



Aberdeen Plant Materials Center

United States
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Agriculture

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**Natural Resources
Conservation Service**

Aberdeen, Idaho

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Bioengineering as a tool for restoring ecological integrity to the Carson River

Riparian Zone Restoration: Field Requirements and Nursery Opportunities. Native Plant Journal, Moscow, ID

View from a Wetland: 2000. No. 6, Jan. 2001

Perigynium Removal and Cold Moist Stratification Improve Germination of *Carex nebrascensis*. Native Plant Journal, Moscow, ID

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 has been the primary breeder and releasing organization for 15 cultivars and a cooperator in the release of 12 additional cultivars. The Aberdeen Plant Materials Center serves portions of Nevada, Utah, California, Oregon and Idaho. This document is a compilation of progress reports for activities by the Aberdeen Plant Materials Center during FY 2001.

The following documents and presentations were developed during FY 2001 and may be obtained by contacting the Aberdeen Plant Materials Center:

DOCUMENTS

- USDA-ARS Forage and Range Lab 2001. Intermountain Planting Guide. USDA-ARS Forage and Range research lab, and USU, Logan, UT. March 2001. 104p.
- USDA,NRCS 2001. Plants for Riparian Buffers. IDPMC, Boise, ID. Sept. 2000. 8p.
- Tingle, J. and JC Hoag 2001. Characterization of Sandbar Willow Stems for Erosion Control Applications. USACE WOTS program, WES, Vicksburg, MS, Vicksburg, MS. ERDC WQTN-MS-06, Sept.
- St. John,L. 2001. Filter Strips for Surface Irrigated Fields. Aberdeen PMC, 4p.
- St. John, L., C. Hoag, and D. Ogle. 2001. 2000 Progress Report of Activities. USDA-NRCS Aberdeen Plant Materials Center, Aberdeen, ID. January 2001. 18p.
- St. John, L. and P. Blaker 2001. Foundation Seed Production at Aberdeen Plant Materials Center. Aberdeen Plant Materials Center, Aberdeen, ID. 1p.
- St. John, L. 2001. 1996 Native Bluegrass Evaluation Planting - 1996-2000 Summary Report. Aberdeen PMC, Aberdeen, ID. 6p.
- St. John, L. 2001. 1998 Hybrid Poplar Initial Evaluation - 2000 Progress Report. 2p.
- St. John, L. 2001. Grantsville Off-Center Advanced Test Site - Summary of Progress 1994-2000. Aberdeen PMC, 28p.
- St. John, L. 2001. Grantsville OffCenter Advanced test site 2000 progress report. Aberdeen, ID. 5p.
- St. John, L. 2001. Idaho Army National Guard Vegetative Rehabilitation Project - 2000 Progress Report. Aberdeen, ID. 19p.
- St. John, L. 2001. Mountain Home Air Force Base Windbreak Installation and Demonstration - 2000 Progress report. Aberdeen, ID. 2p.
- St. John, L. 2001. Plant Testing Activities at Grantsville, Utah Test Site. Current Developments, Oregon, Nevada, Utah, Idaho and National PMC newsletter, 1p.
- St. John, L. 2001. Plant Testing Activities at Idaho Army National Guard. Current Developments Oregon, Nevada, Utah, Idaho and National PM newsletter, 1p.
- St. John, L. 2001. Plant Testing Completed at Coffee Point Off-Center Advanced Test Site. Current Developments, Oregon, Utah, Nevada, Idaho and National PMC newsletter, 1p.
- St. John, L. 2001. Species Descriptions of Some Common windbreak Plants adapted to Southern Idaho. Aberdeen, ID. 2p.
- St. John, L. 2001. Technical Note 37: Hybrid Poplar - An Alternative Crop for the Intermountain West. USDA-NRCS, Boise, ID. ID-TN37; Jan. 2001. 11p.
- St. John, L. 2001. Technical Note Agronomy No. 9 - filter strips for surface irrigated fields. Aberdeen

St. John, Hoag, Ogle 2001. Aberdeen PMC 2000 Annual Technical Report. Aberdeen PMC, Aberdeen PMC. March 2001. 304p.

St. John L. and P. Blaker 2001. New Plant Releases From the Aberdeen Plant Materials Center. Sage Grouse Habitat Restoration Symposium June 4-7, 2001, Boise, Idaho, Aberdeen, ID. 6p.

St. John 2001. Penstemon Certification Regulations in Idaho. Idaho Crop Improvement Association, 4p.

Poulson, N, M. Poulson, J.C. Hoag, J. Stark, S. Howser, and A Funk 2001. The Fairview Wetland Project Water Quality Report, March 2001. Fairview wetland project, American Falls, ID. March 2001. 51p.

Piper, KL, J.C. Hoag, H.H. Allen, G. Durham, and JC Fischenich 2001. Bioengineering as a tool for restoring ecogocial integrity to the Carson River. USACE Waterways Experiement Station, Vicksburg, MS. ERDC WQTN-CS-03 2001. 14p.

Ogle, St. John, Norris 2001. Wildfire Recovery Tips for Small Landowners. Boise, Id, 4p.

Mohan, S.K., Bijman, V.P. and St. John, L. 2001. Bacterial Leaf Stripe Caused by Xanthomonas translucens pv. cerealis on Intermediate Wheatgrass in Idaho. University of Idaho, 4/00. 1p.

Hoag, JC 2001. Clear Lakes Banking Wetland Evaluation for 2000. IDPMC, Aberdeen, ID. January 2001.

Hoag, J.C., S.K. Wyman, G. Bentrup, L. Holzworth, D.G. Ogle, J. Carleton, F. Berg, and B. Leinard. 2001. Technical Note 38: Users Guide to the Description, Propagation, and Establishment of Wetland Plant Species and Grasses for Riparian Areas in the Intermountain West. USDA-NRCS, Boise, ID and Bozeman, MT. ID-TN38 and MT-TN38, Feb. 2001. 46p.

Hoag, J.C., L. St. John, and D.G. Ogle. 2001. Technical Note 4: Reading Seed Packaging Labels and Calculating Seed Mixtures. USDA-NRCS, Boise, ID. ID-TN4; June 2001. 12p.

Hoag, J.C., F.E. berg, S. K. Wyman, and R.W. Sampson. 2001. Riparian/Wetland Project Information Series No. 16: Riparian Planting Zones in the Intermountain West. USDA-NRCS Aberdeen Plant Materials Center, Aberdeen, ID. March 2001. 24p.

Hoag, J.C., B. Simonson, B. Cornforth, and L. St. John. 2001. Riparian/Wetland Project Information Series No. 17: Waterjet Stinger - A tool to plant dormant unrooted cuttings of willows, cottonwoods, dogwoods, and other species. USDA-NRCS Aberdeen Plant Materials Center, Aberdeen, ID. Jan. 2001.

Hoag, J.C., B. Simonson, B. Cornforth, and L. St. John. 2001. Technical Note 39: Waterjet Stinger - A tool to plant dormant unrooted cuttings of willows, cottonwoods, dogwoods, and other species. USDA-NRCS, Boise, ID. ID-TN39; Feb. 2001. 13p.

