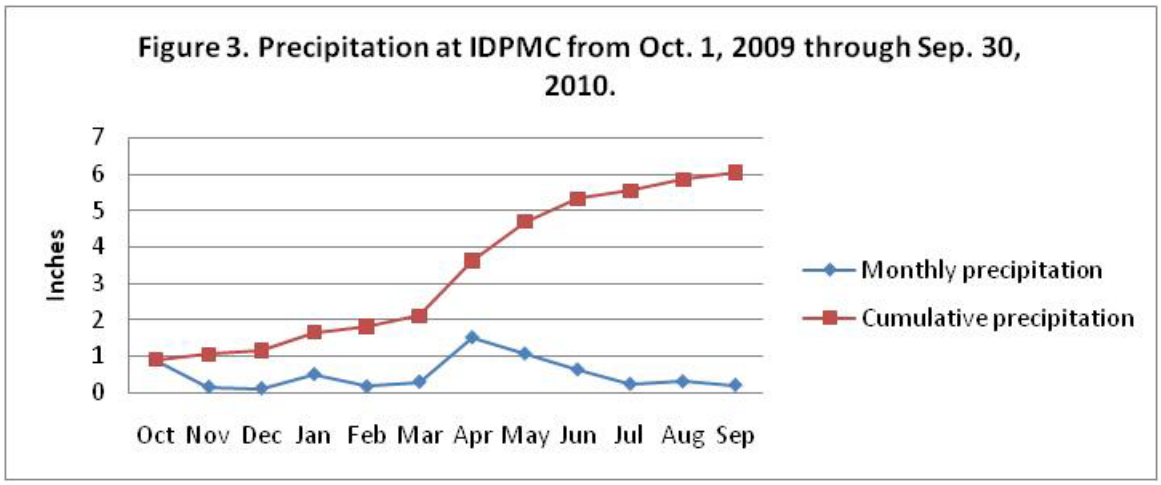
Materials and methods

Seed collection took place during the 2007 and 2008 growing seasons; seed is ripe in July through August. A total of 25 collections were made, of which 15 were selected for inclusion in the trial. Collection locations were throughout the Intermountain West and represent populations found in Major Land Resource Areas B10A, B11, D25, D28A and E47 (USDA, 2006) (see appendix 1 and 2 for collection location information). The best method found to collect wildland seed with little additional vegetative material was by bending the top of the plant into a bag and vigorously shaking the ripe seed off. Following collection, seed was stored in open collection sacks to dry prior to processing. Seed lots were then cleaned using an air-screen cleaner and placed into storage at 10° C (50º F) until planting.

The trial was conducted at the PMC Home Farm 2 miles north of Aberdeen, ID. Soil is a Declo silt-loam with a pH of 8.4. Weed-barrier fabric was laid over a well-prepared bed to reduce weed competition. Each plot consisted of three rows of four, three inch diameter holes (12 total) with 9 inch hole spacing. The plots were laid out linearly along the fabric in four blocks for replication. The trial was seeded on November 8, 2008. Each hole was seeded with a target of 12 to 25 seeds using a "Penstemon Popper" seeder, a 3 inch diameter tube with a spur at the bottom. The spur is used to roughen the soil, then seed is dropped through the tube into the roughened area and the soil is then compacted by foot.

Weather during the first year of establishment and evaluation (2009) was typical for southeastern Idaho with high temperatures averaging near 90º F in the summer and dropping into the teens during winter months with occasional dips below zero (Bureau of Reclamation, 2010). Precipitation for the year was above average (figure 2). Total accumulated precipitation received was 11.45 inches including an abnormal 3.82 inches of rain in June. Mean annual precipitation for the site is 9.39 inches (Bureau of Reclamation, 2010). Aberdeen received 6.06 inches of precipitation during water year 2010 (figure 3). The plots did not receive any supplemental irrigation or fertilization either year.





On July 9, 2009 the plots were evaluated for percent establishment, average plant height, plant vigor, and flower production. Establishment was recorded as the number of holes per plot containing plants divided by 12 holes. 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. On August 6, an estimated seed yield per plot was recorded using the same 1 to 9 scale. Also on August 6, seed collections were made from the top seed producing plot in each replication to be used to develop seed cleaning protocols. All data were analyzed with a one-way analysis of variance to determine significance with an α of 0.05. In cases where significance was found, a Tukey's multiple comparison was used to separate means.

Plots were evaluated in 2010 on March 8, and May 10 for percent stand, and on June 21 for height and vigor. On June 14, the plots were evaluated for percent flowering. Percent flowering was then plotted against the latitude of the original population site to create a scatter plot graph to show phenology from different populations. Means from the 2010 data were separated using a least significant difference (LSD) test.

Results

Establishment rates were good for all accessions (table 1). Of the fifteen accessions, only one (9076643) had an establishment rating below 80% (accession 9076643 with 66% establishment). Despite lower germination and establishment, accession 9076643 had the tallest plants recorded in 2009 with a mean height of 46 cm and the highest rated flower production (2.8). Accession 9076643 also tied for best vigor and seed yield ratings (3).

Figure 4. Dustymaiden growing in weed barrier fabric. Photo taken Aug. 2009. Photo by Loren St. John.

Table 1. 2009 evaluation of Douglas' dusty maiden.

		Jul 9			Aug 6
Accession	Establishment	Height	Vigor	Flower prod.	Seed yield
	----%----	---cm---	----------(1-9)----------		
9076566	98 a	42 a-b	3[a]	3.8 a-c	5
9076572	98 a	33 a-d	3	4.0 a-d	4
9076636	96 a	33 a-d	3	6.0 a-d	3
9076575	96 a	42 a-b	3	3.8 a-c	5
9076635	96 a	40 a-c	3	4.5 a-d	3
9076656	96 a	37 a-d	3	3.3 a-b	5
9076579	92 a	35 a-d	3	4.5 a-d	5
9076634	91 a	27 c-d	4	7.5 c-d	5
9076564	89 a-b	42 a-b	3	5.0 a-d	4
9076665	89 ab	36 a-d	4	4.0 a-d	4
9076626	87 ab	25 d	4	8.0 d	5
9076601	87 ab	29 b-d	4	7.3 b-d	5
9076577	85 ab	36 a-d	3	4.8 a-d	3
9076614	83 ab	36 a-d	4	4.5 a-d	4
9076643	66 b	46 a	3	2.8 a	3
P=	0.01	0.00	0.28	0.00	0.31
Critical value (0.05)=	24	14	NA	4.0	NA

[a] Vigor, flower production and seed yield for each plot were assigned a visual rating of 1-9 with 1 being best and 9 being worst or dead.

Most accessions in the trial had good recovery from dormancy going into the 2010 growing season according to the March evaluation (table 2). Those that didn't come back with good stands, accession 9076665 for example, may have been less adapted to conditions in Aberdeen, or they came from populations of predominately annual plants. Most stands continued to decline through the May 2010 evaluation; however there were several accessions that maintained excellent stands from 2009 to 2010.

Table 2. 2010 evaluation of Douglas' dusty maiden.

Accession	Mar 8, 2010 Stand	May 10, 2010 Stand	June 14, 2010 % Flower	Jun 21, 2010 Height	Jun 21, 2010 Vigor
	%	%		---cm---	(1-9)
9076566	85.5 a-c	83.3 a	1.25 d	42.5 a-b	3.50 a-c
9076572	60.3 c-f	43.8 c-g	1.77 d	35.2 c-d	6.50 d-f
9076636	89.5 a-b	72.9 a-c	32.50 c	38.7 b-d	2.25 a
9076575	91.8 a	85.4 a	3.00 d	48.9 a	3.00 a-b
9076635	83.5 a-c	77.1 a-b	68.75 a	36.8 b-d	2.50 a-b
9076656	64.5 b-f	50.0 b-g	1.25 d	36.2 b-d	6.00 c-e
9076579	56.3 d-f	41.7 e-g	0.24 d	27.1 e	8.00 e-f
9076634	89.8 a-b	70.9 a-d	50.00 b	37.5 b-d	3.00 a-b
9076564	54.3 d-f	25.0 g	3.44 d	31.8 d-e	7.00 d-f
9076665	27.0 g	22.9 g	8.57 d	23.9 e	9.00 f
9076626	77.3 a-d	66.7 a-e	42.50 b-c	34.9 c-d	5.00 b-d
9076601	50.0 e-g	39.6 e-g	13.75 d	36.2 b-d	7.00 d-f
9076577	74.8 a-e	64.6 a-f	1.25 d	48.9 a	2.00 a
9076614	62.5 c-f	47.9 c-g	11.90 d	38.8 b-c	6.00 c-e
9076643	41.5 f-g	37.5 f-g	7.04 d	37.6 b-d	6.00 c-e
P=					
LSD (0.05)=	25.8	28.3	varies	varies	2.59

Height and vigor measurements taken in mid June showed a broad range of growth and appearance between accessions. Accession 9076577 tied with accession 9076575 for tallest plants, and 9076577 likewise had the best vigor rating.

By comparing flowering dates with the latitude of the original collection site for each population, it was determined that northern collections generally flower later in the season than most of the collections from southern latitudes (figure 5). A group of more southerly populations (accessions 635, 634, 626 and 636, shown in green) had an average of 48.4% blooming at June 14, 2010, while three promising northern collections (accessions 575, 577 and 566 shown in red) had an average of 1.8 % bloom at the same date.

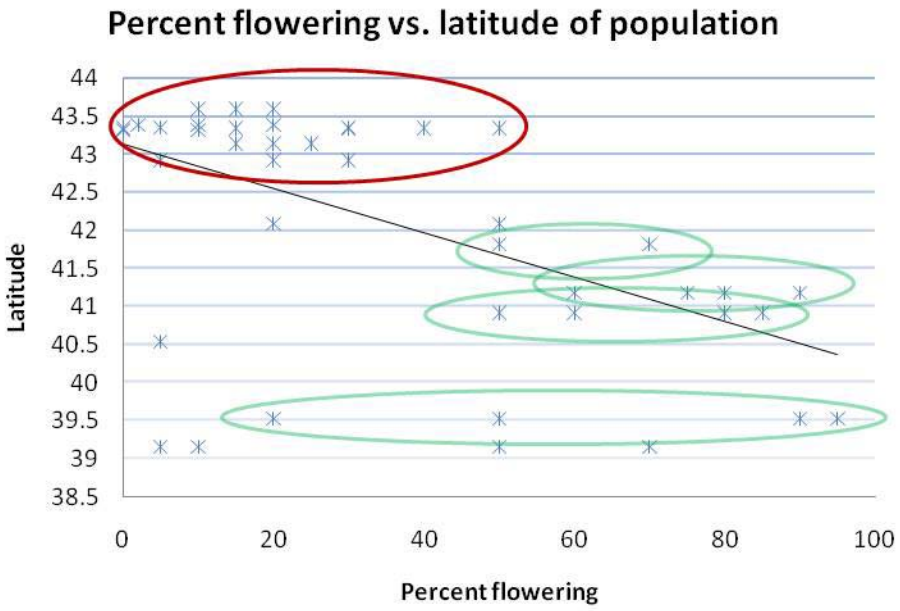


Figure 5. Scatterplot showing percent flowering (x axis) versus latitude of original population (y axis) evaluated on June 14, 2010. Northerly populations (red) had just begun to flower, while most southerly populations (green) were well into their bloom period.

Seed processing

To assess Douglas' dustymaiden's potential for commercial seed production, several methods of seed processing were evaluated. Various small-lot seed cleaning machines were tested including a brush dehuller, debearder, gravity table and airscreen cleaner. We found it difficult to remove the membranous pappus from the achene, and complete removal may be unobtainable. This may become problematic when attempting to seed through a range drill or other seeding equipment, especially without the aid of a dilutent such as rice hulls. Good results came from hammer-milling the seed with a sizeable amount of plant material (figure 6). The inert matter helps in rubbing the pappus from the achenes. Using the hammer-mill or debearder without inert material did not provide enough weight or friction for successful achene removal. Some damage occurred to seed during milling, but germination rates of milled seed do not appear to differ significantly from un-milled seed.

An alternate method used by USDA Forest Service at the Bend, OR Seed Extractory is to use a Westrup Model LA-H laboratory brush machine with a #40 mantel at a speed of 3 to dislodge seed from the flower heads and remove the pappus. The gate is left completely open to allow the seed to move quickly through the machine and avoid damaging the achenes. This is followed by air-screening (Barner 2009).

In 2010, the plots were harvested using a vacuum type harvester (Bair and Tilley 2010). Using this machine, it is possible to collect seed of high enough quality that additional processing may not be necessary. Seed harvested in this manner did have an intact pappus and fair to moderate purity; however, when mixed with a dilutent such as rice hulls, the seed flows well through grain and no-till drills and other seeding equipment.

Figure 6. Clockwise from top left: unprocessed seed shaken directly from plant to avoid excess chaff; unprocessed seed; seed processed with a hammer-mill; a cleaned lot of seed. Photo by Derek Tilley.

Pollinators

Douglas' dustymaiden plants provide pollen and nectar to a variety of insect visitors. Insect surveys at the Aberdeen Plant Materials Center showed visitation by: sweat bees (*Halictus ligatus*), green sweat bees (*Agapostemon* sp.), Hunt's bumblebees (*Bombus huntii*), and mason bees (*Osmia* sp.), and *Micranthophora flexipes* as well as European honey bees (*Apis mellifera*) (figure 7).

Figure 7 . Bee pollinators of Douglas' dustymaiden. Left to right: honey bee (*Apis melifera*), green sweat bee (*Agapostemon* sp.), and sweat bee (*Halictus ligatus*). Photos by Derek Tilley.

Managing seed production fields for native bee habitat may improve seed yield. In the spring of 2010, PMC staff attempted to establish a hive of *Osmia californica* near the dustymaiden planting. Bee blocks and bee larvae provided by Jim Cane of the ARS Bee

Lab in Logan, Utah were placed next to the planting; however the colony failed to establish, possibly due to predation from magpies as young bees were emerging from their overwintering tubes.

Discussion

All accessions performed well the first year of evaluation. Data from the first year of evaluation indicate that Douglas' dustymaiden is easily established utilizing weed barrier fabric under field conditions for seed production.

On March 8, 2010 plants from all plots were green when winter snows melted. Douglas' dustymaiden appears to come out of dormancy very early in the spring, which may enable the plants to better compete against weeds such as cheatgrass, medusahead and knapweed species. The second year of evaluation showed continuing promise for Douglas' dustymaiden. Many accessions persisted into the second year, and had plots of excellent vigor and seed production. The pH range of the species can probably be safely extended to 8.5. Plants grown at Aberdeen showed no signs of negative effects from the basic soils at the study site.

Several factors are being considered with regard to release type. Mooring (1980), detected diploid, tetraploid and hexaploid (2n=12, 24 and 36) chromosome counts in Douglas' dustymaiden within the Aberdeen PMC service area. Diploids were more frequent at higher elevations and polyploids inhabited lower elevations or areas of Pleistocene or later disturbance. In our plots, we noticed a general trend towards shorter, earlier flowering plants from southerly latitudes and taller, later blooming plants from northern populations (figure 8). Considering the variability in chromosome counts and the significant morphological variability seen in our study, a multiple-origin polycross release might be an option for use throughout the service area. However, the variability observed in height and flowering date between accessions creates difficulty for seed production. For this reason, it was decided to concentrate our release efforts on the top performer of the northerly and southerly ecotypes.

The top performer of the northern types was accession 9076577, which originates in Boise County, Idaho near Arrow Rock and Lucky Peak Reservoirs, approximately 0.5 miles west of the dam on Forest Road 268. The site is a mountain big sagebrush/bitterbrush community in coarse granitic soils at 960 m (3150 ft) elevation. Accession 9076577 was the tallest accession in our evaluation with an average height of 48.9 cm in June, 2010, and had excellent vigor in the second year (2.00).

Figure 8. Two tall-late flowering accession plots flanking a short-early flowering accession. Photo by Derek Tilley.

Two accessions from the southern range performed very well, accession 9076636 from Cache County, Utah, and accession 9076635 from Morgan County, Utah. Accession 9076636 is located in Logan Canyon on Utah Highway 89 at 5,600 ft elevation. The site is found on an open road cut in a Douglas fir/Rocky Mountain Maple community in association with Idaho fescue, bluebunch wheatgrass and arrowleaf balsamroot. Accession 9076635 is located in a bitterbrush/rabbitbrush, mountain big sagebrush community at Lost Creek Reservoir on the west side of the dam. The population occurs on coarse soils at 6,000 ft elevation.

In the fall of 2010, the sites were revisited to make additional seed collections for increase plantings at the PMC. However, we were unable to find enough seed at the Morgan County site for collection. The PMC will proceed with increase plantings for development of accessions 9076636 and 9076577. These plantings will take place in November 2010 at the PMC Home Farm.

In 2011, the plots will again be evaluated for percent stand and seed production to determine if dustymaiden will persist into a third growing season to allow seed harvest, or if production fields will have to be replanted after two full growing seasons. We will also harvest seed from the two seed increase plantings in 2011 in preparation for release.

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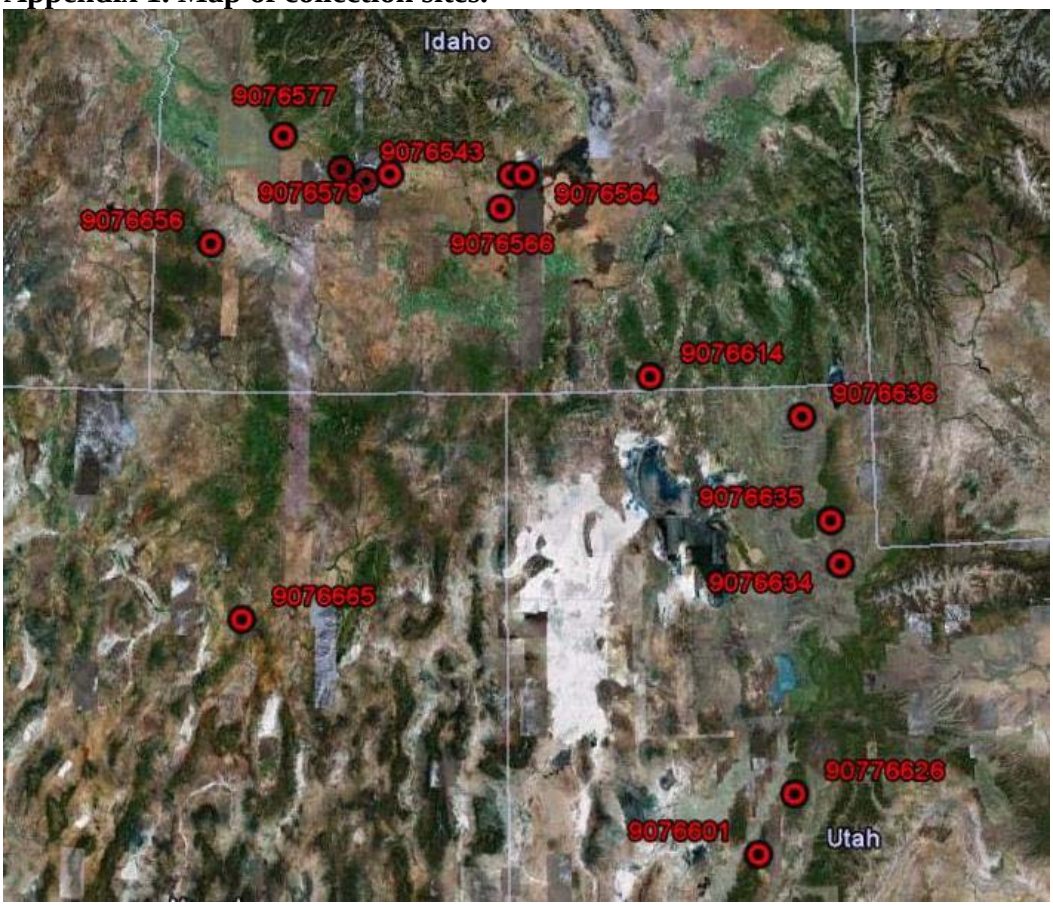
Appendix 1. Map of collection sites.