Hoag, J.C., B. Simonson, B. Cornforth, and L. St. John 2001. Waterjet Stinger: A tool for planting dormant nonrooted cuttings. Native Plant Journal, Moscow, ID. Fall, 2001. 6p.

Hoag, J.C., Compiler 2001. Riparian Ecology, Management and Restoration Workshop Handbook. ABPMC Interagency Riparian/Wetland Project, Aberdeen, ID. 2001. 300p.

Hoag, J.C. and T.D. Landis 2001. Riparian Zone Restoration: Field Requirements and Nursery Opportunities. Native Plant Journal, Forest Research Nursery, Dept. of Forest Resources, University of Idaho, Moscow, ID, Moscow, ID. Spring 2001. 6p.

Hoag, J.C. 2001. View from a Wetland: 2000. USDA-NRCS Aberdeen Plant Materials Center, Aberdeen, ID. No. 6, Jan. 2001. 4p.

Hoag, J. C., R. K. Dumroese, and ME Sellers 2001. Perigynium Removal and Cold Moist Stratification Improve Germination of Carex nebrascensis. Native Plant Journal, Forest Research Nursery, Dept. of Forest Resources, Univeristy of Idaho, Moscow, ID. Spring 2001. 4p.

Bentrup, G. and JC Hoag 2001. Plant Datsheets for The Practical Streambank Bioengineering Guide. ABPMC, Aberdeen, ID. 2001. 16p.

PRESENTATIONS

Date 10/16/00

Title: Ft. Hall Americorps PM training and tour

Date 3/4/01

Title: Riparian Ecology, Management, and Restoration Workshop - Field Exercise at Chalk Creek

Presenter: Hoag and Ellicott

Location Coalville, UT

Date 3/16/01

Title: Presentation of Penstemon Certification Standards to Foundation Seed Stocks

Presenter: St. John

Location Kimberly, ID

Date 4/15/01

Title: Constructed Wetland Systems for Bioremediation

Presenter: Hoag

Location Idaho State University, Pocatello, ID

Date 4/18/01

Title: Orchard Off-center tour

Presenter: St. John, Ogle

Location Orchard Off-center test site

Date 4/25/01

Title: Aberdeen PMC Activities update to PNW Advisory group

Presenter: St. John

Location Spokane WA

Date 4/25/01

Title: Riparian Ecology, Management, and Restoration Workshop - Preston

Presenter: Hoag and Sampson

Location Preston, ID

Date 4/26/01

Title: Recommendation to drop Topar Foundation Seed Production

Presenter: St. John

Location Spokane, WA

Date 4/26/01

Title: Riparian Ecology, Management and Restoration workshop - Field Exercise

Presenter: Hoag and Sampson

Location Preston, ID

Date 5/7/01

Title: Picabo Ranch Windbreak Demonstration

Presenter: PMC

Location Picabo, ID

Date 5/7/01

Title: Fairfield Waterjet Stinger Demonstration

Presenter: Hoag

Location Fairfield, ID

Date 5/9/01

Title: Weiser Waterjet Stinger Demonstration

Presenter: Hoag

Location New Meadows, ID

Date 5/10/01

Title: Aberdeen VO-AG Plant Materials Training

Presenter: Cornforth

Location PMC

Date 5/10/01

Title: Goose Creek waterjet stinger demonstration

Presenter: Hoag **Location** New Meadows, ID
Date 5/15/01
Title: USFS Region 1 and 4 PMC tour

Presenter: St. John and Hoag **Location** PMC
Date 5/21/01
Title: Wetland Restoration and Enhancement Training Course

Presenter: Hoag, O'Clair **Location** Syracuse, NY
Date 5/22/01
Title: Aberdeen Fifth graders PMC training

Presenter: PMC **Location** PMC
Date 5/30/01
Title: Constructed Wetland Systems for Agricultural wastewater

Presenter: Hoag **Location** Fairview Wetland, American Falls, ID
Date 6/5/01
Title: Riparian Revegetaion and Streambank Stablization Training for the Nevada Pyramid Lake Paiute Tribe

Presenter: Hoag **Location** Reno, NV
Date 6/13/01
Title: Idaho-Utah Interagency Plant Materials tour of PMC

Presenter: St. John and Hoag **Location** PMC
Date 6/17/01
Title: China and Mongolia PM Training

Presenter: Cornforth, Ogle, St. John **Location** PMC
Date 6/25/01
Title: Division VI NRCS Stream Assessment Training session

Presenter: Hoag, Sampson, Gill **Location** Rexburg, ID
Date 7/10/01
Title: Plant Materials Multi-state Training Session

Presenter: PMC **Location** Aberdeen PMC
Date 7/24/01
Title: Seed Production training

Presenter: Cornforth, Simonson, St. John **Location** PMC
Date 7/25/01
Title: Seed grower training

Presenter: Cornforth, Simonson, St. John **Location** PMC
Date 8/2/01
Title: Windbreak training and tour of PMC windbreak work

Presenter: Cornforth, St. John **Location** Aberdeen PMC

Date 8/13/01
Title: Stream Assessments using SVAP
Presenter: Hoag **Location** Morgan, UT

Date 8/16/01
Title: Coffee Point tour for Farm Management Co.
Presenter: St. John **Location** Coffee Point off-center test site

Date 8/25/01
Title: Bioengineering from a watershed perspective
Presenter: Hoag, Allen, and Sotir **Location** ASCE Wetlands engineering and River

Date 8/27/01
Title: Constructed Wetland System to treat irrigation wastewater in the Arid and Semi-arid
Presenter: Hoag **Location** Reno, NV

Date 9/6/01
Title: Nevada Indian Agricultural and Environmental Summit2
Presenter: Hoag **Location** Reno, NV

Date 9/7/01
Title: Nevada Indian Agricultural and Environmental Summit
Presenter: Hoag and Ogle **Location** Atlantis Casino Resort, Reno, NV

Date 9/25/01
Title: Waterjet Demo and streambank bioengineering review at Arimo Ranch
Presenter: Hoag, JC **Location** Aberdeen PMC and Arimo Ranch, Arimo,

Date 9/26/01
Title: PMC Agroforestry Tour
Presenter: Cornforth, Ogle, St. John **Location** Aberdeen PMC

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NEW PLANT RELEASES

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
ABERDEEN, IDAHO and PULLMAN, WASHINGTON

and

THE IDAHO AGRICULTURAL EXPERIMENT STATION
UNIVERSITY OF IDAHO
MOSCOW, IDAHO

NOTICE OF RELEASE OF
SNAKE RIVER PLAINS GERMPLASM FOURWING SALTBUH
SELECTED CLASS GERMPLASM

The Natural Resources Conservation Service, U.S. Department of Agriculture and the Idaho Agricultural Experiment Station announce the select release of a selected ecotype of Snake River Plains fourwing saltbush (*Atriplex canescens* (Pursh) Nutt.) for the intermountain west region.

As a selected release, this plant will be referred to as Snake River Plains Germplasm fourwing saltbush to document its original collection location. It has been assigned the NRCS accession number 9067480. Snake River Plains Germplasm is released as a selected class of certified seed (manipulated).