Appendix 2. Collection information.

Accession	Date	State	County	Coordinates	Elev. (ft)	Location description
9076564	8/21/2007	ID	Blaine	43.3441166, -113.860316	4860	Hwy 20, ca 5 mi NE of Carey, just E of mile post 210 @ gravel pile.
9076643	7/18/2008	ID	Blaine	43.34430, -113.97308	4900	Little Wood River in gravel pits between road and river.
9076577	8/21/2007	ID	Boise	43.60021, -115.9254	3150	Arrow Rock Res/Lucky Peak Lake, ca 0.5 mi W of dam on FR 268, slope below rd, 2.1 mi E of Forest Boundary sign.
9076579	8/21/2007	ID	Camas	43.3588, -115.0026	5255	Gate to Hill City Dump.
9076572	8/21/2007	ID	Elmore	43.318266, -115.207266	5500	8.4 mi W of Hill City N side of hwy 20 on S facing burm, 100 meters E of mile post 130.
9076575	8/21/2007	ID	Elmore	43.38925, -115.42213	--	W side of Anderson Ranch Res. S of Evans Crk on E facing slopes.
9076566	8/21/2007	ID	Lincoln	43.1418166, -114.063316	--	Hwy 93/26 ca 8 mi N of Richfield on W side of hwy, 200 meters S of Bear Track Williams public use area, Turnout just N of mile post 190.
9076656	7/18/2008	ID	Owyhee	42.92585, -116.52134	4800	Owyhee Mts, Triangle Rd from Oreana.
9076614	7/16/2008	ID	Power	42.09427, -112.83748	5100	Cow Canyon, burned PJ community.
9076636	7/18/2008	UT	Cache	41.82353, -111.60458	5600	Logan Canyon, Hwy 89, large road cut above river.
9076601	6/28/2008	UT	Millard	39.16003, -112.06482	5900	Hwy 50 S of Scipio in Valley Mts, E side of hwy in post burn site.
9076635	7/18/2008	UT	Morgan	41.18494, -111.40105	6000	Lost Creek Res, W side of dam above parking lot and restroom.
9076626	7/18/2008	UT	San Pete	39.52448, -111.76621	6400	Chicken Creek Canyon, E of Levan.
9076634	7/18/2008	UT	Summit	40.91962, -111.33685	5860	Chalk Creek Rd above Coalville on road cuts.
9076665	7/15/2008	NV	Elko	40.53826, -11613034	--	Near Palisade (collection by Scott Jensen).

Hoary Tansyaster Initial Evaluation

Progress Report, 2010
Study Number: IDPMC-P-0902-RA
Derek Tilley, PMC Agronomist
Loren St. John, PMC Team Leader
Natural Resources Conservation Service
Plant Materials Center
Aberdeen, Idaho

Introduction

Hoary tansyaster (*Machaeranthera canescens*) (Pursh) A. Gray is a native forb that may be suitable for use in rangeland restoration in the Intermountain West. There is increasing demand for releases of native forbs for use in revegetation efforts throughout western North America. Native forbs are important for increasing biodiversity, improving wildlife habitat and providing food for numerous birds and mammals. The goal of this trial is to identify one or more superior hoary tansyaster accessions adapted for use in the Aberdeen Plant Materials Center (IDPMC) service area.

Hoary tansyaster is a short-lived perennial forb with pale to dark purple flowers. Plants are 15 to 75 cm (6 to 30 in) tall with diffuse branching. Leaves are approximately 5 cm (2 in) long and about 6 mm (0.25 in) wide, oblong or lance shaped with entire to sharply toothed margin. Flower heads have many subtending bracts that reflex away from the flower at the tip. Flower heads and vegetation are very sticky and heavily scented. Bracts are white and membranous at the bottom and green at the tip. The pappus of the achene is dirty white and hair-like. There are approximately 1.3 million seeds/lb based on seed counts conducted by IDPMC.

Hoary tansyaster is common in plant communities from shadscale desert and Wyoming big sage sagebrush shrub communities on the valley floors to mountain big sagebrush, aspen and limber pine communities moving up-slope to higher elevations. In the Aberdeen PMC service area, plants can be readily found flowering in late summer at lower elevations in Wyoming big sagebrush communities and other desert shrub sites. Hoary tansyaster is very common in low seral degraded and disturbed sites and has been considered by some as a weedy species in meadows and rangelands (Whitson et al., 1996).

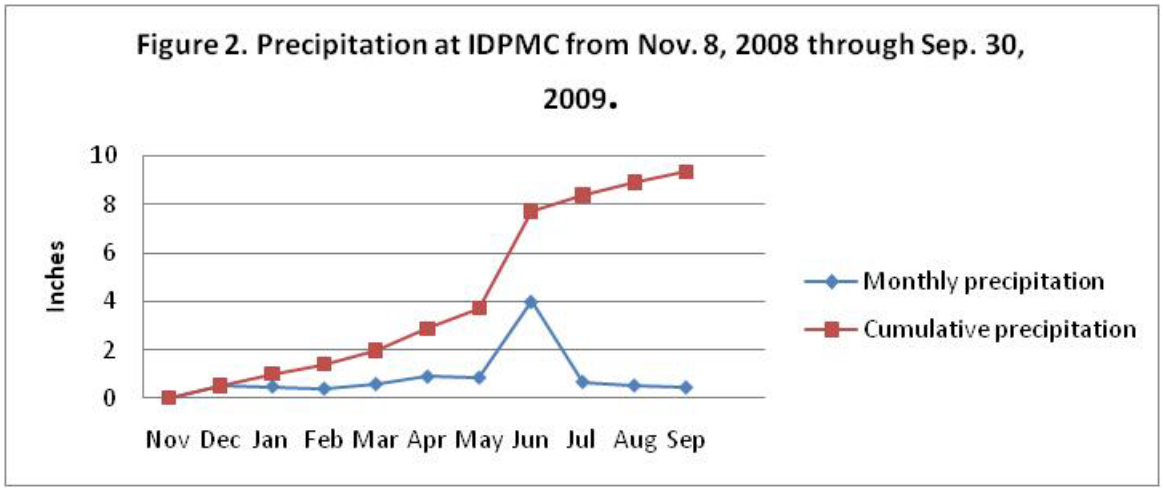
Materials and Methods

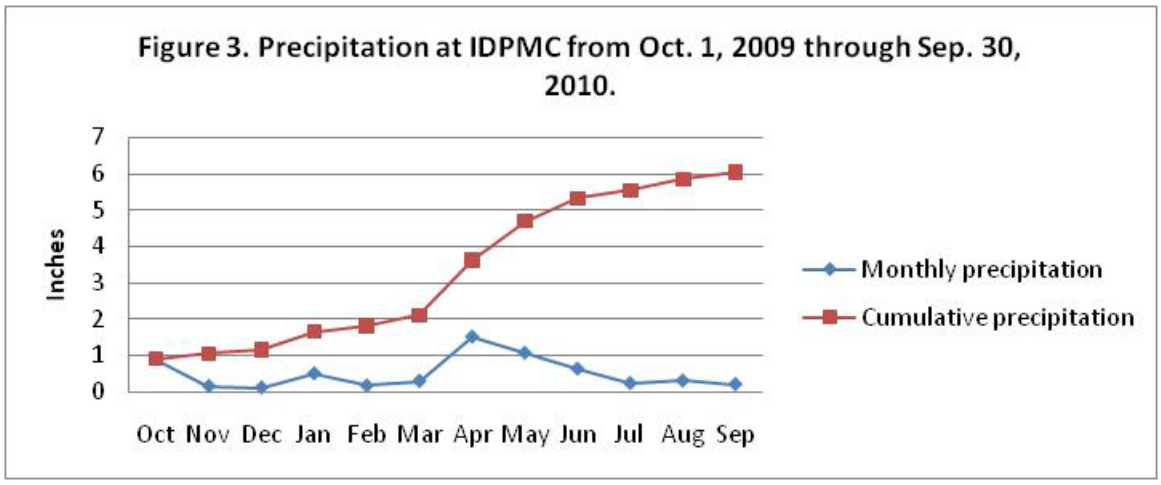
Seed collection was completed in August to October 2008. A total of 9 accessions were collected from moderate elevations ranging from 1,300 to 2,300 m (4,300 to 7,500 ft) elevations in eastern Idaho and northern Utah (see Appendix 1 and 2 for collection site information). Following collection, seed was stored in open collection sacks to dry prior to processing. Seed lots were cleaned using an air-screen cleaner and placed into storage at 50º F until planting.

The study was conducted at the PMC Home Farm 2 miles north of Aberdeen, ID. Weed-barrier fabric was laid over a well-prepared bed to reduce weed competition. Each plot

consisted of 3 rows of 4, 3 inch diameter holes (12 total) with 9 inch hole spacing. The plots were laid out linearly along the fabric in four blocks for replication. The study was seeded on November 8, 2008. Each hole was seeded with a target of 12 to 25 seeds using the “Penstemon Popper” seeder, a 3 inch diameter tube with a spur at the bottom. The spur is used to roughen the soil, then seed is dropped through the tube into the roughened area and the soil is then compacted by foot.

Weather during the first year of establishment and evaluation was typical for southeastern Idaho with high temperatures averaging near 90º F in the summer and dropping into the teens during winter months with occasional dips below zero (Bureau of Reclamation, 2010). Precipitation for the year was above average (figure 2). Total accumulated precipitation received was 11.45 inches including an abnormal 3.82 inches of rain in June. Mean annual precipitation for the site is 9.39 inches (Bureau of Reclamation, 2010). Aberdeen received 6.06 inches of precipitation during water year 2010 (figure 3). The plots did not receive any supplemental irrigation or fertilization either year.





On June 3, 2009 the plots were evaluated for percent establishment. Establishment was recorded as the number of holes per plot containing plants divided by 12. On October 16,

seed production estimates for each plot were assigned a visual rating of 1-9 with 1 being best and 9 being worst. Seed collection was made on October 16 from the three top seed producing plots in the trial to be used to develop seed cleaning protocols. In 2010 the plots were evaluated for percent stand on May 10. On August 16 the plots were evaluated for average plant height and plant vigor. Occasional wind storms caused the dispersal of seed from various plots at different times during the evaluation. Seed was collected as possible; however, no evaluation comparing the accessions for seed production could be made. All data were analyzed with a one-way analysis of variance to determine significance. When significance was detected, means were separated using a Tukey's test (2009evaluation) or LSD test (2010 evaluation).

Results

No significant differences were detected in plant establishment or estimated seed yields in 2009. The best average establishment came from accession 9076670 with 87%. The lowest germination percentage was recorded from the accession 9076666 with 41%. The highest estimated seed yields were recorded for accessions 9076669 and 9076661, both with an average rating of 2.

2009 evaluation of hoary tansyaster

Accession	State	County	Coll. date	Jun 3 Establishment	Oct 16 Seed yield
				----%----	(1-9)
9076670	ID	Fremont	9/24/08	87 [a]	3 [b]
9076669	ID	Butte	9/24/08	81	2
9076663	ID	Lincoln	10/1/08	79	4
9076662	ID	Lincoln	10/1/08	73	5
9076664	ID	Bingham	10/3/08	70	5
9076668	ID	Lincoln	9/24/08	64	3
9076661	ID	Lincoln	10/1/08	62	2
9076667	ID	Bingham	9/23/08	56	5
9076666	UT	Cache	8/26/08	41	3
P=				0.31	0.20

[a] No significant differences detected
[b] Seed yields were assigned a visual rating of 1-9 with 1 being best and 9 being worst.

In 2010, accession 9076670 continued to have the highest percent stand with 70%, significantly higher than any other accession in the trial. Accession 9076670 also had the highest vigor rating (2.0) and tallest plants (60.5 cm); however no significant difference could be detected for the vigor and height measurements.

2010 evaluation of hoary tansyaster

Accession	5/10/10 Stand	8/16/10 Vigor [a]	8/31/10 Height [a]
	%	(1-9)	cm
9076670	70 a	2.0	60.5
9076669	42 b	3.5	59.3
9076663	38 b	4.8	57.3
9076662	38 b	4.5	48.5
9076664	29 b	6.3	44.8
9076668	38 b	5.3	47.5
9076661	33 b	5.0	49.8
9076667	33 b	5.8	59.8
9076666	46 b	6.0	45.8
LSD (0.05)=	21	NA	NA

[a] No significant differences detected

Seed processing

Hoary tansyaster is a difficult species to clean. Seed is small with a flexible pappus that is not easily removed. Hammer-milling removes some of the pappus, but mostly results in creating a mat of pappus hairs, seed, and inert matter. The USDA Forest Service at the Bend, OR Seed Extractory uses a Westrup Model LA-H laboratory brush machine with a #40 mantel at a speed of 3 to dislodge seed from the flower heads and remove the pappus. The gate is left completely open to allow the seed to move quickly through the machine and avoid damaging the achenes. This is followed by air-screening (Barner 2009).

In 2009, seed harvests were made from accession 9076670 (rep 1) and 9076669 (reps 1 and 4) for use in seed cleaning evaluations. Seed yield data were not determined. In 2010 seed was harvested from the entire study using a vacuum harvester (Bair and Tilley 2010). The vacuum, or jet harvester, allowed multiple, non-destructive harvests to take place as seed matured. Seed was cleaned minimally by sifting collected materials over ½ inch hardware cloth to separate seed from stems and flower heads. From the 2 harvests, we collected a total of 2.3 lbs of cleaned seed. This equates to just over 200 lbs/acre. Using this method, it is possible to collect seed of high enough quality that additional processing may not be necessary. Seed processed in this manner will have an intact pappus and fair to moderate purity; however, when mixed with a dilutent such as rice hulls, the seed flows well through grain and no-till drills and other seeding equipment.

Pollinators

Hoary tansyaster plants provide pollen and nectar to a variety of insect visitors. Insect surveys at the Aberdeen Plant Materials Center showed visitation by sweat bees (*Halictus* sp), green sweat bees (*Agapostemon* sp.), and European honey bees (*Apis mellifera*). We also observed bee flies (*Bombilidae*) and cabbage white butterflies (*Pieris* sp.).

Insect visitors to hoary tansyaster at Aberdeen, Idaho included green sweat bees (*Agopostemon* sp.), bee flies (*Bombilidae*), and cabbage white butterflies (*Pieris* sp). Photos by Derek Tilley.

Insect pests

In mid-summer 2010 we observed moth caterpillars from the genus *Cucillia*. These were seen eating flower heads, but did not appear to do extensive damage to the plots or decrease seed production significantly.

***Cucillia* moth caterpillar feeding on hoary tansyaster. Photo by Derek Tilley.**

Discussion

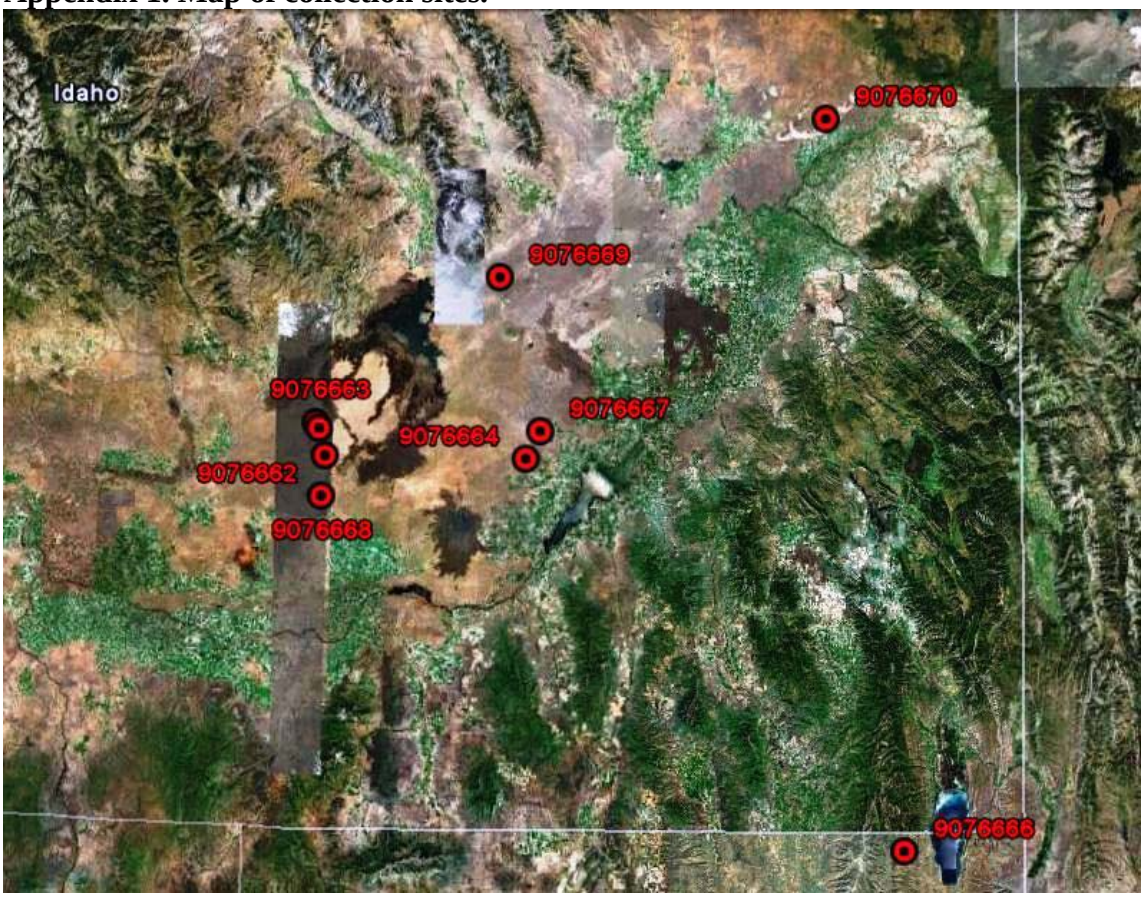
Hoary tansyaster accessions all performed well the first year of evaluations. Data from the first two years indicate that hoary tansyaster is easily propagated and maintained utilizing weed barrier fabric under field conditions for seed production. We observed numerous volunteers growing in and around the tansyaster plots going into the 2010 growing season. This is further indication of easy establishment.

Seed from adjacent plots are likely producing volunteers at this point of the evaluation, making it difficult to make detailed observations. The plots will be left intact for one more growing season, but evaluations by accessions will probably not be possible. The 2011 evaluation should, however, provide more insight into the stand persistence and seed production capabilities.

Currently accession 9076670 appears to be the front runner for release consideration. This accession had the best establishment and stands for both years, and had the best rated vigor in 2010. This accession also had the tallest plants in the study. Although we were not able to evaluate seed production in 2010 by accession due to wind storms, the 9076670 plots were observed to be excellent seed producers.

The population for 9076670 is located near the St. Anthony Sand Dunes in Fremont County, Idaho at 5,000 ft elevation. The site has sand soils and supports a bitterbrush, Indian ricegrass, rabbitbrush, scurfpea plant community. The location receives on average between 10 and 15 inches of mean annual precipitation. In the fall of 2010, the site was revisited to collect additional seed to use in a seed increase planting at IDPMC. This planting will be installed as a dormant-fall seeding in early November 2010.

Appendix 1. Map of collection sites.



Appendix 2. Collection information.

Accession	Date	State	County	Coordinates
9076661	10/1/08	ID	Lincoln	43 9' 1", -113 46' 49"
9076662	10/1/08	ID	Lincoln	43 3' 25", -113 44' 26"
9076663	10/1/08	ID	Lincoln	43 8' 3", -113 45' 56"
9076664	10/3/08	ID	Bingham	43 3' 25", -112 57' 20"
9076666	8/26/08	UT	Cache	41.95214, -111.49615
9076667	9/23/2008	ID	Bingham	43.13556, -112.90076
9076668	9/24/2008	ID	Lincoln	42.94173, -113.75234
9076669	9/24/2008	ID	Butte	43.57076, -113.06772
9076670	9/24/2008	ID	Fremont	44.02512, -111.79420

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Aberdeen Plant Materials Center
Grass Display Nursery
2010 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 a few grasses currently under testing and evaluation) of over 30 species suited for land reclamation, rangeland restoration or irrigated and dryland pasture plantings in the Aberdeen PMC service area. The display is divided into three sections according to species 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. A strip of 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 to Covar sheep fescue using a broadcast seeder. Plots are irrigated to enhance display.

The plots were evaluated on July 15, 2010 for stand rating and plant height. Stands were rated 1 best through 9 worst and accessions of the same species were rated against each other. Within the greater than 16 inch precipitation group, accession 9092261 big bluegrass had the best stand. The blue wildrye accessions which are short-lived species are starting to decline. Cache meadowbrome was greener than Regar. There was not much difference between the tall fescue accessions and BG24T perennial ryegrass was drying out much sooner than the other forage grasses.

Within the 12-16 inch precipitation group, Covar sheep fescue and Sherman big bluegrass had the best stand ratings. The tallest accession was Magnar basin wildrye. Bromar mountain brome was much greener than Garnet, and Mustang Altai wildrye was much greener than the other accessions within this group. Shoshone manystem wildrye was very chlorotic in appearance. San Luis slender wheatgrass which is a short-lived species is starting to decline. Arriba western wheatgrass had more seedheads than the other western wheatgrass accessions which are reproducing more by rhizome spread.

In the less than 12 inch precipitation group, Bozoisky II Russian wildrye, P-7 bluebunch wheatgrass, Whitmar beardless wheatgrass, Fairway crested wheatgrass, Vavilov II Siberian wheatgrass, and Bannock thickspike wheatgrass had the best stand ratings. The Russian wildrye plots were the tallest within this group. Bozoisky II had slightly more forage production than Bozoisky and Vavilov II had slightly more forage production than Vavilov. The short-lived bottlebrush squirreltail plots are starting to decline and the Sandberg bluegrass plots are struggling due to weed competition.

Aberdeen Plant Materials Center
2007 Grass Display Nursery
July 15, 2010 Evaluation

VARIETY	COMMON NAME	SCIENTIFIC NAME	STAND RATING	PLANT HEIGHT (IN.)
> 16 inches annual precipitation				
ELKTON	blue wildrye	*Elymus glaucus*	4	26
ARLINGTON	blue wildrye	*Elymus glaucus*	6	20
CACHE*	meadow brome	*Bromus biebersteinii*	4	30
REGAR*	meadow brome	*Bromus biebersteinii*	5	32
LINCOLN*	smooth brome	*Bromus inermis*	2	39
9092261	big bluegrass	*Poa ampla*	1	26
LATAR*	orchardgrass	*Dactylis glomerata*	4	30
POTOMAC*	orchardgrass	*Dactylis glomerata*	4	30
HIMAG*	tall fescue	*Festuca arundinacea*	3	30
ARKPLUS*	tall fescue	*Festuca arundinacea*	3	32
STF 43*	tall fescue	*Festuca arundinacea*	2	29
GARRISON*	creeping foxtail	*Alopecurus arundinaceus*	4	25
BG 24T*	perennial ryegrass	*Lolium perenne*	6	16
12 – 16 inches annual precipitation				
BROMAR	mountain brome	*Bromus marginatus*	2	30
GARNET	mountain brome	*Bromus marginatus*	4	35
LARGO*	tall wheatgrass	*Thinopyrum ponticum*	4	25
JOSE*	tall wheatgrass	*Thinopyrum ponticum*	4	29
ALKAR*	tall wheatgrass	*Thinopyrum ponticum*	2	30
MUSTANG*	Altai wildrye	*Leymus angustus*	2	37
SHOSHONE	manystem wildrye	*Leymus triticoides*	5	30
TRAILHEAD	basin wildrye	*Leymus cinereus*	3	40
MAGNAR	basin wildrye	*Leymus cinereus*	2	48
MANSKA*	pubescent wheatgrass	*Thinopyrum intermedium*	3	33
MANIFEST*	intermediate wheatgrass	*Thinopyrum intermedium*	3	33
RELIANT*	intermediate wheatgrass	*Thinopyrum intermedium*	2	33
RUSH*	intermediate wheatgrass	*Thinopyrum intermedium*	2	35
NEWHY*	RS- H hybrid wheatgrass	*Elymus hoffmanii*	2	35
PAIUTE*	orchardgrass	*Dactylis glomerata*	3	24
DURAR*	hard fescue	*Festuca trachyphylla*	2	22
BLACKSHEEP*	sheep fescue	*Festuca ovina*	3	22
COVAR*	sheep fescue	*Festuca ovina*	1	22
FIRST STRIKE	slender wheatgrass	*Elymus trachycaulus*	2	34
PRYOR	slender wheatgrass	*Elymus trachycaulus*	2	36
COPPERHEAD	slender wheatgrass	*Elymus trachycaulus*	4	25
SAN LUIS	slender wheatgrass	*Elymus trachycaulus*	5	25
SHERMAN	big bluegrass	*Poa ampla*	1	28
RECOVERY	western wheatgrass	*Pascopyrum smithii*	3	27
ARRIBA	western wheatgrass	*Pascopyrum smithii*	2	30
ROSANA	western wheatgrass	*Pascopyrum smithii*	3	28
< 12 inches annual precipitation				
BOZOISKY II*	Russian wildrye	*Psathrostachys juncea*	2	33
BOZOISKY *	Russian wildrye	*Psathrostachys juncea*	3	39
MANKOTA*	Russian wildrye	*Psathrostachys juncea*	3	35
SERDP	Snake River wheatgrass	*Elymus wawawaiensis*	3	20
SECAR	Snake River wheatgrass	*Elymus wawawaiensis*	3	20
GOLDAR	bluebunch wheatgrass	*Pseudoroegneria spicata*	3	24
P-7	bluebunch wheatgrass	*Pseudoroegneria spicata*	2	28
ANATONE	bluebunch wheatgrass	*Pseudoroegneria spicata*	3	20
WHITMAR	beardless wheatgrass	*Pseudoroegneria spicata*	2	22
EPHRAIM*	crested wheatgrass	*Agropyron cristatum*	3	24

FAIRWAY*	crested wheatgrass	*Agropyron cristatum*	2	24
DOUGLAS*	crested wheatgrass	*Agropyron desertorum*	5	24
ROADCREST*	crested wheatgrass	*Agropyron cristatum*	4	24
HYCREST II*	crested wheatgrass	*Agropyron cristatum X desertorum*	3	26
HYCREST*	crested wheatgrass	*Agropyron cristatum X desertorum*	3	26
NORDAN*	crested wheatgrass	*Agropyron desertorum*	3	24
P-27*	Siberian wheatgrass	*Agropyron fragile*	3	24
VAVILOV II*	Siberian wheatgrass	*Agropyron fragile*	2	25
VAVILOV*	Siberian wheatgrass	*Agropyron fragile*	2	25
CRITANA	thickspike wheatgrass	*Elymus lanceolatus*	3	30
BANNOCK	thickspike wheatgrass	*Elymus lanceolatus*	2	34
SODAR	streambank wheatgrass	*Elymus lanceolatus*	3	20
MOUNTAIN HOME	Sandberg bluegrass	*Poa secunda*	4	16
HIGH PLAINS	Sandberg bluegrass	*Poa secunda*	4	20
TOE JAM CREEK	bottlebrush squirreltail	*Elymus elymoides* ssp. *californicus*	6	15
9019219	bottlebrush squirreltail	*Elymus elymoides* ssp. *elymoides*	6	15

Stand rated 1 best, 9 worst. Accessions within a species rated against each other

* Non-native species

Nevada Bluegrass Initial Evaluation Planting

2010 Progress Report
Study Number: IDPMC-P-0816-RA
Derek J. Tilley, PMC Range Scientist
Loren St. John, PMC Team Leader
Natural Resources Conservation Service
Plant Materials Center
Aberdeen, Idaho

Introduction

Nevada bluegrass (*Poa secunda* ssp. *nevadensis*) is a large statured subspecies of the Sandberg bluegrass complex (Majerus et al., 2007). It can be found in the foothills and mountains of southern Idaho, northern Utah and Nevada, eastern Oregon and Washington and western Montana and Wyoming. Nevada bluegrass is similar to Sandberg bluegrass, but is considerably larger in stature, approximating the size of big bluegrass. This subspecies is a perennial bunchgrass with culms as much as 100 cm (40 in) tall. Basal leaves typically reach a length of 25 cm (10 in) with a width of 1 to 3 mm (1/16 to 3/32 in). Nevada bluegrass has distinctive long acuminate ligules from 1.5 to 6 mm (1/16 to ¼ in) long. The narrow panicles are 10 to 18 cm (4 to 7 in) long with yellowish-green to purplish-tinged spikelets. Nevada bluegrass can be distinguished from Sandberg bluegrass by its glabrous (hairless) to scabrous (rough) lemma, long decurrent ligules and large stature. The species can be wind pollinated, self-fertile, or apomyctic (Monsen et al., 2004).

Nevada bluegrass can be found in 10 inch and greater rainfall areas in sagebrush steppe plant communities including mountain foothills and mountains from Alaska to southern California, through Nevada to Arizona and Colorado. In our region plants are commonly found in the lower foothills into the mountains of southern Idaho, northern Nevada and Utah, eastern Oregon and Washington and western Montana and Wyoming.

There are no releases of Nevada bluegrass selected specifically for use in the Aberdeen PMC service area. The Bridger PMC has recently released Opportunity Germplasm Nevada bluegrass for use in mine spoil contaminated soils in Wyoming and Montana (Majerus and Majerus, 2008).

Because of the small stature and early maturity, most of the species of Sandberg bluegrass do not provide much usable forage; however, Nevada bluegrass can be an important forage producer for larger animals. Sandberg bluegrass and its subspecies are usually minor components of many grassland communities, but are considered among the six most important rangeland grasses of the Intermountain and Pacific Northwest regions (USDA Forest Service 1937).

The anticipated use of commercially available Nevada bluegrass seed is for inclusion in native mixtures for wildlife habitat, reclamation of disturbed sites, restoration of native rangeland, and conservation plantings. Nevada bluegrass is a good forage producer and has value in native species rehabilitation and site recapture.

Materials and Methods

Seed was collected from native sites during the summer of 2008. Seed was allowed to air dry and was then cleaned to approximately 97% purity. Cleaned seed was placed in cold-dry storage (ca 50º F, 20% RH) until planting. Viability was estimated in January 2010 using the kerosene heater "popping" method outlined in Tilley et al., (2010) and in-house germination tests.

Greenhouse Trial

On January 14, 2010 we initiated a greenhouse trial to evaluate seedling emergence. Seed was sown into 12 x 18" greenhouse trays filled with a soil mix containing 1 part coconut fiber peat, 1 part compost and 1 part perlite. The seed was sown into rows at 50 seeds/linear foot. Seeding depth was 0 to ¼ inches. The trays were watered with overhead irrigation. Temperatures in the greenhouse averaged between 50 and 75 degrees with a 17 hour light period.

Three germination indices were calculated in this trial. A germination rate was determined by using the method described by Maguire (1962). The number of seedlings obtained at each counting was divided by the number of days after planting, and the values obtained at each count were summed at the end of the test as follows:

$$\text{Germination rate} = \left(\frac{\text{Number of seedlings}}{\text{Days after planting}}\right) + \ldots + \left(\frac{\text{Number of seedlings}}{\text{Days after planting}}\right)$$

Days to 50% germination (D_{50}) and days between attainment of 10% and 90% germination (D_{10-90}) were obtained by plotting percent germination versus days after planting, in a quadratic regression. Germinants were counted upon visual detection of the cotyledon. Values obtained were then subjected to an analysis of variance with an alpha of 0.05 to determine significance. Means were then separated using a LSD (least significant difference) test. Average total germination percentages are also reported but were not analyzed for significance.

Field Trial

Experimental design was a randomized complete block with four replications. Individual plots were 20 feet long and contained a single row with rows planted on three foot centers. This trial contains primarily Nevada bluegrass, but also includes several collections of Sandberg bluegrass and big bluegrass. The experimental design also included plots of known industry standards (Mountain Home, Opportunity, Hanford Source, Sherman, and High Plains) for comparison.

Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9 inches.

The planting site was prepared in the fall of 2009 and spring of 2010 with herbicide and tillage applications. Plots were planted with a belt-seeder on June 14, 2010 at a depth of 0-1/4 inch. The plots were planted at a target seed rate of 50 seeds/linear foot using an

estimated 1 million seeds per pound based on Ogle et al.(2009), which lists an estimated 925,000 seeds/pound and USDA (2009) which lists 1,049,000.

Between June 14, 2010 and September 30, 2010, Aberdeen received 0.96 inches of precipitation (Bureau of Reclamation, 2010) (table 1). The plots were watered to provide approximately 14 to 16 inches of total accumulated water for the year; the typical moisture requirement for the species.

Table 1. Precipitation from planting date (June 14) through September 30

	monthly	cumulative
Jun	0.23	0.23
Jul	0.23	0.46
Aug	0.3	0.76
Sep	0.2	0.96

On September 12, the plots were evaluated for percent stand, plant density and seedling vigor. Percent stand was measured using a twenty foot rope marked with one foot increments stretched the length of the plot and anchored at either end. Plants intercepting the one foot increments were summed and recorded as a percentage. Plant density was measured by counting seedlings found in the middle two feet of row and converted to average number of plants per foot of row. Representative plants in each plot were measured for plant height. Plant heights were not analyzed for significance.

All data were analyzed using an Analysis of variance. Means of statistically different data were separated using a least significant difference (LSD) test. Accessions are listed in the table from best percent establishment to worst. Only accessions with measureable plants are reported.

Results

Greenhouse Trial

There was a wide range of germination percentages and speeds detected between accessions (table 2). Accession 9076611 had the best recorded germination rate, the shortest D_{10-90} and the second shortest D_{50} rating in the trial. Accession 9076622 had the shortest D_{50} rating and the third highest germination rate.

Table 2. Germination characteristics

Accession	Germination	Germination rate[1]	D_{50}[2]	D_{10-90}[3]
	---%---		--days--	--days--
9076584	87	18.87 b-e	9.12 b-e	5.09 a-e
9076586	92	20.34 a-c	9.02 a-d	5.00 a-e
9076587	52	11.05 i-k	9.19 b-e	5.29 a-g
9076592	100	21.89 a-b	9.17 b-e	5.15 a-f
9076593	75	17.10 d-f	8.87 a-c	4.44 a
9076594	36	6.07 l-n	10.23 f-i	6.33 f-k
9076596	62	13.34 g-i	9.10 b-e	4.99 a-e
9076602	40	6.39 l-m	10.55 g-i	6.64 h-k
9076604	23	4.24 m-o	9.89 d-i	5.72 b-h
9076605	45	9.12 j-l	9.56 c-g	5.93 b-h
9076606	61	12.27 h-j	9.28 b-f	5.02 a-e
9076608	67	15.04 f-h	8.89 a-c	4.96 a-d
9076609	28	4.54 m-o	10.66 h-i	7.29 j-k
9076610	17	2.85 n-o	10.03 e-i	6.52 g-k
9076611	91	22.89 a	8.32 a-b	4.08 a
9076615	19	3.67 m-o	9.77 c-i	6.00 c-i
9076616	73	17.10 d-f	9.14 b-e	5.33 a-g
9076618	51	11.31 i-j	9.01 a-d	4.88 a-d
9076621	12	2.15 o	9.71 c-h	5.78 b-h
9076622	76	19.84 a-d	8.04 a	6.08 d-j
9076623	22	4.40 m-o	9.62 c-g	5.30 a-g
9076624	48	7.90 k-l	10.54 g-i	5.94c-h
9076628	22	3.58 m-o	10.72 i	7.43 k
9076638	68	17.46 c-f	8.43 a-b	4.80 a-c
9076639	79	17.10 d-f	9.05 b-e	4.70 a-b
9076642	74	15.25 f-h	9.28 b-f	4.97 a-d
9076646	81	17.28 c-f	9.19 b-e	5.17 a-f
9076649	21	3.25 m-o	10.70 i	7.23 i-k
9076650	29	6.35 l-m	9.05 b-e	5.94 b-h
9076653	67	12.78 g-i	9.70 c-h	5.83 b-h
9076654	15	3.11 n-o	9.90 d-i	5.72 b-h
9076655	84	15.86 e-g	9.77 c-i	6.23 e-k
LSD (0.05)		3.22	0.99	1.24

[1] Germination rate is a comparative value with no associated unit of measure; larger # means faster germ.
[2] Days to 50% germination.
[3] Days between 10% and 90% germination

Results Field trial

Opportunity germplasm had significantly better establishment in the field trial than any other accession (table 3). Opportunity also rated the highest plant density with 19 plants/ft², which was significantly better than any other accession. The best performer of the non-released accessions was 9076622 with 57% establishment and 8 plants/ft².

Table 3. field establishment

	September 12, 2010		
Accession	Establishment	Density	Height[1]
	----%----	Plants/ft²	cm
Opportunity	88 a	19 a	4.0
9076622	57 b	8 b	2.75
Sherman	37 bc	5 bcd	6.0
9076615	36 c	4 bcd	5.5
9076610	33 c	9 b	1.75
9076618	33 c	5 bcd	2.0
9076609	29 c	6 bc	2.3
9076649	21 cd	4 bcd	2.0
9076623	17 cde	2 cd	4.0
9076605	1 de	1 cd	4.0
LSD (0.05)=			

[1]Height not analyzed for significance.

Discussion

Seedling establishment was low for all accessions with the exception of Oportunity. Only 10 of forty accessions had any measureable germination. The plots will be left in place through 2011 for one additional evaluation. It is possible that more seed will germinate, or that seedlings too small to be counted in 2010 will become large enough to evaluate. If establishment rates of non-released accessions improve significantly, the study will be continued further.