This alternative release is justified because it was selected for cold hardiness and should be better adapted to the northern range of fourwing saltbush and existing sources of fourwing saltbush are inadequate.

Collection Site Information: Snake River Plains Germplasm 9067480 is a composite of 9003126, 9003134, 9003135, and 9003136. 9003126 was collected in 1976 southwest of American Falls, Power County, Idaho along the Snake River on a southwest exposure and 30-60 percent slope. 9003134 was collected in 1976 near Oreana turnoff south of Fossil Butte, Owyhee County, Idaho at an elevation of about 2000 feet and was noted for being very leafy. 9003135 was collected in 1976 near milepost 95 on Highway 78, upstream from Indian Cove Bridge, Elmore County, Idaho at an elevation of about 2000 feet. 9003136 was collected in 1976 near Reynolds Creek, 0.5 miles northeast of Wilson Peak, Elmore County, Idaho at an elevation of about 2200 feet. No other specific collection site information is available.

Description: Fourwing saltbush, *Atriplex canescens* is an erect shrub that can grow to six feet tall. 9067480 under irrigated conditions at Aberdeen, Idaho grows to about three feet wide by four feet tall. Under dryland conditions near Grantsville, Utah it grows to about two feet wide by two feet tall. Fourwing saltbush is dioecious. Leaves are alternate, sessile, and up to 2 inches long. Fruit bracts have 4 prominent wings.

Method of Selection: Snake River Plains was selected from a collection of 83 accessions assembled and evaluated at the Aberdeen Plant Materials Center from 1977 to 1986. The four accessions were selected for their tolerance to cold temperatures and then were planted in a seed increase block that was not reproductively isolated. The seed from the increase block was bulked and given the accession number 9067480. Off-Center testing by the Aberdeen Plant Materials Center was conducted near Grantsville, Utah from 1995 to 2000 and near Boise, Idaho from 1998 to 2000 to evaluate the accession under field conditions. The Pullman Plant Materials Center also conducted field evaluations from 1982 to 1999 near Squaw Butte, Oregon and Lind, Washington.

Ecological Considerations and Evaluation: This release is from a species native to the intermountain region with three previous releases; 'Marana', 'Rincon' and 'Santa Rita'. This selection is from a species that is well documented as having beneficial qualities, and no negative impacts on wild or domestic animals. The test plots supporting this release were in close proximity to natural and induced plant ecosystems. There was no evidence of negative impacts or invasion into those ecosystems. Snake River Plains Germplasm was documented as "OK to release" when evaluated through the "Worksheet for Conducting an Environmental Evaluation of NRCS Plant Releases".

Anticipated Use: The anticipated uses of Snake River Plains fourwing are erosion control; rangeland restoration; livestock and big game browse; and wildlife plantings in dry, moderately saline or alkaline areas. Its shape and root system provides excellent erosion control especially in areas where very little other vegetation can survive. Fourwing saltbush can be used as a browse throughout the year.

Area of Adaptation: Snake River Plains fourwing saltbush is potentially adapted to the northern portion of the Intermountain western United States. It can tolerate moderately saline and alkaline areas and droughty conditions. It is adapted to shallow rocky loams, sandy loams, gravelly loams, and silt loams that are well-drained to moderately well-drained.

Availability of Plant Materials: G0 and G1 seed will be maintained by the Aberdeen Plant Materials Center. Growers may produce two generations (G2 and G3) from the G1 seed.

Prepared by: This notice of Release of Snake River Plains fourwing saltbush was prepared by Loren St. John, Team Leader, Aberdeen Plant Materials Center, Mark Stannard, Team Leader, Pullman Plant Materials Center, Wayne Crowder, Assistant Manager, Pullman Plant Materials Center, and Dan Ogle, Plant Materials Specialist, USDA Natural Resources Conservation Service, Boise, Idaho for joint release by the Natural Resources Conservation Service in Idaho, Nevada, Oregon, Utah, and Washington; and the Idaho Agricultural Experiment Station, University of Idaho.

Signatures for Release of:

Snake River Plains Germplasm fourwing saltbush (*Atriplex canescens*)

Richard W. Sims, State Conservationist, Idaho

Date

Nicholas Pearson, State Conservationist, Nevada

Date

Robert J. Graham, State Conservationist, Oregon

Date

Philip J. Nelson, State Conservationist, Utah

Date

Leonard Jordan, State conservationist, Washington

Date

Diane Gelburd, Director, Ecological Sciences Division

Date

Richard Heimsch, Director, Idaho Experiment Station

Date

Release Documentation
For
9067480 Fourwing Saltbush

Loren St. John, Aberdeen Plant Materials Center
Wayne Crowder, Pullman Plant Materials Center

In November, 1976 a fourwing saltbush Initial Evaluation Planting (IEP) was seeded at the Aberdeen Plant Materials Center (PMC) to evaluate collections of fourwing saltbush for adaptation and potential use in minespoil reclamation, rangeland seeding, and other revegetation efforts. Five accessions and a mixture of seed from a previous planting were seeded in a randomized complete block design with six replications. The seed mixture plots failed to germinate and were reseeded the next year. Seventy-eight additional accessions were transplanted into the IEP in 1977, 1979 and 1980.

During the winter of 1978-79 temperatures were well below normal. The minimum temperature of -33° F occurred on January 29, 1979. Many accessions did not survive this extreme temperature event. In November, 1980 four accessions; 9003126, 9003134, 9003135, and 9003136 (parent accessions of 9067480) were selected to be included in an Inter-Center Strain Trial (ICST) because of their tolerance to the cold temperatures encountered the previous winter. In late January and early February, 1989 a climatic event resulting in a 50° F swing in temperature (32° to -18° F) over a 48 hour period occurred. The parent accessions of 9067480 were not affected by this unusual climatic event.

The ICST was established at the Coffee Point Off-Center Test Site (located approximately 25 miles northwest of Aberdeen) in 1983. Twenty-one accessions were transplanted to the test site. Table 1 is a summary of evaluation data collected in 1984, 1985, and 1986. The evaluations conducted in 1984 showed vigor for the parent accessions of 9067480 to be near average of all the accessions tested. Vigor of the parent accessions was above average in 1985 and 1986. Plant height of the parent accessions of 9067480 was near average in 1984 and 1985. Seed set for the parent accessions was rated above average in 1986.

In 1983, the United States Department of Agriculture, Forest Service, released 'Rincon' fourwing saltbush. It became apparent after the release that field plantings of Rincon were not as cold tolerant as needed for the northern range of the species, so it was decided to continue advanced testing at the Aberdeen PMC. A crossing block of 903126, 9003134, 9003135 and 9003136 was established at the Aberdeen PMC Fish and Game Farm in July, 1985. In the fall of 1989, seed was collected from the block, bulked and planted into a new crossing block and the accession number 9067480 was established. Transplants from seed harvested in 1997 from the 1989 crossing block were established at the Aberdeen PMC Home Farm in July, 1999.

Accession number 9067480 was seeded at the Grantsville, Utah ICST (approximately 30 miles southwest of Salt Lake City) in April, 1995. The test site is located in a 10 – 12 inch annual precipitation area. The trial was seeded with a hand-pushed belt seeder. Included in the trial were accessions of fourwing saltbush and winterfat. The trial was a complete randomized block design with four replications. Each plot was 20 feet long consisting of 4 rows spaced 4 feet apart. The

seeding rate for all accessions was 15 pure live seeds (PLS) per linear foot. No supplemental water was provided at any time. Table 2 summarizes evaluation data of the fourwing saltbush accessions included in the Grantsville ICST.

Data was collected on plant height, percent canopy cover, plant density and vigor during the evaluation period from 1995 to 2000. Individual plant canopy width data was collected during the May 9, 2000 evaluation.

Accession no. 9067480 was the tallest of the fourwing saltbush accessions after the second year of growth. The final evaluation showed 9067480 to average 62.5 cm in height followed by Rincon (57.0 cm) and Wytana (34.0 cm).

Canopy cover data shows that 9067480 had the greatest cover since the second year of growth. The final evaluation of canopy cover in May, 2000 showed accession no. 9067480 had 63.3 percent canopy cover followed by Rincon (52.8 percent) and Wytana (21.8 percent).

Individual plant canopy width evaluated on May 9, 2000 found negligible differences between 9067480 and Rincon (71.3 and 71.0 cm respectively). Individual plant canopy width for Wytana averaged 33.0 cm.

During 1998 and 1999, plant density for 9067480 exceeded the other two accessions. The final evaluation on July 11, 2000 showed 9067480 with an average plant density of 0.74 plants per meter², Rincon 0.69 plants per meter², and Wytana 0.52 plants per meter².

Vigor, a subjective rating of plant health and growth was also evaluated. Between 1996 and 2000 accession 9067480 had the best vigor ratings of the fourwing saltbush accessions.

Accession number 9067480 was also seeded at the Range 26 Site ICST located approximately 30 miles south of Boise, Idaho in February, 1998. The test site is located in a 7 – 10 inch annual precipitation area. The trial was seeded with a hand-pushed belt seeder. Included in the trial were accessions of fourwing saltbush and winterfat. The trial is a complete randomized block design with four replications. Each plot is 20 feet long consisting of 4 rows spaced 4 feet apart. The seeding rate was 15 PLS per linear foot. No supplemental water was provided at anytime.

Due to very dry conditions following planting (2.27 – 5.51 inches annually) plant establishment and growth is limited. Total plant counts made during 2000 found 4 Wytana plants, 1 plant of 9067480 and no Rincon plants. Plant height evaluations found 9067480 at 2.5 cm and 0.5 cm for Wytana.

The Pullman PMC established two ICST plantings (Squaw Butte, Oregon and Lind, Washington) in May, 1982. Nineteen accessions of fourwing saltbush were planted in each trial and included the parent accessions of 9067480 (9003126, 9003134, 9003135 and 9003136). Marana, Rincon, and Wytana were standards of comparison. No supplemental water was provided at any time.

The Squaw Butte site is located 45 miles west of Burns, Oregon on a silt loam soil. The elevation is 4,640 feet and annual precipitation is approximately 14 inches. The Lind site is 2 miles north of

Lind, Washington on a silt loam soil, elevation 1,640 feet and annual precipitation is approximately 9.9 inches.

Table 3 summarizes the data collected at Squaw Butte from 1982 to 1992. All accessions listed in Table 3 had 100 percent survival the first year. By 1992, the last year of evaluation, the parent accessions of 9067480 as a group had better survival than Rincon and Wytana.

In 1989, the last year that plant height and canopy width were measured, the plant height of the parent accessions of 9067480 as a group was slightly less than Rincon but were substantially taller than Wytana. Canopy width of the parent accessions of 9067480 was slightly greater than Rincon and were much greater than Wytana.

There were negligible differences in vigor between the accessions in 1983. By 1992, the parent accessions of 9067480 had better vigor than Rincon and Wytana.

Potential seed production was also rated. In 1983, the parent accessions of 9067480 as a group had greater potential than Rincon and less potential than Wytana. In 1989, the parent accessions of 9067480 had greater potential than Wytana and less potential than Rincon.

Table 4 summarizes evaluation data collected at Lind, Washington from 1982 to 1991. All accessions listed in table 4 had 100 percent survival the first year of evaluation. In 1991, the parent accessions of 9067480 as a group had better survival than Wytana. Rincon maintained 100 percent survival during the 10 year evaluation.

In 1991, plant height of the parent accessions of 9067480 as a group was greater than Wytana but less than Rincon. Canopy width of the parent accessions of 9067480 as a group was greater than Rincon and Wytana.

There were negligible differences in vigor between the accessions at Lind in 1983. In 1991, the parent accessions of 9067480 as a group had better vigor than Rincon but less vigor than Wytana.

Potential seed production was also rated at Lind. In 1983 and 1989 the seed production potential of the parent accessions of 9067480 as a group was less than Wytana but greater than Rincon.

In 1994, the Pullman PMC transplanted containerized plants of 9067480 at the Lind, Washington site. The plants were propagated from seed obtained from the Aberdeen PMC. The following table summarizes evaluation data from this planting:

<u>Year</u>	<u>Percent Survival</u>	<u>Vigor ^{1/}</u>	<u>Seed Potential ^{1/}</u>	<u>Plant Height (cm)</u>	<u>Canopy Width (cm)</u>
1994	100	4.0	-	26	26
1995	100	2.8	5.5	67	82
1998	100	3.0	3.6	105	157
1999	100	3.2	5.5	100	158

^{1/}-Rated 1-9, with 1 best.

Fourwing saltbush accession 9067480 shows good potential for long term survival and productivity in areas similar to the sites where it has been tested.

Table 1.
1984 Fourwing Saltbush Inter-Center Strain Trial
Coffeepoint, Idaho
Summary of Evaluation Data

Accession	Vigor ^{1/}			Height (cm)		Seed Set ^{1/}
	1984	1985	1986	1984	1985	(1986)
9003126 *	6.8	3.9	4.6	31.0	63.0	6.3
9003134 *	7.3	2.2	3.1	26.7	47.8	5.9
9003135 *	6.3	4.0	5.2	26.3	36.6	7.7
9003136 *	6.8	4.4	4.7	38.8	48.1	6.1
Wytana	7.5	3.7	4.6	15.0	34.8	3.6
9003553	5.1	9.0	9.0	33.7	-	9.0
9004468	7.9	8.5	9.0	26.0	33.0	9.0
9004473	7.5	4.7	5.5	19.5	53.7	7.1
9004474	7.5	7.1	7.5	35.0	47.0	9.0
9004478	5.7	4.8	5.3	32.0	57.4	7.6
9004488	6.8	-	-	25.4	-	-
9028162	6.1	6.8	7.2	47.5	60.3	8.1
9028163	7.5	8.5	8.5	23.5	33.0	9.0
9028164	4.7	9.0	9.0	28.7	-	9.0
9028165	6.9	4.8	5.3	26.8	50.9	6.6
9029096	6.1	2.9	3.7	58.3	71.2	7.6
9029097	3.6	6.0	6.2	47.4	53.2	7.7
Rincon	6.2	6.9	7.1	25.2	68.3	8.5
PI-432434	4.7	2.0	3.3	30.8	63.9	3.6
PI-432436	6.3	8.8	9.0	23.4	20.0	9.0
Marana	6.2	9.0	9.0	23.4	-	9.0
Average	6.4	5.9	6.3	30.7	49.5	7.5

^{1/} Rated 1-9 with 1 Best, 9 Worst

* These accessions were later combined and designated no. 9067480.