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Accession	Species	State	County	Lat. / Long.	El. (ft)	Location	Plant community
9076584	POSE	ID	Bingham	43 6' 41", -112 50' 54"	4560	Powerline rd, N of Aberdeen	Basin big sage, rabbitbrush
9076586	POSE/PONE	ID	Bingham	43 6' 41", -112 50' 54"	4560	Powerline rd, N of Aberdeen	Basin big sage, rabbitbrush
9076587	POSE	ID	Power	42 15' 40", -112 45' 44"	5000	Curlew Ntl Grassland, S of Twin Springs in rocky roadside post burn	ARTR, PUTR, PSSP, POSE
9076592	POSE	NV	Elko	41 4' 4", -114 31' 31"	6400	Road to Pequop summit ca 1 mi W of Oasis	ARTR, POSE
9076593	POSE	NV	Elko	41 6' 57", -114, 47' 33"	6200	N side of I-80 at Moor exit (360) near train tracks	PJ
9076594	POSE	NV	Elko	41 2' 27", -115 1' 49"	6600	Road to Angel Lake, exit 351 from Wells, NV	ARTRV, black sage, Juniper, LECI
9076596	POSE	NV	Elko	40 18' 56", -115 29' 36"	6700	FR 113 from Ruby Lake, top of low hill opposite large granite batholith	ARTRv, PUTR
9076602	POSE	UT	Juab	39 24' 43", -111 53' 23"	5900	Off UT hwy 28, E of Yuba state park near small cabin	PJ
9076604	PONE	UT	Box Elder	41 56' 15", -112 28' 34"	6000	N of Valley, UT off hwy 84 exit 20, E of crop field on rocky knob	ARTR, Stipa commata
9076605	PONE	ID	Bingham	43 7' 1", -112 48' 40"	4400	Coffee Point Rd, ca 600 m N of 600 S	ARTRtr, STCO, ELEL
9076606	POSE	ID	Bingham	43 7' 1", -112 48' 40"	4400	Coffee Point Rd, ca 600 m N of 600 S	ARTRtr, STCO, ELEL
9076608	POSE	ID	Power	42 11' 17", -112 45' 6"	4990	Meadowbrook Rd in post burn	PSSP, STCO, POSE, CHVI
9076609	PONE	ID	Power	42 11' 17", -112 45' 6"	4990	Meadowbrook Rd in post burn	PSSP, STCO, POSE, CHVI
9076610	PONE	ID	Power	42 9' 34", -112 49' 36"	5670	Cow Canyon Rd jct w/ Meadowbrook rd	PONE, AGCR, PSSP
9076611	POSE	ID	Power	42 5' 39", -112 50' 15"	5100	Cow Canyon in burned PJ	PJ, STCO, POSE
9076615	POAM	UT	Box Elder	41 48' 41", -113 35' 12"	5860	Dove Creek, W of Rosette	ARTRtr, CHNA, CHVI, PJ
9076616	POSE	NV	White Pine	41 3' 57", -114 31' 23"	6400	Pequop (east exit) N of I-80 on rd to summit	PJ, ARTR
9076618	POSE	NV	White Pine	41 2' 27", -115 1' 49"	6600	Angel Lake Rd, SW of Wells	ARTRV, black sage, Juniper, LECI
9076621	POSE	NV	White Pine	39 32' 3", -115 47' 17"	6250	Diamond Mts, W of Newark Valley, S of Goicochea ranches	one needle pinyon, cliffrose, ARTRtr
9076622	PONE	NV	Eureka	39 29' 8", -115 56' 54"	6900	Windfall Cyn off hwy 50	ARTR, CHNA, LECI
9076623	PONE/POAM	NV	White Pine	39 11' 49", -114 41' 42"	7300	Cave Lake Loop, S of Ely in disturbed area	PJ, ARTR, LECI
9076624	POSE	UT	Millard	38 55' 11", -112 12' 22"	7000	FR100, E of Fillmore on road cut	Cercocarpus, Acer, Juniper, Quercus
9076628	POSE	UT	San Pete	39 30' 36", -111 44' 5"	6000	Chicken Creek Cyn, E of Levan on red rocky slopes	Acer, Quercus
9076631	POSE	UT	Duchesne	40 25' 15", -110 22' 54"	7160	21000 W (road to Moon Lake) N of Mountain Home, UT in rocky soil	Juniper, black sage, PSSP, needlegrass
9076638	POSE	ID	Lincoln	42 54' 52", -113 45' 53"	4300	Kamima to Carey Rd N of Kamima in rocky knoll	ARTR, AGCR, POSE
9076639	PONE	ID	Lincoln	43 8' 12", -113 46' 5"	4300	Kamima to Carey Rd, N o fKamima above Laidlaw Corrals	ARTR, AGCR, POSE
9076642	PONE	ID	Blaine	43 25' 29", -114 0' 57"	5200	Little Wood River, 0.5 mi SE of dam	ARTR, PONE
9076646	POSE	ID	Lincoln	43 6' 22", -114 4' 49"	4460	N of Richfield	ARTR
9076649	POAM	ID	Camas	43 20' 32", -114 35' 19"	5000	Roadside on Hwy 20. Possible seeding of Sherman POAM?	ARTR
9076650	PONE	ID	Ada	43 36' 30", -115 57' 0"	3070	Lucky Peak Res on FR 268 (Side Gulch Rd)	PUTR, chokecherry
9076653	PONE	ID	Elmore	43 37' 9", -115 42 48"	4400	Arrow Rock Res. Side Gulch Rd.	ARTR, PUTR

9076654	PONE	ID	Elmore	43 33' 30", -115 36' 53"	4700	Long Gulch Rd. (FR 113)	
9076655	POSE	ID	Owyhee	42 59' 2", -116 28' 28"	3720	Triangle Rd from Oreana	ARTRwy, POSE, BRTE

9076469	FEID	MT	Gallatin NF
9076620	FEID	NV	White Pine
9076648	FEID	ID	Blaine

Idaho Fescue Initial Evaluation Planting

2010 Progress Report
Study Number: IDPMC-P-1002-RA
Derek J. Tilley, PMC Range Scientist
Loren St. John, PMC Team Leader
Natural Resources Conservation Service
Plant Materials Center
Aberdeen, Idaho

Introduction

Materials and Methods

Seed of two new Idaho Fescue accessions, 9076620 and 9076648, was collected from native sites in Nevada and Idaho during the summer of 2008. Seed was allowed to air dry and was then cleaned to approximately 97% purity. Cleaned seed was placed in cold-dry storage (ca 50º F, 20% RH) until planting. Viability was estimated in January 2010 using the kerosene heater "popping" method outlined in Tilley et al., (2010) and in-house germination tests.

The new accessions were tested against three released Idaho Fescue varieties, Winchester, Joseph and Nezpurs and one previously tested accession 9076469 from near Bozeman, Montana. Experimental design was a randomized complete block with four replications. Individual plots were 20 feet long and contained a single row with rows planted on three foot centers.

Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9 inches.

The planting site was prepared in the fall of 2009 and spring of 2010 with herbicide and tillage applications. Plots were planted with a belt-seeder on June 14, 2010 at a depth of 0-1/4 inch. The plots were planted at a target seed rate of 50 seeds/linear foot (Ogle et al.2009).

Between June 14, 2010 and September 30, 2010, Aberdeen received 0.96 inches of precipitation (Bureau of Reclamation, 2010) (table 1). Between June 14, 2010 and September 30, 2010, Aberdeen received 0.96 inches of precipitation (Bureau of Reclamation, 2010) (table 1). The plots were watered to provide approximately 14 to 16 inches of total accumulated water for the year; the typical moisture requirement for the species.

Table 1. Precipitation from planting date (June 14) through September 30

	monthly	cumulative
Jun	0.23	0.23
Jul	0.23	0.46
Aug	0.3	0.76
Sep	0.2	0.96

On September 12, the plots were evaluated for percent stand, plant density and seedling vigor. Percent stand was measured using a twenty foot rope marked with one foot increments stretched the length of the plot and anchored at either end. Plants intercepting the one foot increments were summed and recorded as a percentage. Plant density was measured by counting seedlings found in the middle two feet of row and converted to average number of plants per foot of row. Representative plants in each plot were measured for plant height.

All data were analyzed using an Analysis of variance. Means of statistically different data were separated using a least significant difference (LSD) test. Accessions are listed in the table from best percent establishment to worst.

Results

Establishment was spotty for most accessions (table 2). Joseph had the best percent establishment, plant density and the tallest plants evaluated, and was significantly better than the other accessions in density and height.

Table 2. field establishment

	September 12, 2010		
Accession	Establishment	Density	Height
	----%----	Plants/ft²	cm
Joseph	28 a	6 a	1.7 a
9076469	18 ab	2 b	0.5 b
9076620	12 ab	1 b	0.4 b
Winchester	9 ab	0 b	0.1 b
Nezpurs	1 b	0 b	0 b
9076648	0 b	0 b	0 b
LSD (0.05)=	21	3	0.9

Discussion

None of the accessions performed to what would be considered acceptable standards. The highest establishment was Joseph with 28% and 6 plants/ft². These results are far lower than would be expected for Idaho Fescue under agricultural conditions with supplemental irrigation. Weed pressure and a late planting date may have had an effect on the planting; but with ample water, low seedling vigor is more likely.

The plots will be evaluated again in 2011 for stand density, forage production and seed production.

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Using floating row cover to establish broadcast seeded Nebraska sedge (*Carex nebrascensis*) and Baltic rush (*Juncus balticus*) under flood irrigation
Study Number: IDPMC-T-1001-WE
Derek Tilley, Agronomist
Loren St. John, PMC Team Leader
Natural Resources Conservation Service
Plant Materials Center
Aberdeen, Idaho

Nebraska sedge (*Carex nebrascensis* Dewey) and Baltic rush (*Juncus balticus*) are major components in many wetlands in western North America. These species develop dense fibrous root systems and provide excellent site stabilization characteristics (Manning et al., 1989). These qualities make them very desirable for wetland and riparian revegetation projects; however they have inherent germination requirements which make them difficult to establish. Both species need sufficient light, moisture, and heat to germinate; conditions which are not easily met under field conditions. For this reason, they are currently most successfully established by using transplants from existing populations, or by propagating containerized material from seed in the greenhouse. There has been very limited success from direct seeding in the field. Development of direct seeding methods would give more flexibility to revegetation efforts and reduce overall project costs.

A new approach to establishing rush and sedge seed in the field is the use of floating row cover fabric following broadcasting. Floating row covers were developed for insect and frost protection on garden and row crops, and are created in various thicknesses and densities, which facilitate more or less frost and wind protection. Floating row covers also enhance soil moisture retention (Tilley et al., 2009). Soils under floating row covers contained as much as 6% more moisture than uncovered soils (Tilley et al., 2009). Additionally, the fabric is designed to provide adequate light penetration for plant growth. Tilley et al. (2009) used floating row cover to establish clustered field sedge from seed using overhead mist irrigation in California. However, wetland revegetation projects in the Intermountain West are most often irrigated by flooding. More information is needed to determine if row covers can aid in establishment of wetland species under flood irrigation conditions.

Agribon™ produces a floating row cover fabric that comes in a variety of thicknesses. The thicker cloth is recommended for greater protection from frost and wind, yet it lets in less sunlight than the thinner fabric. Agribon19® is reported to protect plants down to -2° C (28° F), weighs 0.55 oz/yd² and reportedly allows 85% light transmission. The heavier Agribon50® weighs 1.5 oz/yd² and allows only 50% light transmission, but protects down to -4° C (25° F) (Dripworks 2009).

Materials and Methods
The study site is a 15 x 18 m (50 x 60 ft) pond at the Aberdeen PMC home farm. The pond was prepared with tillage and herbicide-glyphosate treatments in 2009, and was tilled again on May 21, 2010. To reduce weed pressure from a known soil seed bank, the study area was solarized with clear 2 mil polyethylene plastic from June 14, 2010 to July

14, 2010. Solarizing is known to sterilize soils and kill weed seed up to 6 inches below the soil surface (Horowitz et al., 1983). Temperatures under the polyethylene tarp reached a high of 44° C (111° F) on June 21.

Prior to seeding, Nebraska sedge seed was stratified by placing 2.75g PLS in coffee filters and then placed in 1 cup ointment jars along with 8.0 g green sphagnum moss wrapped in 100% cotton cloth, and secured with rubber band. Water was then filled to the top of the ointment jar. Seed was stratified at 4° C (39 ° F) for 52 days then removed and air dried at 21 ° C (70° F) for 3 hours prior to seeding. Stratification began on May 24, and ended on the day of planting (July 15).

Seed used was of the Ruby Lake Selected Germplasm of Nebraska sedge and the Sterling Selected Germplasm of Baltic rush. Nebraska sedge had 79% PLS and Baltic rush had 93% PLS. Plots were 3 x 1.5 m (10 x 5 ft) in a randomized complete block with four replications. Plots were seeded directly following removal of the solarization plastic. Seed was broadcast by hand at 1076 PLS/m^2 (100 PLS/ft^2) on July 17. Row cover fabric was then laid over the plots and pressed to surface with a lawn roller to ensure good seed/soil contact, and secured with garden staples to keep the fabric from floating off of the plots.

Following seeding, the pond was watered to approximately 5 cm (2 in) depth with a perforated irrigation pipe laid diagonally through the pond. The water was then allowed to recede naturally. The pond was then watered to 5 cm (2 in) depth when all surface water had receded, but the soil was still at field capacity moisture. This was generally once per week.

In order to evaluate the effect of short versus long term fabric covering the establishing plants, half of the fabric from each plot was removed on August 17, four weeks after planting. The remaining fabric was left on until September 15, 8 weeks after planting. Each subplot was then evaluated and data analyzed separately.

All plots and subplots were evaluated September 15 for plant density. Approximate density was measured using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 1 m^2, having four columns and five rows, totaling 20 cells. The first grid was laid in the center of the plot, and counts were made of the cells that contained at least one plant. The sum of the cells with plants equals the estimated plants per $meter^2$. Percent establishment was calculated as plants/m^2 divided by 1076 (PLS/m^2) and multiplied by 100. Since both metrics are derived from the same initial measurement, mean separations are the same.

Results and Discussion

The floating row cover had a significant effect on establishment versus the non-covered control plots (table 1). No plants were observed in any of the non-covered treatment plots. Covered plots ranged in plant density from an average of 0.25 plants/m^2 in the JUBA, Ag19, 8 wk plots to 4.75 plants/m^2 in the CANE, Ag19, 4 wk plots. The lighter weight Agribon 19 row cover produced better establishment of Nebraska sedge than the

heavier Agribon 50. The opposite was true regarding Baltic rush, where more plants germinated under Agribon 50 than Agribon 19.

Nebraska sedge treatments had higher germination success rates than Baltic rush. The highest plant density for Baltic rush was from the JUBA, Ag50, 4 wk treatment with 0.75 plants/m² compared with 4.75 plants/m² for CANE Ag19, 4 wk. This most likely reflects Nebraska sedge's greater seedling vigor. Baltic rush has an incredibly small seed, and young seedlings would have great difficulty pushing up the matted fabric.

In those cases where there were germinants to compare between the 4 week and 8 week treatments, the four week covering treatment appeared to have slightly better establishment than the 8 week covering.

Table 1. Plant density and percent establishment, evaluated September 15.

	Plants/m²	% est.
CANE, Ag19, 4wk	4.75 a	0.44 a
CANE, Ag19, 8 wk	4.25 ab	0.4 ab
CANE, Ag50, 4 wk	2.5 abc	0.23 abc
CANE, Ag50, 8 wk	1.75 abc	0.16 abc
JUBA, Ag50, 4 wk	0.75 bc	0.07 bc
JUBA, Ag50, 8 wk	0.5 bc	0.05 bc
JUBA, Ag19, 8 wk	0.25 c	0.02 c
CANE, control, 8 wk	0 c	0 c
CANE, control, 4 wk	0 c	0 c
JUBA, Ag19, 4 wk	0 c	0 c
JUBA, control, 8 wk	0 c	0 c
JUBA, control, 4 wk	0 c	0 c
LSD (0.05)	3.78	0.35

The primary difference between this current trial and the one performed in California by Tilley et al (2009) is the method of irrigation. Under mist sprinklers, as used in the California experiment, the plots were maintained at optimum moisture and temperature. Under flooding, there is more opportunity for seed movement and washout from underneath the fabric. We also observed the wet fabric drawing to the soil surface as the water receded, virtually cementing the fabric to the soil. There were also several plots observed with a film of silt forming on top of the fabric. This added to the fabric being sealed to the soil, and prevented sunlight from penetrating through to the seed. Under these conditions it would appear to be very difficult for sedge and rush seed to become established. We observed higher establishment rates in plots where weeds such as witchgrass grew under the fabric. The weeds acted as props which lifted the fabric off the soil surface and created a greenhouse effect. In plots without weeds, where the fabric was tight against the soil, there was virtually no germination of planted seed.

All establishment percentages were low. The best treatment (CANE, Ag19, 4 wk) had only 0.4% establishment. Even seeded at the high rate of Seeded at 100 PLS/ft or 1076

PLS/m, only 4 seeds in 1,000 established in the CANE 19 treatment. The best Juncus treatment had 5 plants per 10,000 seeds establish. Ultimately, 4 plants/m² is a respectable establishment rate; however, the number of seeds required to achieve that figure was rather high. A seeding rate of 100 PLS/ft² of Nebraska sedge equals approximately 5 lb/acre, and under current production conditions, would cost approximately $500/acre. Floating row yields better establishment of Nebraska sedge and Baltic rush than non-covered broadcast seed, but establishment rates may not be high enough to make this technique a feasible planting option.

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Evaluation of tall wheatgrass for use as a biofuel feedstock in cool season grass regions of the USA

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Abstract

Switchgrass (*Panicum virgatum* L.) and other warm season species have high potential as a biofuel feedstock in much of the Midwestern and southern United States, but have limited application in areas dominated by cool season grasses. Tall wheatgrass (*Thinopyrum ponticum* [Podp.] Z.-W. Liu & R.-C. Wang) is a perennial cool-season bunchgrass with potential as a species of interest for biofuel production, but limited information exists on comparative biomass production of existing cultivars managed as a single, late season harvest. The objective of this study was to comparatively evaluate four commercially available cultivars of tall wheatgrass , 'Jose', 'Alkar', 'Largo', and 'Szarvasi-1', for potential use as a biofuel crop in the cool season grass ecosystems of the United States. Study locations were at USDA-NRCS Plant Material Centers (PMCs) in Arizona, California, Washington, Idaho, Colorado, Michigan, Montana, New York, and Maryland. Established in 2007 data from the study was collected in 2008 and 2009 from plots receiving minimal production inputs. Dry matter yield and mineral analyses characterized performance among entries. Biomass yields at the California PMC site were the highest among all testing sites and averaged 4.5 – 6.8 tons/acre with no significant difference ($P< 0.05$) between cultivars. Seeding rates of 8, 20, and 40 lbs PLS per acre did not affect total biomass yields. Szarvasi-1 had the highest biomass yields and highest percentage of lignin at maturity, as well as the lowest percentage of ash and potassium. Tall wheatgrass appears to have the greatest potential as a large biomass producer in Mediterranean type climate's representative of central California.

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Introduction

Switchgrass and other warm season species have high potential as a biofuel feedstock in much of the Midwestern and southern US, but have limited application in areas of the northeast and large portions of the western US dominated by cool season grasses (McLaughlin 2009). Tall wheatgrass is a perennial, decaploid (2n=70) (Asay and Jensen 1996) cool-season bunchgrass from southern Europe and Asia Minor. The species has a rapid growth rate with a mature height of 5 feet. Tall wheatgrass is well adapted to areas receiving a minimum of 15 inches of precipitation at elevations between 4500-6500 feet. The species is frequently grown in the intermountain West and northern Great Plains of North America (Asay and Jensen 1996). Tall wheatgrass may have potential as a species of interest for biofuel production due to its adaptation to a wide range of soil textures and soil conditions including those that are highly alkaline or saline, large biomass yields, and commercially available cultivars (Vogel and Moore, 1998). There are an estimated 75,320 seeds/lb. Tall wheatgrass is known for high seedling vigor and a slow rate of spread via seed (USDA-NRCS, 2006).

Hungarian researchers reported a tall wheatgrass cultivar, Szarvasi-1 (Agricultural Research Development Institute), as having good yield and quality characteristics for biofuel production. Alkar is adapted to USDA Plant Hardiness Zone (PHZ) 5 and Largo and Jose are adapted to PHZ 4. Alkar is tolerant to wet conditions and is later maturing than Largo and Jose. Although it performs best in areas having greater than 15 inches precipitation per year, tall wheatgrass responds well to irrigation both in areas with high precipitation and in areas with low precipitation (Lauriault et al., 2002).

Aase and Pikul (1995) investigated tall wheatgrass as a vegetative barrier for control of wind erosion in the Northern Great Plains and reported heights of 4 feet and erect stems throughout the winter months which also provide wildlife cover and nesting habitat. The grass remained upright over the winter months in trials at Big Flats, NY. Tall wheatgrass matures later than other cool season grasses. This characteristic is desirable in a biofuel system where maximizing biomass production is the desired goal and obtainable with a single harvest after the grass matures (Lauriault et al., 2002).

Yields of tall wheatgrass under simulated grazing in different climates and with various fertilizer and irrigation treatments have resulted in large variability in reported yields. In Bushland, TX, Jose yielded 5.0 tons/acre (Lauriault et al., 2002). In Los Lunas, NM (Lauriault et al., 2002) 5.8 tons/acre were reported with applications of 128 lb/acre actual N, while at the same location only 2.1 tons/acre was reported with a split application of 203 lb/acre of total N. A study in Tucumcari, NM reported maximum yearly yields of 2.0 tons/acre with irrigation and split application of 148 lb/acre N (Lauriault et al., 2002). Yields of 5.8 tons/acre are consistent with high management yields of other cool season grasses (Moser 1996).

The objective of this study was to comparatively evaluate biomass production and biofuel quality estimates of Alkar, Largo, Jose, and Szarvasi-1 for potential use as a biofuel feedstock in the cool season grass ecosystems of the western and northeastern United States.

Materials and Methods

Tall wheatgrass cultivars Jose, Szarvasi-1, Alkar, and Largo were established at the Arizona, Idaho, Oregon, Washington, Colorado, Montana, Michigan, Maryland, and New York PMCs. Study entries were seeded into plots arranged in a randomized complete block (RCB) design. Plots were planted at 8 PLS pounds per acre at the Arizona, California, Colorado, Idaho, Montana, Oregon and Washington PMCs, and 20 and 40 PLS pounds per acre at the New York, Michigan, and Maryland PMCs. PMCs installed 4 – 6 replicates of each entry in plots 8-16 feet wide and 20 feet long. Row spacing was 6-12 inches within plots, depending on available equipment.

PMCs managed plots to maintain recommended levels of P and K based on soil tests. Nitrogen was applied at a rate of 100 lb/acre as ammonium nitrate or ammonium sulfate, or urea at the 3rd leaf stage in the spring of each growing year. Weeds were controlled through the duration of the study, and irrigation water applied as needed to supplement average rainfall. Total amounts or irrigation water applied was not monitored. Plots were harvested at maturity at all locations. A grab sample was collected for dry matter determination, fiber and mineral content.

Mineral and fiber analyses were performed by Dairy One Forage Testing Laboratory, Ithaca, NY using standard techniques. Samples provided by the participating PMCs were analyzed for a wide range of constituents including dry matter (crude protein, acid detergent fiber, neutral detergent fiber, TDN, lignin, total ash) and a series of mineral analysis (P, K, Ca, Mg, S, Fe, Mn, Zn, Cu, B).

PMCs additionally noted percent stand and any problems (disease, insects, and nutrient problems) which may have adversely impacted production.

Results and Discussion

None of the tall wheatgrass cultivars included in this trial survived the first summer at Tucson, AZ. At other locations all tall wheatgrass cultivars established and grew well. Plots installed at the Washington PMC site located in Prosser, WA had initially good establishment, but were removed in 2008 due to other priorities of the land owner.

First year (2008) results (data not shown) indicated that Largo and Alkar were the best performing entries among tall wheatgrass entries in both stand establishment and vigor. Biomass yield ranged from 1.6 -2.0 tons/acre among tall wheatgrass entries with no entry having significantly better yields at all locations. Szarvasi-1 performance was generally ranked poorer than the other tall wheatgrass entries, although this may be due to the poor quality of the seed (germination less than 50%) received for this trial.

Results from 2009 show biomass yield among tall wheatgrass entries varying by location (Table 1), however in most locations mean dry matter yield was well below the average yield expected of switchgrass (USDA, 2009), the premier biofuel feedstock. The California location was the exception. Biomass reported at Lockeford was twice the biomass yields recorded at other PMCs. When averaged over locations tall wheatgrass cultivars Szarvasi-1 and Largo tended to produce the most biomass (3.2 tons/acre).

No significant differences ($P \leq 0.05$) in yield among cultivars were observed at the California, Colorado, Maryland, or New York PMC trials in 2009. In Idaho and Montana, Largo and Jose had significantly higher yield than Alkar and Szarvasi-1. The Idaho and

Montana PMCs were the driest sites, which may indicate that Szarvasi-1 and Alkar had less drought tolerance than Largo and Jose. In Michigan, Szarvasi-1 had significantly higher yields than Alkar, Largo, and Jose. In Oregon Szarvasi-1, Jose, and Largo had significantly higher yields than Alkar. Seeding rates had no effect on total mean dry matter yield. Montana PMC yields by seeding rate were not included in the data analysis. At all sites tall wheatgrass did not yield substantial amounts of biomass until the second growing season (Table 1). Fiber and minerals analyses for all entries were comparable to switchgrass grown in southern Iowa (Lemus, 2002). Analysis showed that chemical attributes of N, K, Ca, S, Cl among all entries were within ranges that would not present operational concerns if the tall wheatgrass is cut at time of maturity and used for direct combustion to generate energy (Tables 2-5) (Lewandowski and Kicherer1997).

Table 1. Yields of Alkar, Largo. Jose, Szarvasi-1 tall wheatgrass cultivars at Plant Material Centers 2009.

Cultivar	California PMC	Colorado PMC	Idaho PMC	Maryland PMC	Michigan PMC	New York PMC	Montana PMC	Oregon PMC	Mean Yield
	----------Tons/acre----------								
Szarvasi-1	6.9 a[1/]	3.1 a	0.8 b	3.1 a	2.7a	4.8 a	0.9 a	3.6 a	3.2
Largo	6.2 a	4.3 a	1.2 a	2.9 a	2.0 b	4.4 a	1.1 a	3.2 a	3.2
Alkar	5.3 a	3.4 a	0.8 b	3.0 a	2.0 b	4.4 a	0.9 a	2.4 b	2.8
Jose	4.5 a	3.4 a	1.2 a	3.2 a	1.9 b	4.6 a	1.1 a	3.4 a	2.9
Mean	5.7	3.6	1.0	3.1	2.2	4.6	1.0	3.2	

[1/] -Different lower case letters after the mean yield WITHIN a column indicate significant differences at the $P \leq 0.05$ level.

Table 2. Mean chemical composition values of Alkar tall wheatgrass harvested from the California, Colorado, Idaho, Michigan, and Montana PMCs during 2009.

Cultivar	NDF[1/]	ADF[1/]	Lig[1/]	Ash	N	K	Cl	S
	----------Percent (%)----------							
California	73.0	44.7	5.4	6.5	1.2	1.9	0.2	0.2
Colorado	68.0	40.8	7.4	6.1	1.1	0.8	0.1	0.1
Idaho	82.0	50.1	6.3	6.3	0.6	0.9	0.4	0.1
Michigan	78.6	47.0	5.9	4.8	1.4	1.6	0.2	0.1
Montana	73.7	46.2	5.7	5.1	0.8	1.1	0.1	0.1
Mean	75.1	45.8	6.1	5.8	1.0	1.3	0.2	0.1

[1/] - NDF = neutral detergent fiber; ADF = acid detergent fiber; Lig = lignin

Table 3. Mean chemical composition values of Jose tall wheatgrass harvested from the California, Colorado, Idaho, Michigan, and Montana PMCs during 2009

Cultivar	NDF[1/]	ADF[1/]	Lig[1/]	Ash	N	K	Cl	S
	----------Percent (%)----------							
California	70.7	44.3	6.0	6.2	1.0	1.6	0.2	0.2
Colorado	68.4	42.4	7.6	6.2	1.1	0.6	0.1	0.2
Idaho	77.3	52.4	8.1	6.7	0.6	0.9	0.4	0.1
Michigan	78.0	47.6	6.2	4.2	1.4	1.4	0.2	0.1
Montana	76.8	44.5	5.1	4.7	0.7	1.0	0.1	0.1
Mean	74.2	46.2	6.6	5.6	1.0	1.1	0.2	0.2

[1/] - NDF = neutral detergent fiber; ADF = acid detergent fiber; Lig = lignin

Table 4. Mean chemical composition values of Largo tall wheatgrass harvested from the California, Colorado, Idaho, Michigan, and Montana PMCs during 2009

Cultivar	NDF[1/]	ADF[1/]	Lig[1/]	Ash	N	K	Cl	S
	----------Percent (%)----------							
California	73.1	45.2	5.5	6.6	1.0	2.0	0.2	0.2
Colorado	70.6	43.8	6.8	5.8	1.0	0.6	0.1	0.3
Idaho	82.0	50.1	6.3	5.9	0.6	0.9	0.4	0.1
Michigan	78.4	47.2	5.2	4.6	1.4	1.6	0.2	0.1
Montana	75.4	46.2	5.7	5.7	0.8	1.1	0.1	0.1
Mean	75.9	46.5	5.9	5.7	1.0	1.2	0.2	0.2

[1/] - NDF = neutral detergent fiber; ADF = acid detergent fiber; Lig = lignin

Table 5. Mean chemical composition values of Szarvasi-1 tall wheatgrass harvested from the California, Colorado, Idaho, Michigan, and Montana PMCs during 2009

Cultivar	NDF[1/]	ADF[1/]	Lig[1/]	Ash	N	K	Cl	S
	----------Percent (%)----------							
California	71.3	48.4	6.9	5.6	1.1	1.5	0.2	0.2
Colorado	70.2	43.8	7.2	6.0	1.0	0.6	0.1	0.1
Idaho	75.9	51.9	7.2	5.9	0.5	0.9	0.4	0.1
Michigan	81.7	50.7	5.8	4.4	1.3	1.5	0.1	0.2
Montana	73.2	45.0	7.3	4.1	0.7	1.0	0.2	0.1
Mean	74.5	48.0	6.9	5.2	0.9	0.9	0.20	0.1

[1/] - NDF = neutral detergent fiber; ADF = acid detergent fiber; Lig = lignin

Conclusions:

Although Szarvasi-1 established much slower than the other tall wheatgrass entries in this study and biomass yields were not significantly greater than the other tall wheatgrass entries its yields trended higher in the second year. Szarvasi-1 may also be better suited as a biofuel feedstock than the other tall wheatgrass entries due to its higher lignin content and lower percentage of ash and potassium.

Based on biomass yields in these trials tall wheatgrass appears to offer the best potential as an energy crop in the Mediterranean type climate of California. Yields elsewhere, while adequate for pasturage, would likely require substantial inputs to obtain yields adequate for energy production.

Additional trials of Szarvasi-1 and Largo should be conducted in the Mediterranean climatic region to evaluate establishment speed using higher quality seed, biomass production potential under low, intermediate, and high management intensities. Additionally, biomass production potential should be evaluated under higher levels of soil salinity and alkalinity to evaluate the potential of using tall wheatgrass as an alternative energy crop on salt affected lands determined unsuitable for more traditional crops.

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2006 Coffee Point Off-Center Evaluation

2010 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, Utah; Bridger, Montana PMC; Benson Seed Farm; University Nevada, Reno; Department of Defense; Geertson Seed Farm and Los Lunas, New Mexico 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 treatment 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 2X6 ft 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.

In 2010, density measurements were taken on May 19, and biomass harvests of introduced species were taken on August 24.

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.

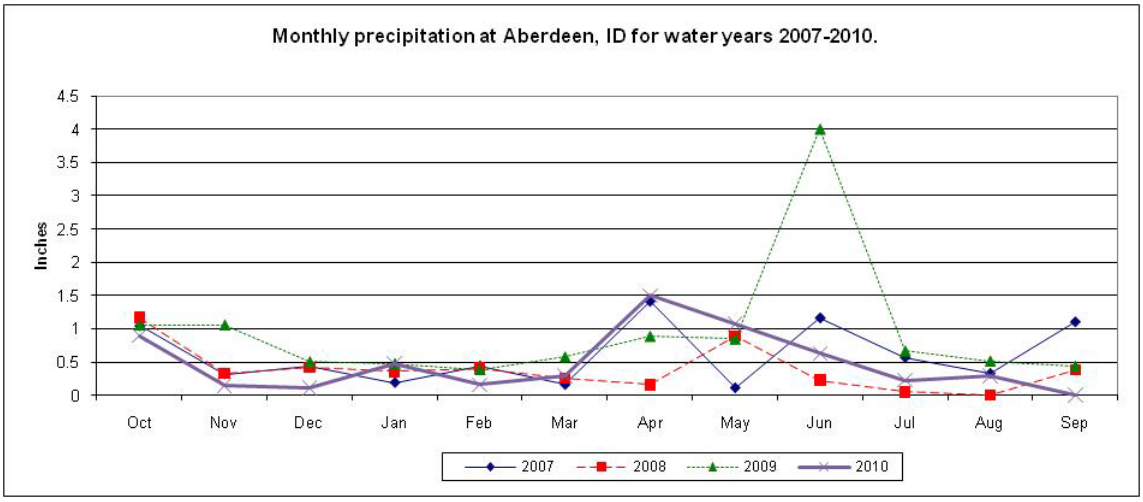
ZEBA

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 over time. 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 managed to break through the crust or had germinated in 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 numbers that 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 fall 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 significantly increased production values of the introduced grasses. Precipitation during the 2010 water year totaled 5.8 inches.



SPECIES DISCUSSION

In the spring 2007 evaluation, basin wildrye densities ranged from 0.06 plants/ft² (Topinish and Jim Creek) to 0.24 plants/ft² (Trailhead). At the time of the fall evaluation, densities dropped ranging from 0.00 to 0.06 plants/ft ². Plant densities remained low at the 2008 through the 2010 evaluations with the highest density being 0.07 plants/ft² achieved by Trailhead in 2009 and 2010.

Basin wildrye

Accession	PLS	Density 5/07	9/07	4/08	5/09	5/10
	---%---	---------- (plants/ft ²)----------				
Trailhead	86.6	0.24[a]	0.06[a]	0.04[a]	0.07[a]	0.07[a]
L-46	74.4	0.22	0.03	0.06	0.03	0.02
L-45	81.7	0.21	0.01	0.08	0.05	0.06
Magnar	89.6	0.15	0.01	0.03	0.02	0.01
Washoe	83.9	0.08	0.02	0.01	0.02	0.02
Gund	89.9	0.08	0.01	0.04	0.01	0.00
Jim Creek	83.6	0.06	0.01	0.01	0.04	0.02
Topinish	85.8	0.06	0.00	0.01	0.03	0.01

[a]Not significant at $p<0.05$

Although no significant differences were detected between the Sandberg bluegrass accessions, at the spring 2007 evaluation, Opportunity had better overall establishment than all other accessions. Opportunity 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 increased from 0.00 plants/ft ² to 0.06 plants/ft², equaling Opportunity for the top performer. In 2009 High Plains (0.14 plants/ft²) performed better than any other accession, differing significantly from Mountain Home and Opportunity. In 2010, several accessions had significant increases in plant density compared to previous years. The top performers were Duffy (0.46 plants/ft²), High Plains (0.38 plants/ft²), Mountain Home (0.32 plants/ft²) and Wallowa (0.24 plants/ft²). Opportunity had the lowest plant density at 0.01 plants/ft².

Sandberg bluegrass

		Density				
Accession	PLS	5/07	9/07	4/08	5/09	5/10
	---%---	---------- (plants/ft ²)----------				
Opportunity	86.0	0.13 [a]	0.06 a	0.06 [a]	0.00 b	0.01b
High Plains	95.0	0.07	0.00 b	0.06	0.14 a	0.38 a
Wallowa	83.2	0.02	0.05 b	0.02	0.04 ab	0.24 ab
Duffy	79.0	0.05	0.00 b	0.01	0.05 ab	0.46 a
Mtn. Home	85.0	0.05	0.00 b	0.00	0.01 b	0.32 a
Critical value (0.05)			0.05		0.11	0.08

[a]Not significant at p<0.05

In the bluebunch wheatgrass trial no significance was detected between density means for the spring or fall evaluation during 2007. Plant densities in the spring ranged from 0.01 plant/ ft² to 0.37 plants/ft². The top performer was P-19, a test accession from the ARS (0.37 plants/ft ²). Plant densities generally stayed the same between the spring and fall evaluations indicating good adaptability of the species to the site conditions. The 2008 evaluation yielded significant differences in plant densities. P-19 had the highest density with 0.26 plants/ft ², significantly greater than P-27 with 0.06 plants/ft ². In 2009 no significant differences were detected between accessions. P-19 continued to have the highest recorded plant density at 0.08 plants/ft². Plant densities remained low in 2010.

Bluebunch wheatgrass

		Density				
Accession	PLS	5/07	9/07	4/08	5/09	5/10
	---%---	(plants/ft ²)				
P-19	92.9	0.37[a]	0.37 [a]	0.26 a	0.08 [a]	0.03 [a]
Anatone	88.1	0.33	0.29	0.22 ab	0.02	0.05
P-24	91.2	0.28	0.28	0.22 ab	0.06	0.07
9081636	92.0	0.27	0.17	0.12 ab	0.06	0.03
P-22	85.3	0.24	0.28	0.20 ab	0.06	0.03
Wahluke	87.3	0.24	0.25	0.18 ab	0.07	0.02
Goldar	90.6	0.13	0.13	0.10 ab	0.02	0.02
P-27	87.4	0.11	0.09	0.06 b	0.03	0.01
P-7	89.4	0.11	0.12	0.11 ab	0.02	0.03
P-32	86.5	0.01	0.12	0.10 ab	0.02	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 Discovery, and the lowest was 0.32 from

E-46 during 2007. Densities decreased between the spring and fall evaluations. Discovery continued to have the highest density (0.35 plants/ft²). In 2008, Discovery 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. Discovery had the highest density in 2009 and 2010 with 0.11 and 0.12 plants/ft² for the respective years.

Snake River wheatgrass

		Density				
Accession	PLS	5/07	9/07	4/08	5/09	5/10
	---%---	----------(plants/ft²)----------				
Discovery	90.0	0.50[a]	0.35[a]	0.38[a]	0.11[a]	0.12[a]
E-51	91.1	0.39	0.29	0.30	0.05	0.06
E-45	94.5	0.33	0.18	0.18	0.04	0.07
E-46	96.3	0.32	0.27	0.26	0.04	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. Densities dropped slightly in 2010 with Sodar having the best plant density with 0.40 plants/ft².

Thickspike and streambank wheatgrass

		Density			Forage	Density	
Accession	PLS	5/07	9/07	4/08	8/08	5/09	5/10
	---%---	---------(plants/ft²)--------			---(lb/ac)---	-----(plants/ft²)-----	
Sodar	96.5	0.98[a]	0.78[a]	0.83[a]	137[a]	0.45[a]	0.40[a]
Critana	90.0	0.86	0.67	0.74	133	0.32	0.29
Bannock	94.3	0.84	0.66	0.73	151	0.21	0.20

[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 generally considered well adapted to the conditions faced at Coffee Point. However, 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/ft². In 2009 the only accession with living plants in the evaluated plots was Rosana with 0.04 plants/ft². In 2010 plant densities had rebounded somewhat with Rosana, Recovery and 9081630 having 0.13, 0.07 and 0.06 plants/ft² respectively.