Table 2.
 Grantsville, Utah Inter-Center Strain Trial
 Summary of 1995-2000 Fourwing Saltbush Evaluation Data
 Mean of four replications

Plant Height (cm)

Accession No.	Common Name	9/26/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
Wytana	Fourwing Saltbush	34.8	23.0	43.3	33.0	28.8	23.3	40.5	26.0	35.0	27.3	34.0
9067480	Fourwing Saltbush	22.3	18.3	45.3	44.0	45.5	45.8	55.8	51.8	62.8	62.0	62.5
Rincon	Fourwing Saltbush	22.5	27.5	45.5	34.5	43.8	41.5	54.3	47.3	54.3	56.0	57.0

Percent Canopy Cover and Individual Plant Canopy Width (cm)

Accession No.	Common Name	5/17/95	9/26/95	5/7/96	5/7/97	5/6/98	5/6/99	5/9/00	Canopy Width 5/9/00
Wytana	Fourwing Saltbush	1.8	29.5	40.8	22.8	29.3	29.3	21.8	33.0
9067480	Fourwing Saltbush	1.0	29.3	37.5	34.0	40.8	40.8	63.3	71.3
Rincon	Fourwing Saltbush	3.8	24.3	28.3	33.5	37.0	37.0	52.8	71.0

Plant Density (plants per m²)

Accession No.	Common Name	5/17/95	9/26/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
Wytana	Fourwing Saltbush	0.32	1.64	1.48	1.24	0.77	0.74	0.71	0.74	0.52	0.71	0.40	0.52
9067480	Fourwing Saltbush	0.44	1.37	1.23	0.90	0.87	0.84	0.84	0.79	0.83	0.84	0.69	0.74
Rincon	Fourwing Saltbush	0.42	1.28	1.00	0.83	0.81	1.09	0.79	0.74	0.71	0.79	0.69	0.69

Vigor ^{1/}

Accession No.	Common Name	5/17/95	9/26/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
Wytana	Fourwing Saltbush	3.8	1.0	3.5	2.3	3.8	3.0	3.8	3.5	4.8	3.5	5.3	3.0
9067480	Fourwing Saltbush	4.0	2.8	2.0	1.8	2.0	1.8	1.5	1.5	1.8	2.3	1.5	1.5
Rincon	Fourwing Saltbush	4.8	2.3	2.5	3.8	4.0	2.0	3.0	2.5	3.0	3.8	3.8	2.3

^{1/} Subjective rating of plant health and growth. Rated 1-9 with 1 best, 9 worst

Table 3.
Squaw Butte, Oregon Inter-Center Strain Trial
Summary of 1982-1992 Fourwing Saltbush Evaluation Data

Percent Survival

Accession No.	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
9003126 *	100	83	83	83	83	83	83	83	66	66	66
9003134 *	100	100	83	83	83	83	83	83	83	83	83
9003135 *	100	100	100	100	100	100	100	100	100	100	100
9003136 *	100	100	100	100	100	100	100	100	100	100	100
Rincon	100	100	83	83	83	83	83	83	66	50	50
Wytana	100	100	66	50	50	50	33	33	33	0	0

Plant Height (cm)

Accession No.	1982	1983	1984	1985	1986	1987	1988	1989
9003126 *	56	85	100	103	103	107	112	106
9003134 *	59	67	89	98	106	113	117	120
9003135 *	48	72	86	89	93	98	107	104
9003136 *	51	77	108	95	96	96	106	107
Rincon	55	84	100	112	118	124	141	118
Wytana	24	42	54	46	36	42	40	20

Canopy Width (cm)

Accession No.	1982	1983	1984	1985	1986	1987	1988	1989
9003126 *	53	111	107	147	157	150	163	155
9003134 *	59	97	152	172	185	174	191	195
9003135 *	40	93	135	139	157	150	166	138
9003136 *	58	112	126	156	158	148	160	157
Rincon	49	108	157	162	168	162	153	153
Wytana	52	79	95	82	77	65	63	23

* These accessions were later combined and designated accession no.9067480.

Table 3 continued.
 Squaw Butte, Oregon
 Squaw Butte, Oregon Inter-Center Strain Trial
 Summary of 1982-1992 Fourwing Saltbush Evaluation Data

Vigor ^{1/}

Accession No.	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
9003126 *	-	2.2	3.4	3.4	4.4	6.2	4.6	6.4	6.0	6.3	6.0
9003134 *	-	3.0	3.0	3.2	3.6	4.4	3.4	4.6	3.8	4.8	4.8
9003135 *	-	2.0	3.2	4.3	4.7	6.2	4.7	6.0	5.7	7.0	6.8
9003136 *	-	2.0	3.2	3.5	4.7	6.0	4.5	5.7	5.7	6.3	6.6
Rincon	-	2.3	3.4	3.6	5.2	6.0	5.4	6.8	6.5	6.7	7.0
Wytana	-	2.7	3.5	6.8	5.7	8.0	7.0	9.0	9.0	9.0	9.0

Seed Production Potential ^{2/}

Accession No.	1982	1983	1984	1985	1986	1987	1988	1989
9003126 *	-	9.0	4.0	6.0	7.3	9.0	4.0	5.0
9003134 *	-	4.3	3.0	6.0	6.0	6.0	3.0	5.3
9003135 *	-	8.0	6.5	5.8	6.0	8.3	5.5	7.8
9003136 *	-	7.0	5.2	6.3	7.3	8.3	6.3	6.5
Rincon	-	9.0	6.0	7.0	7.3	9.0	5.0	5.0
Wytana	-	5.0	6.3	8.0	9.0	8.0	7.0	9.0

^{1/}Subjective rating of plant health and growth. Rated 1-9 with 1 best, 9 worst.

^{2/} Subjective rating of seed production. Rated 1-9 with 1 best, 9 worst.

* These accessions were later combined and designated accession no. 9067480.

Table 4.
Lind, Washington Inter-Center Strain Trial
Summary of 1982-1991 Fourwing Saltbush Evaluation Data

Percent Survival

Accession No.	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
9003126 *	100	100	100	100	100	100	100	100	100	100
9003134 *	100	83	83	83	83	83	83	83	66	66
9003135 *	100	100	100	100	100	100	100	100	100	100
9003136 *	100	100	100	100	100	100	83	83	83	83
Rincon	100	100	100	100	100	100	100	100	100	100
Wytana	100	100	75	75	75	75	75	75	75	75

Plant Height (cm)

Accession No.	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
9003126 *	53	80	87	101	111	118	128	131	132	132
9003134 *	67	96	103	120	148	136	132	130	145	140
9003135 *	60	79	85	91	104	109	111	115	-	133
9003136 *	62	96	101	109	117	117	136	146	140	136
Rincon	66	109	117	128	145	149	155	150	140	149
Wytana	30	59	53	60	62	63	70	68	65	67

Canopy Width (cm)

Accession No.	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
9003126 *	76	165	206	233	270	284	294	282	284	291
9003134 *	82	179	248	268	286	317	346	318	326	356
9003135 *	75	156	189	203	244	244	264	253	250	263
9003136 *	84	188	222	223	248	248	299	284	282	278
Rincon	88	193	238	260	285	281	298	260	254	277
Wytana	76	124	163	157	177	200	207	208	212	215

* These accessions were later combined and designated accession no. 9067480.

Table 4 continued.
 Lind, Washington Inter-Center Strain Trial
 Summary of 1982-1991 Fourwing Saltbush Evaluation Data

Accession No.	Vigor ^{1/}									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
9003126 *	-	1.8	2.4	3.4	3.0	3.6	3.4	4.8	4.0	4.6
9003134 *	-	1.4	2.0	2.8	2.6	4.6	2.8	4.8	4.0	4.0
9003135 *	-	1.7	2.3	3.0	2.2	4.3	4.2	6.3	5.8	5.3
9003136 *	-	1.3	2.2	4.2	3.3	5.2	4.4	5.6	5.6	7.0
Rincon	-	1.3	2.2	4.2	3.2	6.2	4.7	6.2	5.5	8.0
Wytana	-	1.5	2.7	6.0	3.3	3.0	3.7	4.7	4.0	2.3

Accession No.	Seed Production Potential ^{2/}								
	1982	1983	1984	1985	1986	1987	1988	1989	
9003126 *	-	9.0	8.5	7.0	8.5	9.0	6.5	8.0	
9003134 *	-	4.3	2.5	3.5	5.4	4.0	1.8	4.0	
9003135 *	-	8.0	3.2	3.5	3.5	6.0	3.0	4.8	
9003136 *	-	7.0	5.3	5.5	6.0	8.8	4.3	6.0	
Rincon	-	9.0	2.5	3.0	5.5	6.0	4.5	6.5	
Wytana	-	5.0	4.0	5.0	5.0	7.0	3.0	3.0	

^{1/} Subjective rating of plant health and growth. Rated 1-9 with 1 best, 9 worst.

^{2/} Subjective rating of seed production. Rated 1-9 with 1 best, 9 worst.

* These accessions were later combined and designated accession no. 9067480.

Exhibit 540-31 Worksheet for Documenting an Environmental Evaluation of NRCS Plant Releases

Introduction

This worksheet is used to conduct and document an Environmental Evaluation of Plant Materials releases. Criteria relating to the biological characteristics of a plant, the potential impact on ecosystems, the ease of managing the plant, and conservation need are scored. These scores and their interpretation are used with a decision flowchart to determine the appropriate course of action for making a release. As with any such ranking system, it is necessary to use sound judgement and experience when interpreting the final results.

Understanding this worksheet

The primary purpose for this worksheet is to determine if the plant release has the potential to adversely affect the environment or natural surroundings. It is possible for a plant to rate low on Part 1 (Impact on Habitats), and thus be released without further consideration, and still have a high rating on Part 4 (Biological Characteristics) indicating that the plant has the ability to propagate and maintain itself naturally. Good conservation plants usually need to persist to be able to solve the conservation problem or need for which they were intended. This is even more important for plants used in critical areas, i.e. severely eroding sites. In light of this fact, the most important criteria being used in this worksheet to determine release include those in Part 1 (Impact on Habitats) and Part 2 (Ease of Management). Parts 3 (Conservation Need) and 4 (Biological Characteristics) are used when the decision is not so clear and there is the potential for a high impact on habitats and control may be moderate to difficult.

Instructions

Rate the plant or release based on the following criteria by circling your assessment. If the criteria does not apply to the species or release, then do not rate for that criteria. If you do not have enough information on the species or plant release to complete at least Parts 1, 2 and 4 in Section A, then additional data must be accumulated through literature searches, cooperators, or studies to be able to complete these sections. Additional notes which may be used to clarify or interpret the ranking should be included in the margins of this worksheet. For plant releases which may be considered nearly unacceptable for release it may be helpful to have other PM staff or cooperators complete copies of this worksheet to provide additional documentation.

All rating criteria must be completed, even if it is found in Section A, Part 1 that the plant has a low impact on the environment. Evaluation of all criteria will provide documentation that a thorough evaluation was completed for the plant at the time of release. This documentation may be needed in the future if questions are raised about the potential invasiveness or control of the plant.

When finished with ranking, interpretation, and decision making, record the final decision on the next page of this worksheet. A completed worksheet must be included with the release documentation and a copy sent to the NPMC for filing.

Environmental Evaluation of Plant Materials Releases

Name of person

scoring: Loren St. John

Date of scoring: December 1, 2000

Scientific Name: Atriplex canescens

Common Name: Fourwing saltbush

Release Name: Pending (9067480)

Is the plant native to the US?

Yes **X** No

Is the plant native to the area of intended use?

Yes **X** No

Authority used to determine native status:

NRCS PLANTS

What is the intended area of use for this plant?

Intermountain West

What is the intended use for this plant?

Erosion control,
Range seeding,
Livestock and
Wildlife browse

Areas in which the release is known to be invasive
or has a high probability of being invasive:

None

Summary of Criteria from Section A

Part 1. Impact on Habitats, Ecosystems, and Land Use

Score

3

Part 2. Ease of Management

12

Part 3. Conservation Need and Plant Use

13

Part 4. Biological Characteristics

36

Final Determination of Release Based on the Environmental Evaluation:

OK to Release

OK to Release but qualify use and intended area of use*

Do Not Release - NPL determines if release is made*

Do Not Release - document and destroy materials

I certify that this Environmental Evaluation
was conducted with the most accurate and
current information possible.

/s/ Loren St. John

12/01/00

Signature of Person Scoring

Date

Signature of NPL indicating that it is OK to make the release:

National Program Leader, PM

Date

* An Environmental Assessment (EA) and/or Environmental Impact Statement (EIS) may be required prior to release. If required, attach the EA and/or EIS to this worksheet and to the release notice.

Section A. Scoring of Criteria for Impact, Management, Need and Biological Characteristics

Circle the appropriate number for each of the following criteria. Add up the scores for each part and record at the end of each part. Comments which clarify answers or provide supporting information may be included in the right margin of the worksheet or attached on a separate sheet of paper.

Part 1: Impact on Habitats, Ecosystems, and Land Use

This section assesses the ability of the species or release to adversely affect habitats, ecosystems, and agricultural areas.