Western wheatgrass

Accession	PLS	Density 5/07	9/07	4/08	5/09	5/10
	---%---	(plants/ft²)				
Rosana	90.0	0.05[a]	0.02 [a]	0.07 [a]	0.04 [a]	0.13 [a]
Recovery	90.0	0.03	0.03	0.03	0.00	0.07
9081630	85.0	0.03	0.03	0.01	0.00	0.06

[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 Montana 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 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 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. Sparse plants were observed in the 2010 evaluation, but stands remained negligible.

Slender wheatgrass

Accession	PLS	Density 5/07	9/07	4/08	Forage 8/08	Density 5/09	5/10
	---%---	---------(plants/ft²)---------			---(lb/ac)---	----(plants/ft²)----	
First Strike	90.0	0.53 a	0.37 a	0.45 a	143 a	0.00 [a]	0.02 [a]
Pryor	95.9	0.46 ab	0.30 ab	0.34 a	75 ab	0.00	0.01
Copperhead	85.0	0.23 b	0.08 b	0.08 b	0 b	0.00	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, a test material from the Montana PMC had an establishment density of 0.65 plants/ft² during 2007 and was significantly greater than the plant density of Toe Jam Creek (0.20 plants/ft²). Fall densities remained essentially the same as spring. Accession 9019219 is likely the subspecies *elymoides* and is currently being tested by 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 statistically different. 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. In 2010, accession 9019219 had an average plant density of 0.40 plants/ft² compared to Toe Jam Creek with 0.14 plants/ft².

Bottlebrush squirreltail

Accession	PLS	Density 5/07	9/07	4/08	5/09	5/10
	---%---	---------- (plants/ft²)----------				
9019219	85.0	0.65 a	0.57 a	0.58[a]	0.39[a]	0.40 a
Toe Jam Creek	92.2	0.20 b	0.15 b	0.20	0.12	0.14 b
Critical value (0.05)		0.32	0.37			0.06

[a]Not significant at p<0.05

Shrub densities were low and were not statistically different 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 Montana 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. In 2010 Snake River Plains had 0.32 plants/ft² and Gardener's saltbush had 0.13 plants/ft². All other accessions had insignificant plant densities.

Shrubs

Accession	PLS	Density 5/07	9/07	4/08	5/09	5/10
	---%---	---------- (plants/ft²)----------				
Snake River Plains fourwing saltbush	44.5	0.17[a]	0.13 ab	0.19 a	0.24 a	0.32 a
9016134 Gardener's saltbush	30.0	0.15	0.19 a	0.19 a	0.20 a	0.13 ab
Open Range winterfat	80.8	0.02	0.04 bc	0.06 ab	0.03 b	0.04 b
Wytana fourwing saltbush	45.0	0.01	0.00 c	0.00 b	0.01 b	0.01 b
Northern Cold Desert winterfat	85.2	0.00	0.00 c	0.00 b	0.00 b	0.01 b
Wyoming big sagebrush	21.3	0.00	0.01 bc	0.01 b	0.01 b	0.02 b
Critical value (0.05)			0.13	0.15	0.15	0.06

[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 Montana 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 western yarrow had plants visible within the evaluated plots, but only recorded 0.01 plants/ft². In the 2010 evaluation Eagle western yarrow had the highest density at 0.03 plants/ft² and Great Northern western yarrow had 0.01 plants/ft². All other accessions had no plants.

Forbs

Accession	PLS	Density 5/07	9/07	4/08	5/09	5/10
	---%---	----------(plants/ft²)----------				
Maple Grove Lewis flax	93.0	0.45 a	0.20 a	0.36 a	0.00 b	0.00 b
Phacelia	81.8	0.28 ab	0.00 b	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	0.01b
Cedar Palmer penstemon	95.0	0.00 b	0.06 ab	0.00 b	0.00 b	0.00 b
Eagle w. yarrow	90.0	0.00 b	0.01 b	0.00 b	0.01 a	0.03 a
Richfield firecracker penstemon	92.2	0.00 b	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	0.00 b
Old Works penstemon	95.0	0.00 b	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	0.00 b
Critical value (0.05)		0.34	0.18	0.17	0.01	0.01

As a group, the introduced grasses outperformed all others with regard to establishment. 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 of 2165 lb/ac. In 2010 Vavilov II had significantly higher density than all other accessions with 1.31 plants/ft². Vavilov had the second highest plant density with 0.83 plants/ft². Vavilov II also had the highest forage yield in 2010 with 2522 lbs/ac with Vavilov close behind with 2352 lbs/ac.

Introduced grasses

Accession	PLS	Density 5/07	9/07	4/08	5/09	5/10	Forage 8/08	8/09	8/10
	---%---	---------- (plants/ft²)----------					---------- (lb/ac)----------		
Vavilov II Siberian wheatgrass	90.0	1.48 a	1.46 a	1.53 a	1.32 a	1.31 a	1176 a	2165 a	2522 a
Vavilov Siberian wheatgrass	90.0	0.74 b	0.68 b	0.75 b	0.68 b	0.83 ab	528 b	1505 ab	2352 ab
Mustang Altai wildrye	90.0	0.75 b	0.58 b	0.70 b	0.24 b	0.47 b	56 b	595 b	827 ab
Bozoisky Select Russian wildrye	90.7	0.70 b	0.65 b	0.65 b	0.60 b	0.73 b	189 b	669 b	1350 ab
Bozoisky II Russian wildrye	90.0	0.54 b	0.59 b	0.63 b	0.58 b	0.69 b	168 b	799 b	618 b
Critical value (0.05)		3.70	0.42	0.39	0.45	0.53	527	1239	1815

Introduced grass plots, May 2009.

Vavilov II August 2009.

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/ft². In 2009 only Magnar basin wildrye and Goldar bluebunch wheatgrass still had viable plants in the evaluation with 0.11 and 0.06 plants/ft² respectively. The 2010 evaluation revealed 0.02 plants/ft² of Nezpar and 0.04 plants/ft² of Goldar.

Zeba®

Accession	PLS	Density 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 during 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 through the 2010 season. Native grass species that had 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. By 2010 only western yarrow plots had any detectable plants. Of the shrubs, Snake River Plains fourwing saltbush and Gardener's saltbush had good initial establishment and continue to have stands through 2010.

The next evaluations will be 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
	Opportunity	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	Discovery	ARS
	E-45	ARS
	E-46	ARS
	E-51	ARS
Thickspike wheatgrass	Critana	MTPMC
	Bannock	IDPMC
	Sodar	IDPMC
Western wheatgrass	Rosana	MTPMC
	9081630	MTPMC
	Recovery	DOD/ARS/IDPMC
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/MTPMC
	Bozoisky II Russian 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	Recovery	9081630	Rosanna	1.
2.	Washoe	Jim crk	Topinish	L-45	2.	9081630	Rosanna	Rosanna	Recovery	2.
3.	Topinish	Gund	Trailhead	Washoe	3.	Recovery	9081630	Recovery	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.	Discovery	e-45	e-51	e-46	24.	Bozoisky	Vav II	Mustang	Vavilov	24.
25.	E-45	e-46	Discovery	e-51	25.	Boz II	Bozoisky	Vavilov	Mustang	25.
26.	E-46	Discovery	e-45	e-45	26.	Vavilov	Mustang	Vav II	Bozoisky	26.
27.	E-51	e-51	e-46	Discovery	27.	Vav II	Vavilov	Boz II	Vav II	27.
28.	Critana	Bannock	Bannock	Sodar	28.	Mustang	Boz II	Bozoisky	Boz II	28.
29.	Bannock	Critana	Sodar	Critana	29.	ZEBA Nezpar	ZEBA Magnar	ZEBA Goldar	ZEBA Appar	29.
30.	Sodar	sodar	critana	bannock	30.	blank	blank	blank	blank	30.
	20’									

→ NE

Orchard Display Nursery
Evaluation Summary (2005-2010) Final Report
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Introduction

The Orchard Display Nursery was planted on November 16, 2004 in cooperation with the Great Basin Native Plant Selection and Increase Project. The test site is located on loamy soils in an ecological site that historically supported a Wyoming big sagebrush, bluebunch wheatgrass, Thurber's needlegrass plant community.

The nursery includes 82 accessions of 27 native and introduced grass, forb and shrub species. Each accession was planted in a 7 X 60 foot plot. See Tilley et al (2005) for descriptions of the species and accessions planted. The remaining area was planted to a cover crop mix of 50% Anatone bluebunch wheatgrass, 20% Bannock thickspike wheatgrass, 20% Magnar basin wildrye and 10% Snake River Plains fourwing saltbush.

The Orchard display nursery was evaluated from 2005 to 2008 and again in 2010. This report summarizes the evaluations conducted at the site.

Orchard test site on May 16, 2007.

Materials and Methods

The Bureau of Land Management (BLM) prescribed burned the site in the fall of 2002. The site was later sprayed by Aberdeen PMC staff in May 2003 and May 2004 with a Roundup/2, 4-D herbicide mix to create a weed free seedbed. Due to limited breakdown of dead grass clumps that would inhibit proper seed placement with a drill, and to ensure a clean seedbed, the decision was made to cultivate the site with a culti-packer just prior to seeding. During the first evaluation most plots contained high densities 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.). Grass 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.

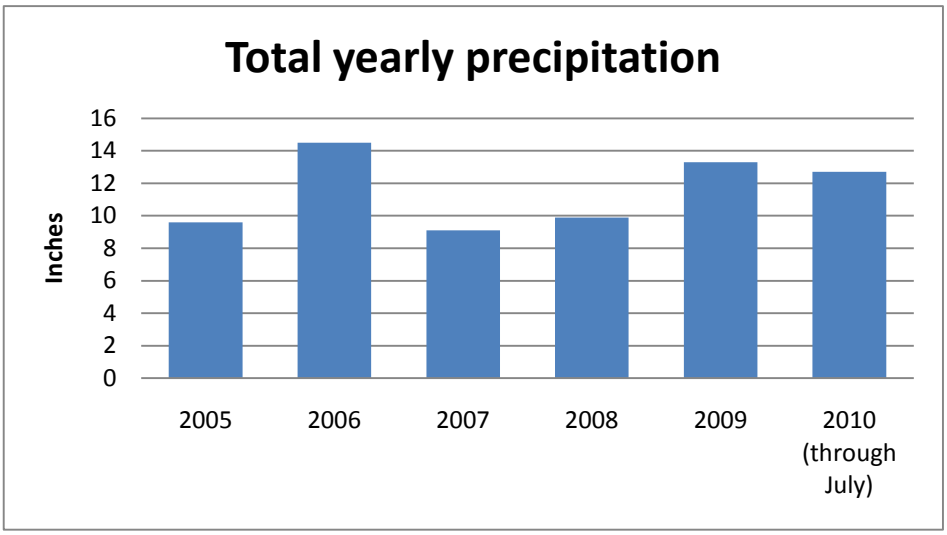
Orchard display site in September 2004 prior to mechanical seedbed preparation

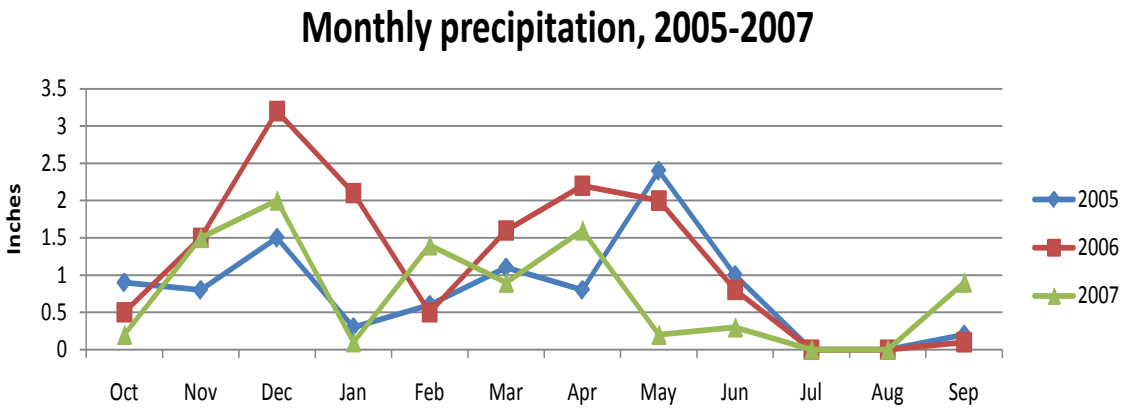
The first evaluation of the plots for initial establishment was conducted on April 27, 2005 using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40X41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The first grid was laid on the rows approximately two grid lengths (80 inches) into the plot. Counts were made of the cells that contained at least one plant. Grids were subsequently flipped and evaluated three more times giving a total of 80 evaluated cells. Total area for one grid is approximately $1m^2$. 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, the 2008 evaluation was completed on May 1, and the 2010 evaluation occurred on July 2. The methods followed in 2006, 2007, 2008 and 2010 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 2010. Due to the non-replicated design, data were not analyzed for significance.

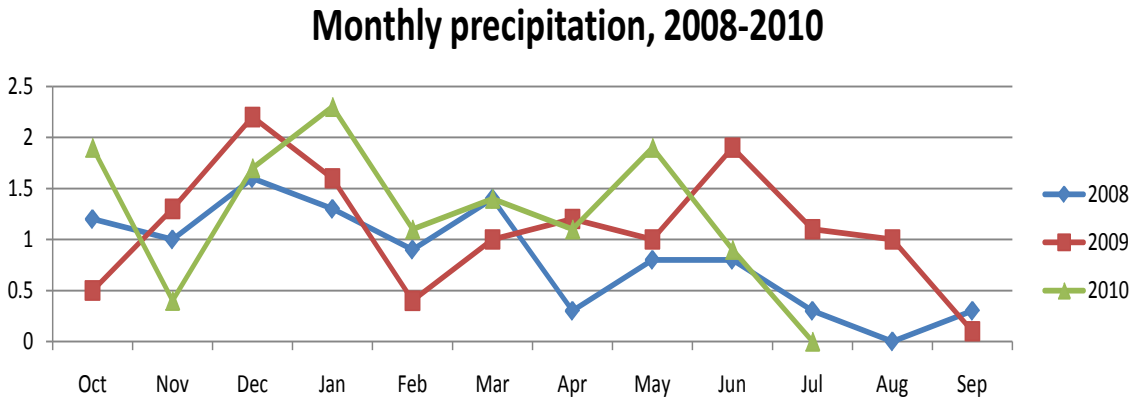
Weather

On average the site receives 8 to 12 inches of mean annual precipitation. Approximately 60 to 65 percent of this comes as winter snow with a the remaining 35 to 40 percent primarily as spring rain. The summer months are commonly very dry, and it is common to have no precipitation during July and August. From 2005 to 2010 the mean annual precipitation was 11.5 inches. The lowest water years were 2007, 2005 and 2008 which received 9.1, 9.6 and 9.9 inches

respectively. Water years 2010, 2009 and 2006 had good moisture with 12.7, 13.3 and 14.5 inches respectively (USDA-NRCS, 2010).







Performance Results

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 April 2005 and May 2005 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. 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 2010 there were no plants of any Indian ricegrass accessions observed in the evaluation grids and none seen within their respective plots.

In 2005 the bottlebrush squirreltail plots had as high of 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, presumably through volunteering. By 2010 Fish Creek had decreased to 0.11 plants/ft^2 and Sand Hollow big squirreltail was down to 0.15 plants/ft^2.

Plots of bluebunch wheatgrass in May 2008

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/ft^2 and Schwendimar fell in density to 0.17 plants/ft^2. In 2010 all thickspike wheatgrass densities had increased slightly with Bannock having the highest density at 0.39 plants/ft^2.

Revenue and San Luis slender wheatgrass both showed zero plants/ft^2 in 2006. Pryor slender wheatgrass similarly dropped in density but had 0.02 plants/ft^2. In 2007 and 2008 no slender wheatgrass plants could be found in any of the evaluated grids. In 2010 however, a few plants were detected in the Pryor plots resulting in 0.07 plants/ft².

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; however in 2010 there were 0.04 plants/ft² in the Arriba plot.

Discovery Snake River wheatgrass plot in May 2008

The bluebunch wheatgrass accessions had the highest average densities of all the native grasses. All decreased slightly in density from 2005 to 2006, but still maintained good stands. P-12, Wahluke and Jim Creek all had densities over 1.00 plants/ft^2. Columbia, Anatone, P-7 and P-15 had densities between 0.50 and 1.00 plants/ft^2 while P-5 and Goldar both shared low densities. In 2007 densities were slightly lower, but still higher than all other species in the trial. 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. Stands generally remained good in 2010 with Jim Creek and Wahluke having the highest densities at 0.99 and 0.80 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 Discovery 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. Densities continued to slide through 2010. The highest rating was achived by SERDP with 0.50 plants/ft².

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. Plant densities changed little in the 2010 evaluation. U108-02 had the top stand with 0.15 plants/ft², followed by Trailhead (0.11) and Magnar (0.09) plants/ft².

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 and 2010 the sheep 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; however in 2010 it had dropped to 0.22 plants/ft².

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 suffering and perhaps dead during the second evaluation in 2005 were still alive. However, the plants of crested wheatgrass were very small when compared to the other wheatgrass plants in the nursery and still appeared to be recovering from black grass bug pressure in 2007. The 2007 and 2008 evaluations showed most established plots with reduced densities, many accessions dropping out completely.

In 2006 all of the crested wheatgrass accessions increased in density or remained approximately where they were in 2005. Ephraim rose from 0.28 to 1.23 plants/ft^2; however, many of the plants were small in size due to the black grass bug infestation during the spring of 2005. In 2007 the best density was obtained from Nordan with 0.67 plants/ft^2. Ephraim had dropped from 1.23 to 0.02 plants/ft^2. In 2008, Nordan and Roadcrest had both increased in density to 0.88 and 0.71 plants/ft² respectively; the remaining crested wheatgrass plots had few remaining plants. The 2010 evaluation showed declines in Nordan and Roadcrest with 0.56 and 0.28 plants/ft² respectively.

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. In 2010 Vavilov dropped again to 0.13 plants/ft².

The 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. In 2010 Manska and Greenleaf both had 0.02 plants/ft² and Luna had no plants in the evaluated frames.

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 2010.

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 plants detected in 2008 or 2010.

The Russian wildrye accessions all increased in density with the exception of Tetracan which decreased slightly. The best stand was recorded in the Bozoisky Select plot with 0.58 plants/ft^2. Bozoisky Select had the best stand in 2007 with 0.35 plants/ft^2. Bozoisky II had the next best rating with 0.26 plants/ft^2. In 2008 the Russian wildrye plots had poor stands, the top performer being Bozoisky Select with 0.11 plants/ft². 2010 showed moderate improvement with Bozoisky increasing to 0.20 plants/ft², Mankota increasing to 0.15 plants/ft and Bozoisky II increasing to 0.13 plants/ft².

Forbs and Shrubs

Stand of Eagle western yarrow, 2007.

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 germinated from the original seeding. Plant density for Eagle in 2007 was 0.24

plants/ft^2. Summer rains in 2009 caused continued volunteering of Eagle western yarrow. In 2010 Eagle had a mean density of 0.63 plants/ft² composed primarily of young volunteer plants.