1) Ability to invade natural systems where the species does not naturally occur

- | | |
|---|----------|
| a) Species not known to spread into natural areas on its own | 0 |
| b) Establishes only in areas where major disturbance has occurred in the last 20 years (e.g., natural disasters, highway corridors) | 3 |
| c) Often establishes in mid- to late-successional natural areas where minor disturbances occur (e.g., tree falls, streambank erosion), but no major disturbance in last 20-75 years | 6 |
| d) Often establishes in intact or otherwise healthy natural areas with no major disturbance for at least 75 years | 10 |

2) Negative impacts on ecosystem processes (e.g., altering fire occurrence, rapid growth may alter hydrology)

- | | |
|---|----------|
| a) No perceivable negative impacts | 0 |
| b) Minor negative impacts to ecosystem processes | 2 |
| c) Known significant negative impacts to ecosystems processes | 6 |
| d) Major, potentially irreversible, alteration or disruption of ecosystem processes | 10 |

3) Impacts on the composition of plant communities where the species does not naturally occur

- | | |
|--|----------|
| a) No negative impact; causes no perceivable changes in native populations | 0 |
| b) Noticeable negative influences on community composition | 5 |
| c) Causes major negative alterations in community composition | 10 |

4) Allelopathy

- | | |
|--|-----------|
| a) No known allelopathic effects on other plants | 0 |
| b) Demonstrates allelopathic effects on seed germination of other plants | 3* |
| c) Demonstrates allelopathic effects to mature stages of other plants | 5 |

* salt exudate from plant can produce allelopathic effects

5) Impact on habitat for wildlife or domestic animals (aquatic and terrestrial), including threatened and endangered species (coordinate with USFWS and state Heritage Programs as appropriate)	
a) No negative impact on habitat, or this criteria not applicable based on intended use for the plant	0
b) Minor negative impact on habitat (e.g., decreased palatability; lower wildlife value; decreased value for undesirable animal species)	2
c) Significant negative impact on habitat (e.g., foliage toxic to animals; significantly lower value for wildlife; excludes desirable animal species from an area)	5
6) Impact on other land use	
a) No negative impacts on other land uses	0
b) Minor impacts (plant could invade adjacent areas and decrease its value)	3
c) Significant impacts (plant may alter the system or adjacent lands significantly enough to prevent certain uses)	5
	Total Possible Points 45
	Total Points for Part 1 <u>3</u>

Part 2. Ease of Management

This part evaluates the degree of management which might be needed to control the species or release if it becomes a problem, or eradicate the species or release if it is no longer desirable.

1) Level of effort required for control	
a) Effective control can be achieved with mechanical treatment	0
b) Can be controlled with one chemical treatment	2
c) One or two chemical or mechanical treatments required or biological control is available or practical	5
d) Repeated chemical or mechanical control measures required	10
2) Effectiveness of community management to potentially control the plant release	
a) No management is needed, the plant release is short-lived and will significantly decrease or disappear within 5 years under normal conditions without human intervention	0
b) Routine management of a community or restoration/preservation practices (e.g., prescribed burning, flooding, controlled disturbance, pasture renovation) effectively controls the release	2
c) Cultural techniques beyond routine management can be used to control the release	4
d) The previous options are not effective for managing or controlling the release	10

- 3) Side effects of chemical or mechanical control measures**
- a) Control measures used on release will have little or no effect on other plants 0
 - b) Control measures used on release will cause moderate effects on other plants 3
 - c) Control measures used on release will cause major effects on other plants 5

**If spreads by seed, or both seed and vegetative means, go to #4

**If spreads by vegetative means only, go to #5

- 4) Seed banks**
- a) Seeds viable in the soil for 1 year or less 0
 - b) Seeds remain viable in the soil for 2-3 years 1
 - c) Seeds remain viable in the soil for 4-5 years 3
 - d) Seeds remain viable in the soil for more than 5 years 5

- 5) Vegetative regeneration under natural conditions**
- a) Regeneration from resprouting of cut stumps 1
 - b) Regeneration from pieces of the root left in the soil 3
 - c) Regeneration from root or stem parts left in the soil 5

- 6) Resprouts after cutting above-ground parts**
- a) Does not resprout or resprouts but the release is sterile and does not produce seed 0
 - b) Resprouts and produces seed in future years 3
 - c) Resprouts and produces seed in same year 5

Total Possible Points 40
Total Points for Part 2 12

Part 3. Conservation Need and Plant Use

This part evaluates the importance of the species or release to meet a conservation need.

- 1) Potential Use(s) of the Plant Release**
- a) Used for low-priority issues or single use 1
 - b) Has several uses within conservation 2
 - c) Has many uses within conservation as well as outside of conservation 4
 - d) Has high-priority use within conservation 5

- 2) Availability of Other Plants to Solve the Same Need**
- a) Many other plants available 1
 - b) Few other plants available 3
 - c) No other plants available 5

3) Consequences of <u>Not</u> Releasing This Plant	
a) No impact to conservation practices	0
b) Minor impact on one or more conservation practice	1
c) Serious impact on one conservation practice	3
d) Serious impact on more than one conservation practices	5
	Total Possible Points 15
	Total Points for Part 3 <u>13</u>

Part 4. Biological Characteristics

This part evaluates the biological properties which indicate the natural ability of the species or release to propagate and maintain itself under natural conditions. Note: these criteria relate to the species under natural conditions, as opposed to the species under managed conditions used to increase the species, i.e. seed increase programs, or specific propagation methods which do not normally occur in nature.

1) Typical mode of reproduction under natural conditions	
a) Plant does not increase by seed or vegetative means (<u>skip to #11</u>)	0
b) Reproduces almost entirely by vegetative means	1
c) Reproduces only by seeds	3
d) Reproduces vegetatively and by seed	5
2) Reproduction (by seed or vegetative) in geographic area of intended use	
a) Reproduces only outside the geographic area of intended use	1
b) Reproduces within the geographic area of intended use	3
c) Reproduces in all areas of the United States where plant can be grown	5
3) Time required to reach reproductive maturity by seed or vegetative methods	
a) Requires more than 10 years	1
b) Requires 5-10 years	2
c) Requires 2-5 years	3
d) Requires 1 year	5

**** If reproduces only by seed, skip to #5**

4) Vegetative reproduction (by rhizomes, suckering, or self-layering)	
a) Vegetative reproduction rate maintains population (plant spreads but older parts die out)	1
b) Vegetative reproduction rate results in moderate increase in population size (plant spreads <3' per year)	3
c) Vegetative reproduction rate results in rapid increase in population size (plant spreads >3' per year)	5

** If reproduces only vegetatively, skip to #11

- 5) Ability to complete sexual reproductive cycle in area of intended use**
- a) Not observed to complete sexual reproductive cycle in the geographic area of intended use, but completes sexual reproduction in distant areas of the United States 1
 - b) Not observed to complete sexual reproductive cycle in the geographic area of intended use, but completes sexual reproduction in adjoining geographic areas 3
 - c) Observed to complete the sexual reproductive cycle in the geographic area of intended use 5
- 6) Frequency of sexual reproduction for mature plant**
- a) Almost never reproduces sexually 0
 - b) Once every five or more years 1
 - c) Every other year 3
 - d) One or more times a year 5
- 7) Number of viable seeds per mature plant each reproductive cycle**
- a) None (does not produce viable seed) 0
 - b) Few (1-10) 1
 - c) Moderate (11-1,000) 3
 - d) Many-seeded (>1,000) 5
- 8) Dispersal ability**
- a) Limited dispersal (<20') and few plants produced (<100) 1
 - b) Limited dispersal (<20') and many plants produced (>100) 3
 - c) Greater dispersal (>20') and few plants produced (<100) 7
 - d) Greater dispersal (>20') and many plants produced (>100) 10
- 9) Germination requirements**
- a) Requires open soil and disturbance to germinate 1
 - b) Can germinate in vegetated areas but in a narrow range or in special conditions 5
 - c) Can germinate in existing vegetation in a wide range of conditions 10
- 10) Hybridization**
- a) Has not been observed to hybridize outside the species 0
 - b) Hybridizes with other species in the same genera 3
 - c) Hybridizes with other genera 5

11) Competitive ability (of established plants)	
a) Poor competitor for limiting factors	0
b) Moderately competitive for limiting factors	5
c) Highly competitive for limiting factors	10
Total Possible Points	70
Total Points for Part 4	<u>36</u>

References

Many of the criteria used in this rating system were adapted from the following sources:

Hiebert, Ron D. and James Stubbendieck. 1993. Handbook for Ranking Exotic Plants for Management and Control. US Department of the Interior, National Park Service, Denver, CO.