Native Grasses Species	Name or accession	4/27/05	5/25/05	5/30/06	5/16/07	5/1/08	7/2/10
		Plants/ft²					
Indian ricegrass	Rimrock	0.37	0.20	0.00	0.00	0.00	0.00
	White River	0.56	0.17	0.00	0.00	0.00	0.00
	Nezpar	0.42	0.17	0.00	0.00	0.00	0.00
	Ribstone	0.14	0.09	0.00	0.00	0.00	0.00
	Paloma	0.05	0.00	0.00	0.00	0.00	0.00
Squirreltail	Sand Hollow	0.37	0.20	0.19	0.20	0.24	0.15
	Fish Creek	0.97	0.54	0.26	0.22	0.67	0.11
	Shaniko Plateau	0.81	0.52	0.06	0.09	0.00	0.06
	Toe Jam Creek	0.58	0.17	0.00	0.00	0.02	0.00
	9019219	0.02	0.02	0.00	0.00	0.00	0.00
Thickspike wheatgrass	Bannock	1.04	1.07	0.58	0.43	0.28	0.39
	Schwendimar	0.69	0.52	0.39	0.24	0.17	0.30
	Critana	0.90	0.56	0.24	0.17	0.00	0.04
	Sodar	0.37	0.30	0.15	0.07	0.00	0.04
Slender wheatgrass	Pryor	0.30	0.30	0.02	0.00	0.00	0.07
	Revenue	1.00	0.93	0.00	0.00	0.00	0.00
	San Luis	0.60	0.69	0.00	0.00	0.00	0.00
Western wheatgrass	Arriba	0.16	0.15	0.06	0.00	0.00	0.04
	Rodan	0.28	0.35	0.13	0.00	0.00	0.00
	Rosana	0.05	0.20	0.04	0.00	0.00	0.00
Bluebunch wheatgrass	Jim Creek	0.83	1.02	1.02	1.07	1.10	0.99
	Wahluke	0.97	1.26	1.02	0.98	1.10	0.80
	P-12	1.34	1.59	1.04	0.89	0.82	0.61
	Anatone	0.81	1.15	0.80	0.69	0.47	0.61
	Columbia	1.30	1.23	0.84	0.83	0.65	0.54
	P-15	0.60	0.93	0.54	0.50	0.41	0.45
	P-7	0.93	1.15	0.67	0.57	0.75	0.41
	Goldar	0.51	0.37	0.33	0.19	0.24	0.09
	P-5	0.42	0.61	0.22	0.13	0.17	0.11
Snake River wheatgrass	Discovery	1.02	0.94	0.67	0.70	0.80	0.50
	Secar	1.00	1.11	0.76	0.56	0.54	0.46
	Expedition	1.27	1.44	0.54	0.41	0.34	0.26
	E-26	0.21	0.23	0.22	0.13	0.11	0.19
Basin wildrye	U100-01	0.53	0.41	0.11	0.13	0.06	0.17
	U108-02	0.56	0.57	0.24	0.11	0.09	0.15
	Trailhead	0.60	0.52	0.26	0.17	0.04	0.11
	Magnar	0.28	0.22	0.04	0.04	0.02	0.09
	Washoe	0.21	0.09	0.09	0.06	0.00	0.06
	U70-01	0.30	0.22	0.02	0.02	0.02	0.00
Sheep fescue	Covar	0.16	0.00	0.07	0.07	0.06	0.06
	Initial Point	0.21	0.04	0.02	0.00	0.02	0.04
Thurber's needlegrass	Thurber's	0.00	0.00	0.00	0.00	0.00	0.00
Sandberg bluegrass	Hanford Source	0.00	0.00	0.19	0.00	0.56	0.22
	Mountain Home	0.00	0.00	0.35	0.00	0.03	0.02
	High Plains	0.25	0.00	0.54	0.00	0.00	0.00
	Sherman	0.00	0.00	0.02	0.00	0.00	0.00
	Toole County, MT	0.00	0.00	0.04	0.00	0.00	0.00

Introduced Grasses Species	Name or accession	4/27/05	5/25/05	5/30/06	5/16/07	5/8/08	7/2/10
		Plants/ft²					
Crested wheatgrass	Nordan	1.30	1.19	1.10	0.67	0.88	0.56
	Roadcrest	1.30	0.07	0.52	0.19	0.71	0.28
	Hycrest	0.39	0.24	0.15	0.07	0.04	0.06
	Ephraim	0.65	0.28	1.23	0.02	0.00	0.00
	CD-II	0.56	0.24	0.20	0.00	0.00	0.00
	Douglas	0.28	0.04	0.09	0.00	0.04	0.00
Siberian wheatgrass	Vavilov	0.65	0.20	0.61	0.26	0.54	0.13
	P-27	0.09	0.02	0.33	0.00	0.00	0.00
Pubescent wheatgrass	Manska	0.69	0.65	0.28	0.13	0.09	0.02
	Greenleaf	0.60	0.59	0.15	0.09	0.02	0.02
	Luna	0.79	0.54	0.13	0.00	0.22	0.00
Intermediate wheatgrass	Rush	0.60	0.56	0.00	0.00	0.00	0.00
	Pearl	0.35	0.15	0.02	0.04	0.00	0.00
Altai wildrye	Prairieland	0.56	0.39	0.00	0.00	0.00	0.00
	Eejay	0.16	0.28	0.00	0.00	0.00	0.00
Russian wildrye	Bozoisky Select	0.72	0.54	0.58	0.35	0.11	0.20
	Mankota	0.46	0.28	0.32	0.19	0.02	0.15
	Syn-A (Bozoisky II)	0.21	0.13	0.24	0.26	0.09	0.13
	Tetracan	0.42	0.20	0.17	0.07	0.04	0.03

Native/Introduced Forbs and Shrubs Species	Name or accession	4/27/05	5/25/05	5/30/06	5/16/07	5/8/08	7/2/10
		Plants/ft²					
Western yarrow	Eagle	0.51	0.50	0.07	0.24	0.21	0.63
	Great Northern	0.19	0.09	0.00	0.00	0.00	0.00
Utah sweetvetch	Timp	0.14	0.02	0.00	0.00	0.00	0.00
Firecracker penstemon	Richfield Selection	0.02	0.02	0.00	0.00	0.00	0.00
Scarlet globemallow	Wild collection	0.00	0.00	0.00	0.00	0.00	0.00
Lewis flax	Maple Grove	0.42	0.15	0.00	0.00	0.00	0.00
Blue flax	Appar	0.90	0.26	0.00	0.00	0.00	0.00
Wyoming big sagebrush	Wild collection	0.02	0.02	0.00	0.00	0.00	0.00
Fourwing saltbush	Snake River Plains	0.00	0.00	0.00	0.02	0.00	0.00
	Wytana	0.00	0.00	0.00	0.00	0.00	0.00
	Rincon	0.00	0.00	0.00	0.00	0.00	0.00
Gardner's saltbush	9016134	0.00	0.00	0.00	0.00	0.00	0.00
Winterfat	Hatch	0.28	0.17	0.00	0.00	0.00	0.00
	Northern Cold Desert	0.00	0.00	0.00	0.00	0.00	0.00
	Open Range	0.00	0.00	0.00	0.00	0.00	0.00
Forage kochia	Immigrant	0.00	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/ft^2. The cover crop was not evaluated in 2010.

Discussion

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

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

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

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Summary of Polymer Seed Coating and Soil Amendment Evaluation Studies

February 4, 2010
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In the past few decades, researchers have developed numerous products designed to increase seedling establishment and survival for many different kinds of applications including native site restoration. Zeba, produced by Absorbent Technologies, Inc, is a superabsorbent cornstarch based polymer that is used as a seed coating or soil amendment. The product is designed to hold and release water for use by plants multiple times throughout the growing season 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 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.

Between 2006 and 2009 the Aberdeen Plant Materials Center (PMC) conducted three evaluation plantings of Zeba seed coating. Three Zeba treatments were tested among these studies; 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 (Figure 1).

Figure 1. Zeba Farm soil amendment (left) and used as a seed coating (right).

This report provides a summary of the data collected from trials. For detailed information on each of these studies, refer to the individual progress reports.

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.

Coffee Point, Idaho non-replicated initial evaluation

The PMC established non-replicated evaluation plots of Zeba treated Magnar basin wildrye, Goldar bluebunch wheatgrass, Appar blue flax, and Nezpar Indian ricegrass at the Coffee Point test site, 25 miles northwest of Aberdeen, Idaho. The site conditions are very dry with mean annual precipitation ranging from 8 to 12 inches. The area historically supported a Wyoming big sagebrush/bluebunch wheatgrass plant community. 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.

The plots of Zeba treated Magnar and Goldar were compared against an adjacent non-treated planting. There were no non-treated plots of Appar or Nezpar so a comparison could not be made. Observation plots were not replicated and could not be analyzed statistically. In May 2007 Zeba treated Magnar seed had a mean establishment density of 0.71 plants/ft² as compared with 0.15 plants/ft² achieved in the untreated plots. Similarly, treated Goldar bluebunch wheatgrass had an average plant density of 0.43 plants/ft² while the untreated plots averaged only 0.13 plants/ft². Zeba treated plots continued to have greater plant densities than the non-treated plots for the next two years.

Table 1. Coffee Point initial observation planting.

Treatment	May 07	Sep 07	May 08	May 09
	----------(plants/ft²)----------			
Magnar Zeba	0.71	0.24	0.30	0.11
Magnar non-treated	0.15	0.01	0.03	0.02
Goldar Zeba	0.43	0.32	0.35	0.06
Goldar non-treated	0.13	0.13	0.10	0.02

Skull Valley, Utah

In order to better evaluate the efficacy of Zeba for use in rangeland seeding projects, the PMC established a study at Skull Valley, Utah, 45 miles west of Salt Lake City, Utah. The site is a Wyoming big sagebrush- grass- forb community receiving an average of 8 to 12 inches of annual precipitation. Soils at the site are a semi-desert gravelly loam. We evaluated establishment and survival of Anatone Germplasm bluebunch wheatgrass and Nezpar Indian ricegrass when used in conjunction with Zeba standard, Zeba plus compound and Farm treatments.

No significant differences were detected between treatments at any evaluation for plant density or persistence. All Zeba treatments, however, with the exception of the Farm amendment in the bluebunch wheatgrass trial, had greater average plant densities than the

non-treated controls. 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 August evaluation the Farm treatment in the Indian ricegrass trial had a slightly greater plant density than the other Zeba treatments. The plots were evaluated again in 2009, but not enough plants were detected to conduct an analysis.

Table 2. Skull Valley replicated planting.

	Nezpar		Anatone	
Treatment	May 08	Aug 08	May 08	Aug 08
	----------(plants/ft²)----------			
Control	0.13	0.04	0.50	0.20
Farm	0.25	0.13	0.38	0.17
Zeba + compound	0.39	0.12	0.70	0.36
Zeba	0.46	0.09	0.66	0.35
P=	0.27	0.63	0.16	0.17

Native forb establishment

In 2008 a trial was established at the PMC home farm near Aberdeen, Idaho to compare establishment and survival of the forbs, Appar blue flax and Maple Grove Lewis flax, when used with Zeba technologies versus a non-treated control. The treatments evaluated were the same as in the Skull Valley study.

Figure 2. Zeba coating remained on seed coat after germination and was deposited on soil surface.

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

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. One observation noted during the study was that the Zeba remained on the seed coat at the time of germination (Figure 2). The seed coat of many forbs is lifted above the soil surface with the cotyledons and falls shortly after to the ground. It is hard to conceive the Zeba coating providing much soil moisture retention accessible to the roots in this position.

Table 3. Evaluation of Appar and maple grove blue flax May 2009.

	Appar		Maple Grove	
Treatment	% stand	Plants/ft	% stand	Plants/ft
Control	59	9.0	54	10.9
Farm	46	8.6	44	7.8
Zeba	56	11.3	42	4.5
Farm+Zeba	55	6.8	28	3.5
P=	0.59	0.48	0.35	0.07

Discussion

The results from these studies indicated no significant effect from the use of Zeba formulations. However, less than average rainfall at Coffee Point and Skull Valley during establishment and beyond significantly decreased expected germination and survival. Coffee Point received less than 6 inches of precipitation during 2007 (establishment year), and Skull Valley received less than 3 inches of precipitation the establishment year. Such extreme drought conditions created an environment that was unreasonable to expect the amendment to perform as it might have under more normal conditions

Using Zeba seed coating on species which elevate the seed coat above the soil surface as in many dicotyledonous forbs appears to be ineffective. Use of the Farm soil amendment intuitively seems a better option for such species; however our results showed no conclusive evidence that using Farm aids in establishment or persistence.

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 Skull Valley 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.

Another idea that has been suggested which may be worth further testing is the use of much higher rates of Zeba Farm than the recommended rate following the assumption that the limiting factor of plant growth is available soil moisture. Increasing Farm soil amendment rates may increase soil moisture next to the planted seed and increase the overall chance of seed germination, plant establishment and long-term survival. This may be especially applicable in extreme arid conditions such as those encountered at Coffee Point and Skull Valley during these studies.

PLANT MATERIALS

2010

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 and 10 no evaluations.

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 and 10 no evaluations.

ID04002 Dave Wattenburger Field Planting. Delar small burnet ordered August 19, 2003. Planting seeded fall 2004. No evaluations FY05 – FY10.

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- FY10 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- FY10 no evaluations.

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 and FY10 no evaluations.

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. FY09and FY10 no evaluations.

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- FY10 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- FY10 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- FY10 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.
FY10 evaluations: The meadow foxtail and ventenata competition was very heavy in all plots. In the fall of 2009 the adjacent field was sprayed with Outrider at 2/3 oz per acre. The plots were sprayed in Nov. 2009. The spray application did an excellent job controlling the ventenata and the meadow foxtail. Most of the planted species were having a difficult time prior to the spray application. Unfortunately the spray also had an adverse affect on plants within the plot. 1. Delar small burnet - only a couple of plants remain very poor vigor; 2. Pryor slender wheatgrass - a good population of plants, seeding out, plants are smaller than would be expected; 3. Secar Snake River wheatgrass - poor population and extremely poor vigor; 4. Union Flat blue wildrye - poor stand and poor vigor; 5. Regar meadow brome - none found; 6. Covar sheep fescue - very poor population and vigor; 7. Latar orchardgrass - good population plants are stunted; 8. Bromar mountain brome - none found; 9. Alkar tall wheatgrass - good population and fair vigor; 10. Durar hard fescue - none found; 11. Sherman big bluegrass - none found; 12. Winchester Idaho fescue - none found; 13. Foothills Canada bluegrass - fair population, poor vigor; 14. Bozoisky Russian wildrye - none found; 15 . Rush intermediate wheatgrass - good population fair vigor; 16. Tuscany tall fescue - poor population and poor vigor; 17. Rosana western wheatgrass - good population beginning to spread, fair vigor; 18. Sodar streambank wheatgrass - none found; 19. Vavilov Siberian wheatgrass - good population , fair vigor; 20. Lutana cicer milkvetch - none found.; 21. Syn-1 alfalfa - none found. Plot will be sprayed with a broad leave herbicide. Will continue to monitor at least one more year.

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 – FY10 no evaluations.

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. FY09and FY10 no evaluations.

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 and FY10 no evaluations.

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. FY09and FY10 no evaluations.

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. FY09and FY10 no evaluations.

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 and FY10 no evaluations.

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 and FY10 no evaluations.

ID10009 Tim Bodine field planting. Recovery western wheatgrass, Vavilov II Siberian wheatgrass and Hycrest II crested wheatgrass (2 acres each) seed was ordered March 1, 2010. Purpose: adaptation to control winter annual grass – ventenata. Site characteristics: MLRA 43, silt loam soil, 5- 7 percent slopes, south aspect, 3570 feet elevation, 20- 22 inch precipitation, non-irrigated, T31N R2E SE quarter Section 10. FY10 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 2011.**

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 and FY10 no evaluations.

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 and FY10 no evaluations.

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 and FY10 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 evaluations.

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 and FY10 no evaluations.

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 – FY10 no evaluations.

IDAHO DIVISION III
PLANT MATERIALS PLANTINGS

FIELD OFFICE: CALDWELL

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. **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 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. **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. **FY10 Regar:** Good stand with 3+ plants/ft2, 10 inch height, 3.6 AUMs/ac. **FY10 Cache:** Good stand with 3+ plants/ft2, 8 inch height, 2.75 AUMs/ac. Fields were grazed in late spring, mowed during summer and grazed again in fall thus not all production is accounted for under the AUMs/ac figures. **FY10 Newhy:** The dead areas (high calcium carbonates locations) were over-seeded with Newhy RS wheatgrass and look much better this year. Both fields would benefit from applications of 2,4D for clover, plantain and other herbaceous weed control. In addition, irrigated forage grasses require fairly high levels of fertility and both fields would probably benefit from applications of fertilizer (primarily nitrogen since this is intended to be an irrigated grass pasture).

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. **Next evaluation scheduled for 2012.**

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 nut-sedge, 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. FY10 this is an excellent stand with 4 plants/ft2, 36-40 inch height and excellent vigor. The inner pond is flooded and the Garrison looks great (100 percent cover); the outer berm built to prevent flooding of adjacent alfalfa field has less water available resulting in a thinner Garrison stand and increased weed pressure.

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. **FY10** Both the Vavilov and Vavilov II plantings have established nicely except for the lower portion of the accession Vavilov where there are very few seedlings. The seed may have been buried too deep to sprout and a reseeding is recommended in this area. The Vavilov planting on the upper slope is thriving; about 5-7 plants per square feet. On the Vavilov II side, there are more plants overall. The Vavilov II accession took a little longer to establish, but now it is looking better than the accession Vavilov. The Vavilov II side has an average of 3 plants per square feet, with some areas at top of slope with densities of 7 plants per square feet. Weeds are not too tall, but there is still pressure in some areas with mustard. The Landowner mowed the stand/weeds in May. Mustard, Russian thistle and kochia are most common on the Vavilov side. Bulbous bluegrass died after being mowed. Overall the wheatgrass has filled significantly this year and the stand is expected to look great next year.

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- FY10 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- FY10 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- FY10 no evaluations.

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 and FY10 no evaluations.

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. FY10 no evaluation.

FIELD OFFICE: MARSING/GRANDVIEW

ID11001 Ron Bitner – vineyard cover crop/erosion control trial. Vavilov II Siberian wheatgrass, Ephraim crest wheatgrass, Roadcrest crested wheatgrass and Recovery western wheatgrass seed was ordered September 23, 2010. Tall fescue, white mustard and Birdsfoot trefoil seed will be obtain by landowner for this trial. Planting is planned for November 1, 2010 or later. Site characteristics: Canyon County Idaho, MLRA 11, Jacquith loamy fine sand soil, 1- 3 percent slopes, 2630 feet elevation, 7- 11 inch rainfall zone, site is irrigated, T3N R4W SE Quarter Section 5. FY10 the IDFG 7 ft drill was rented to complete the plantings. The grass planting was completed November 3rd and the Basalt milkvetch was seeded on November 4th. The birdsfoot trefoil, white mustard, and tansy phacelia will be planted in February 2011.

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. FY10 excellent weed control and irrigation in the 2009 growing season set the stage for a very successful planting. The cool spring temperature and above normal rainfall in the spring of 2010 have helped maintain this trend. All species have thrived with better than 1 plant of each species per square foot. All species have set seed in 2010. This stand is providing very good weed control, ground cover and erosion control. The landowner has sold this land and it is recommended that this planting be removed from the active planting list. **Cancel**

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 and FY10 no evaluation.

FIELD OFFICE: MOUNTAIN HOME

None

FIELD OFFICE: PAYETTE
None

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. FY10 Bozoisky Russian wildrye appears to be the preferred grazing species and grazing pressure is affecting stand health and stand is beginning to look very poor. Goldar bluebunch wheatgrass is probably the next preferred grazing species after Russian wildrye. Secar Snake River wheatgrass is the least preferred grazing species in trial. Rush intermediate wheatgrass is the most aggressive species in the trial and stand survival is high. Because of light grazing pressure, Rush is moving into Goldar bluebunch wheatgrass plots.

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 FY05- FY10 no evaluations.

ID02010 Hugh Pangman - New Meadows Riparian Planting. 9067541 Peachleaf willow - Baker source and Golden willow. 50 cuttings ordered February 11, 2002 for shipment in early May 2002. To be planted with waterjet stinger. FY02 willows were planted through cobbly site using a backhoe to watertable located at 5-6 feet depth. 95 survival of each species. Peachleaf willows are 18-20 inches tall and Golden willows are 24 inches tall. Golden willows are more vigorous with more stem growth. FY03 Peachleaf willow 95 percent survival with 36-48 inch height. Golden willow local cuttings also have 95 percent survival with 48 inch plus height. Producer is please with this planting. FY04 no evaluation. FY05 end of 4th growing season - peachleaf willow 90% survival with excellent vigor, 15 feet plant height, 10 feet crown width, 3 inch DBH. Golden willow 90% survival with very good vigor, 10 feet plant height, 6 feet crown width and 2 inch DBH. Peachleaf plants are more vigorous than golden willow, but in a slightly better site based on soil and moisture availability. Plants are protected from grazing by domestic livestock. FY06 evaluation – peachleaf willow 90 percent survival, excellent vigor, 22-25 feet tall, 15 feet crown width; golden willow 90 percent survival, good vigor, 11-12 feet tall, 8 feet crown widths. Evaluate again in 2007 to document a good record of the success of planting and growth rates. FY07- FY10 no evaluations.

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 – FY10 no evaluations.

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. FY06 – FY10 no evaluations. **Cancel**

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. FY05 – FY10 no evaluations. **Cancel**

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. FY05 – FY10 no evaluations. **Cancel**

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 judgment as not much apparently came. FY09 and FY10 no evaluations.

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 and FY10 no evaluation.

FIELD OFFICE: JEROME/ SHOSHONE/HAILEY
None

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. FY10 the north planting continues to look fairly good with 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; the south planting continues to struggle with poor stands and vigor overall. **Data will be maintained but evaluations will longer be collected for this planting.**

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.
FY10 Dryland Planting: Stand of Rosana western wheatgrass continues to fill in open spaces and was still green in early fall. Vavilov Siberian wheatgrass has an excellent stand with few weeds. FY10 Semi-irrigated Planting: Vavilov failed due to excessive atv traffic and leaking irrigation ditch. Newhy was destroyed to make room for an additional nursery. Bozoisky has an excellent stand with about 12- 18 inches between plants and little to no weeds. Quatro and Covar sheep fescues have excellent stands with no weeds and plant spacing at 6-8 inches. Fescues stands were rated number 1 and wildrye stand was rated number 2. **Data will be maintained but evaluations will longer be collected for this planting.**

	Stand					Vigor				
Species	2003	2004	2005	2006	2010	2003	2004	2005	2006	2010
Irrigated Perennial Cover										
Sherman big bluegrass	good	fair	fair	fair	poor	exc.	fair	exc.	exc.	poor
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	fair
Semi-Irrigated Perennial Cover										
Covar sheep fescue	poor	fair	good	good	exc.	fair	good	exc.	exc.	exc.
Quatro sheep fescue	poor	good	exc.	good	exc.	fair	good	exc.	exc.	exc.
Bozoisky R. wildrye	poor	v. poor	good	good	good	fair	poor	good	good	good
Newhy hybrid wheatgrass	poor	failed	fair	fair	failed	fair	v. poor	good	good	failed
Roadcrest c. wheatgrass	good	fair	poor	poor	failed	good	good	good	fair	failed
Vavilov S. wheatgrass	good	exc.	exc.	good	destroyed	good	exc.	exc.	good	destroyed
Ephraim c. wheatgrass	exc.	fair	exc.	exc.	destroyed	good	fair.	exc.	exc.	destroyed
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	failed	fair	poor	good	good	failed
Sherman big bluegrass	v. poor	v. poor	good	good	failed	poor	v. poor	good	good	failed
Rosana w. wheatgrass	fair	good	exc.	exc.	exc.	good	good	exc.	exc.	good

Recommendations based on evaluation years
Irrigated – Foothills and Talon Canada bluegrass are the best fully irrigated ground cover choices
Semi-irrigated – Vavilov Siberian wheatgrass, Rosana western wheatgrass, Bozoisky Russian wildrye and Ephraim crested wheatgrass provide the best ground cover
Dryland – Vavilov Siberian wheatgrass mixed with Rosana (Recovery) western wheatgrass provides best ground cover

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. FY10 no evaluation.

ID04006 Dickenson 319 riparian woody planting. Laurel willow, golden current, Wood's Rose, redosier dogwood, Siberian peashrub, coyote willow, golden willow, chokecherry, blue spruce, and Austrian pine. Plantings are protected from grazing and grass is mowed around pines, spruce, juniper and sumac.
FY04 planted in May 2004. Plantings are protected from grazing with a fence and arranged in clumps (copses) for natural appearance. Laurel willow 92 percent survival, excellent vigor, 24-36 inch height. Golden current 100 percent survival, excellent vigor, and 18-24 inch height. Wood's rose 100 percent survival, excellent vigor, and 18-24 inch height. Redosier dogwood 60 percent survival, fair vigor, and 18-24 inch height. Siberian peashrub 100 percent survival, excellent vigor, and 18-24 inch height. Coyote willow 80 percent survival, good vigor and 12-48 inch height. Golden willow 100 percent survival, excellent vigor and 72 inch height. Chokecherry 23 percent survival, poor vigor and 36 inch height. Blue spruce 73 percent survival, good vigor and 36 inch height. Austrian pine 100 percent survival, excellent vigor and 36 inch height. FY05 evaluation August 11, 2005- Laurel willow 100% survival, excellent vigor, 4-8 feet height and 2 feet crown width; Golden current 92% survival, excellent vigor, 4 feet height and 2.5 feet crown with; Wood's rose 100% survival, excellent vigor, 2.5 feet height and 3 feet crown width; Redosier dogwood 83% survival, excellent vigor, 4 feet height and 2 feet crown width; Siberian peashrub 12% survival, very poor vigor; Coyote willow 33% survival, good vigor, 5 feet height and 0.5 feet crown width; Golden willow 90% survival, excellent vigor, and 6 feet height; chokecherry 27% survival, fair vigor and 4.4 feet height; blue spruce 73% survival, fair vigor and 4.5 feet height; Austrian pine 100% survival, excellent vigor and 4.6 feet height; Rocky Mountain juniper 100% survival, excellent vigor and 14 inch height; Skunkbush sumac 80% survival, good vigor and 2 feet height. 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. FY10 no evaluation.

ID05002 Perinne Coulee 319 Project riparian planting. Redosier dogwood (accessions 9023733, 9023739 and 9023740), Laurel willow and Peachleaf willow (accessions (9067375, 9067376, 9067541, 9067546, 9067549 and 9067560) cuttings were ordered February 4, 2005. Planted spring 2005. Survival and identification difficult in 2005. 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. FY10 no evaluation.

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. FY10 no evaluation.

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. FY10 no evaluation.

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. FY10 no evaluation.

ID09012 Twin Falls East Perrine Riparian Planting. 9076375 peachleaf willow (40 cuttings) ordered February 2009. Planted on May 8, 2009. FY10 no evaluation.

IDAHO DIVISION V
PLANT MATERIALS PLANTINGS

FIELD OFFICE: AMERICAN FALLS/ABERDEEN
ID07022 Wynn Farms Magnar basin wildrye demonstration planting. Seed ordered April 12, 2007. Seed shipped April 13, 2007. FY07- FY10 no evaluations. **Cancel**

FIELD OFFICE: BLACKFOOT
None

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. No evaluation.

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 – FY10 no evaluations.

Species	**Percent Stand**		**Vigor**		**Height**	
	2005	**2011**	**2005**	**2011**	**2005**	**2011**
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- FY10 no evaluations.

ID09002 _____ - Recovery western wheatgrass field planting. Seed shipped September 29, 2008. FY09 – FY10 no evaluations.

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 and FY10 no evaluations.

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. FY10 no evaluation.

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 – FY10 no evaluations.

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 and FY10 no evaluations. **Cancel**

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. FY10 poor stand. **Cancel**

ID05015 Winterfeld Pryor slender wheatgrass for seed increase. Seed shipped May 2, 2005. FY05 no evaluation. FY06 excellent stand with excellent vigor - seed production not reported. FY07 excellent stand with excellent vigor – 320 pounds per acre cleaned seed production. FY08 320 pounds of cleaned seed production per acre and 0.75 tons per acre hay. FY09 no evaluation. FY10 poor stand. **Cancel**

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. FY10 poor stand. **Cancel**

ID07012 Winterfeld Regar meadow brome for seed increase. Seed shipped March 1, 2007. FY07 excellent stand with excellent vigor – establishment year – no seed production. FY08 8 pounds per acre seed production due to poor moisture year. FY09 no evaluation. FY10 poor stand. **Cancel**

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. FY10 harvested – seed not conditioned.

ID08003 Winterfeld Bannock thickspike wheatgrass seed increase. Seed shipped February 28, 2008. FY08 planted June 5, 2008. FY09 no evaluation. FY10 excellent stand with approximately 4000 pounds production.

ID08004 Winterfeld Vavilov II Siberian wheatgrass seed increase. Seed shipped February 28, 2008. FY08 planted June 5, 2008. FY09 no evaluation. FY10 excellent stand with approximately 7600 pounds production.

ID09001 Winterfeld Richfield firecracker penstemon seed increase. Seed shipped September 24, 2008. FY10 not planted.

FIELD OFFICE: REXBURG
None

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. FY10 Rush intermediate wheatgrass - irrigated portion of stand: excellent stand, 6 plants/ft2, 50- 60 inch height, fair vigor; non-irrigated portion of stand, Rush is sparse with very low production. Cooperator has passed away. **Cancel**

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. FY10 Rush intermediate wheatgrass excellent stand, 68 inch height, very good density, outstanding performance, rates very high for use in cross wind strips; Bozoisky Russian wildrye excellent stand, 20 inch height, not enough height for cross wind strips, irrigation may be too much water for this species; Mankota Russian wildrye excellent stand, 20 inch height, not enough height for cross wind strips, irrigation may be too much water for this species; Alkar tall wheatgrass good stand, 68 inch height, not as dense as Rush, outstanding performance, rates very high for use in cross wind strips; Largo tall

wheatgrass good stand, 72 inch height, not as dense as Rush, outstanding performance, rates very high for use in cross wind strips; Manifest intermediate wheatgrass fair stand, 50 inch height, drifting sand appears to be affecting stand quality, ergot present in seedheads, not a good choice for cross wind strips; Luna pubescent wheatgrass excellent stand, 53 inch height, drifting sand appears to be affecting stand quality, ergot present in seedheads, not a good choice for cross wind strips.

FIELD OFFICE: RIGBY/DUBOIS

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. **Planting will no longer be evaluated, but will be maintained for training purposes.**

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. **Planting will no longer be evaluated, but will be maintained for training purposes.**

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. **Planting will no longer be evaluated, but will be maintained for training purposes.**

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. **Planting will no longer be evaluated, but will be maintained for training purposes.**

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 – FY10 no evaluations.

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 berm near pond - was the only location where wildlife use was evident – probably moose.
Site 2 berm 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

2010

UTAH EVALUATION SUMMARIES

FIELD 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. FY10 Mix 1: yarrow, Maple Grove Lewis flax and Bandera Rocky Mountain penstemon fair stands, Magnar basin wildrye poor stand. All other species in planting failed. Surviving plants primarily found scattered in patches across the planting; Mix 2: Appar blue flax and Bandera Rocky mountain penstemon fairs stands. Rimrock Indian ricegrass poor stand. All other species in planting failed. Surviving plants primarily found scattered in patches across the planting. Forbs were affected by herbicide utilized for Canada thistle control. **Cancel**

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. FY10 Peachleaf willow survival: 9067375 – 8 percent, 9067376 – 8 percent, 9067541 – 4 percent, 9067546 – 4 percent, 9067549 – 36 percent and 9067560 – 36 percent; dogwood and elderberry failed. Weed competition from quackgrass and Reed canarygrass is very severe.

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. FY10 Peachleaf willow survival: 9067549 - 28 percent and 9067560 - 32 percent; Coyote willow survival - 66 percent. This planting is performing very well.

UT09003 Lyle Holmgram Tremonton Field Office adaptation trial. 10 plants of 9008027 silver buffaloberry were ordered February 2009 for delivery in late March. FY10 Silver buffaloberry – 30 percent survival and about 8 inches tall.

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. FY10 initial establishment – Vavilov II Siberian wheatgrass good stand with 4 plants per foot squared and excellent vigor; Bozoisky II Russian wildrye plants not apparent; Oahe intermediate wheatgrass good stand with 4 plants per foot squared and excellent vigor; Ranger alfalfa fair stand with 0.2 plants per foot squared and excellent vigor. Overall planting is establishing very well.

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 2011.**

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. FY10 Planting # 1 P27 failed – Bannock failed – Nezpar poor stand – alfalfa failed – Volga poor stand. Sand dropseed dominates the site with globemallow very common. Planting # 2 Vavilov good stand with 0.5 plants/ft2 - Nezpar very poor stand – Bannock very poor stand – Magnar fair stand - Volga fair stand – Snake River Plains fourwing saltbush fair stand. Vavilov dominates the site following excellent spring and summer rain in 2010.

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 - 10 no evaluations. **Cancel**

UT07002 Niels Hansen seed increase planting. Northern Cold Desert winterfat seed shipped February 8, 2007. Seed will be planted the spring of 2007. FY07 In the spring of 2007 6.5 acres of Northern Cold Desert Germplasm Winterfat was planted. The seeding rate was approximately 2 lbs per acre in rows five feet apart using a ten foot double disk grain drill with all but three of the drops taped shut. Row spacing was 5 feet. Soil had been prepared in the fall of 2006 with no tillage in the spring and soils were firm. On 3/20/07 seed was placed in a groove 1/4 to1/2 inch deep, but there was no packing wheel. The actual seeding rate was less due to adding too many rice hulls with the seed and occasional plugging. There were very harsh spring conditions for germination because there was no rain. It rained the second week in June and some winterfat germinated, but there was no rain again for four weeks. About 30 plants survived. They grew a foot tall by fall of 2007 and had heavy seed production. FY08 in fall of 2007 part of the winterfat field was replanted using left-over seed. The DWR cone seeder with 1/4 inch depth bands was used for this planting. In spring of 2008 the field was tilled for several reasons: no new seedlings were observed; the stand was too thin for production; and a significant encroachment of squarrose knapweed was observed. Landowner is holding back a half acre of this land where there were about 30 winterfat plants that grew where he spilled some seed cleaning the drill. These plants were hand-transplanted to a five foot spacing and will be sprinkle irrigated because he believes winterfat responds well to mid summer moisture. In fall of 2008 or spring of 2009 additional winterfat seed will be planted into weed barrier material. The other 6 acres have been spot sprayed with Milestone, sprayed with glyphosate first week of June, tilled twice in June, and sprayed with glyphosate and 2,4-D July 12. Some weed seed will persist next year, but weeds that have sprouted are gone. FY09 and FY10 no evaluations.

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 and FY10 no evaluations.

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 and FY10 no evaluations.

UT08001 Lee Madison (ARS) Demonstration Plots – Fillmore FO planting planned for late November 2007. FY09 and FY10 no evaluations.

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. FY10 two sites were seeded; Site 1: embankment around an irrigation pond; Rush intermediate wheatgrass has a fair stand; Regar meadow brome failed; site is heavily grazed to a 2 inch stubble height. Site2: stream diversion area; evidence of Rush intermediate wheatgrass establishment; Regar meadow brome failed; due to equipment traffic to repair stream down cuttings only remnant stand still exists.

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 and FY10 no evaluations.

UT10002 Niels Hansen seed increase planting Vavilov II Siberian wheatgrass. 50 PLS of Foundation seed shipped 11/12/09. FY10 no evaluation.

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 and FY10 no evaluations.

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 and FY10 no evaluations.

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 2011.**

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. FY10: Excellent stands with good vigor of Tegmar, Topar and Paiute. **Cancel**

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 – FY10 no evaluations.

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 and FY10 no evaluations.

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. FY10 planting failed. **Cancel**

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. FY10 poor stand of Alma blue grama, Appar blue flax and Richfield firecracker penstemon. **Cancel**

UT07001 James Wheeler – Monticello FO field planting. Seed of P-7 bluebunch wheatgrass, Anatone bluebunch wheatgrass, Regar meadow brome, Cache meadow brome, Rush intermediate wheatgrass, Topar pubescent wheatgrass, Paiute orchardgrass, Bozoisky Russian wildrye, Vavilov Siberian wheatgrass and Sherman big bluegrass were ordered on August 28, 2006. A dormant fall planting is scheduled for late October to early November. Site characteristics include MLRA 36, silty clay loam soil, 0-2 percent slopes, NE aspect, 14-16 inch precipitation, T32S R26E NE ¼ Section 31. FY06 seed was drill planted into prepared seedbed on November 17, 2006. Soil moisture and fall rain was good prior to and after planting. It turned cold and snowy soon after planting. FY07 this area is suffering from the current drought conditions. Kyle explained that they did have some grass coming up from the planting in the spring but not much since. We walked around and looked and in fact did find some dormant grass plants that had become established. Dan indicated that it looks as if they got established enough for them to come up this next spring. We did see quite a few weeds in the planting but that is to be expected in the early stages of a new planting. Kyle and his Dad are optimistic and look forward to this coming spring to see how the grasses come back. FY10 Rush intermediate wheatgrass excellent stand with excellent vigor; Vavilov Siberian wheatgrass good stand with excellent vigor; P27 Siberian wheatgrass fair stand with excellent vigor. Anatone bluebunch wheatgrass, Regar meadow brome, Cache meadow brome, Topar intermediate wheatgrass, Paiute orchardgrass poor to very poor stands.

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. FY10 planting has not been completed.

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. FY10 planting failed. **Cancel**

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. FY10 good to excellent stand of all species planted.

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. FY10 broadcast planted with very poor establishment of all plots. **Cancel**

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. FY10 planting failed. **Cancel**

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. FY10 planting failed. **Cancel** FY09 and FY10 no evaluations.

UT11001 Monument Valley High School (Monticello) demonstration planting. Nezpar Indian ricegrass, Paloma Indian ricegrass, Rimrock Indian ricegrass, Cochise spike dropseed, Vavilov II Siberian wheatgrass, P27 Siberian wheatgrass and Volga mammoth wildrye seed ordered March 30, 2010. Planting planned for fall 2010. Purpose – field/demonstration planting – FFA project. Site characteristics – MLRA 35, 5 acres, Monue-Sheppard complex fine sandy loam, 1-3 percent slope, 5180 feet elevation, 7- 8 inch rainfall, T43S R16E SW1/4 Section 32. FY10 planted fall 2010.

UT11002 Grand County demonstration plantings. Paloma Indian ricegrass, Nezpar Indian ricegrass, Viva galleta, Arriba western wheatgrass, Recovery western wheatgrass, Secar Snake River wheatgrass, Discovery Snake River wheatgrass and Jemez NM olive seed plants ordered July 12, 2010. Seed for 6 demonstration plot locations in Grand County. Plantings intended to determine replacement species for tamarisk removal projects.

UT11003 Chris Carter (Castle Dale) field planting. P27 Siberian wheatgrass, Vavilov II Siberian wheatgrass, Nezpar Indian ricegrass, Northern Cold Desert winterfat and Immigrant forage kochia seed was ordered September 22, 2010. Seeding is planned for late fall (dormant) 2010. Site characteristics – MLRA 34, Killpack/Sagar loam soil, 0-3 percent slopes, 5700 feet elevation, 7- 9 inch precipitation zone, non-irrigated, T17S R9E SE ¼ Section 24..