Randall, John M., Nancy Benton, Larry E. Morse, and Gwendolyn A. Thornhurst. 1999. Criteria for Ranking Alien Wildland Weeds. The Nature Conservancy, Arlington, VA.

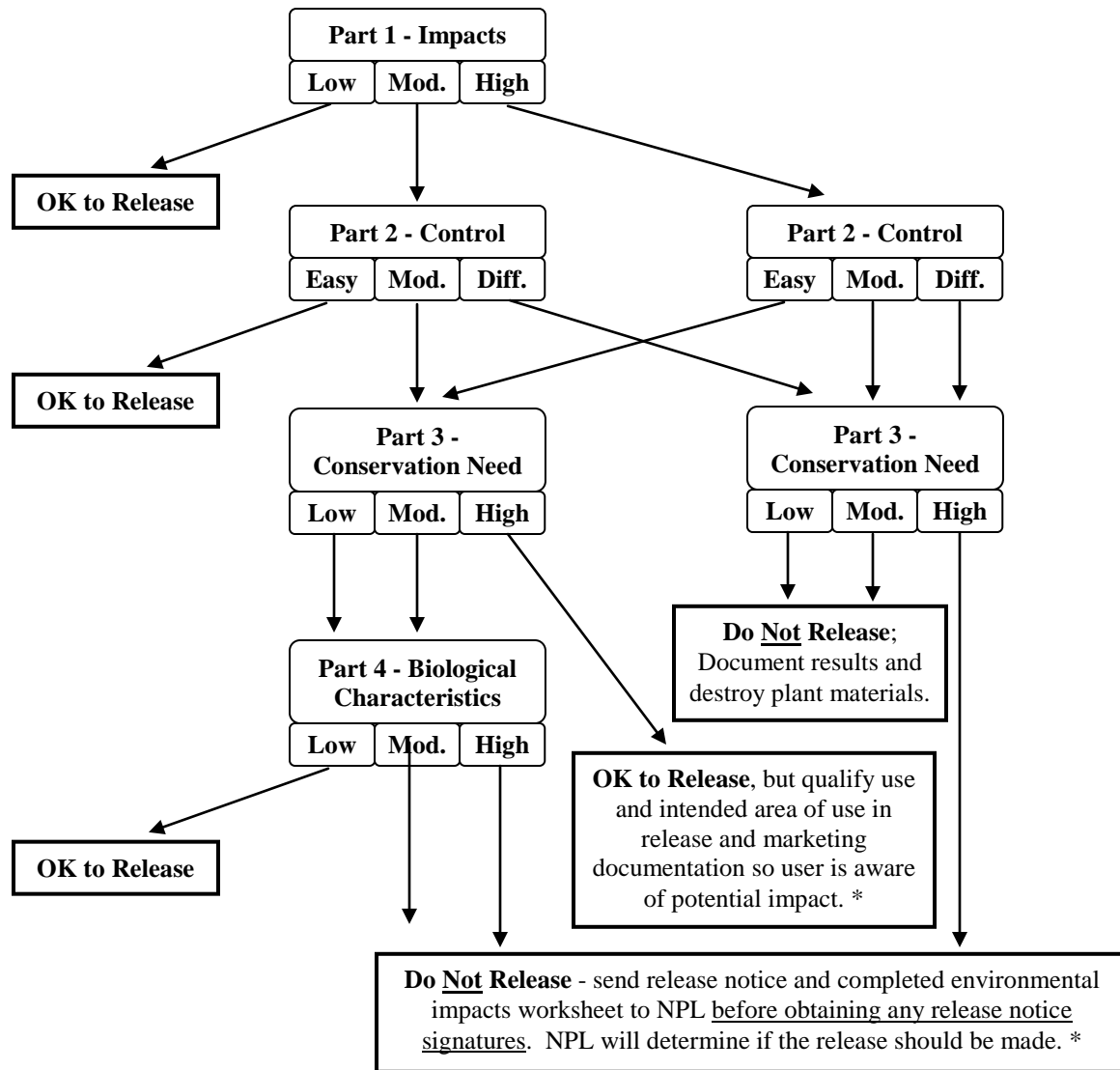
Section B. Scoring and Interpretation

Based on the scores from above, circle the points range you scored to determine the appropriate interpretation. The interpretation will be used to determine the course of action for the release.

Part	Points Scored	Interpretation
Part 1. Impacts on Habitats, Ecosystems, and Land Use	0-15 X	<u>Low</u> chance plant is going to affect the environment
	16-25	<u>Moderate</u> chance plant is going to affect the environment
	26-45	<u>High</u> chance plant is going to affect the environment
Part 2. Ease of Management	0-20 X	<u>Easy</u> to control
	21-30	<u>Moderate</u> to control
	31-40	<u>Difficult</u> to control
Part 3. Conservation Need and Plant Use	0-5	<u>Low</u> need
	6-9	<u>Moderate</u> need
	10-15 X	<u>High</u> need
Part 4. Biological Characteristics	0-25	<u>Low</u> chance plant is going to propagate and increase itself
	26-40 X	<u>Moderate</u> chance plant is going to propagate and increase itself
	41-70	<u>High</u> chance plant is going to propagate and increase itself

Section C. Action to Take for Releasing Plants

Based on the interpretation above, follow the decision tree below. Start with your interpretation rating for Part 1 (Low, Moderate, or High) and follow the appropriate arrow to the next level until you reach a decision box. Once you reach a decision box you may stop and record the decision on the first page of this worksheet.



* Indicates that an Environmental Assessment or Environmental Impact Statement may need to be prepared prior to release (see NPMM Part 540.73(a)(3)).

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
ABERDEEN, IDAHO

and

THE IDAHO AGRICULTURAL EXPERIMENT STATION
UNIVERSITY OF IDAHO
MOSCOW, IDAHO

NOTICE OF RELEASE OF
NORTHERN COLD DESERT WINTERFAT GERMPLASM
SELECTED CLASS GERMPLASM

The Natural Resources Conservation Service, U.S. Department of Agriculture and the Idaho Agricultural Experiment Station announce the release of a selected ecotype of Northern Cold Desert winterfat (*Krascheninnikovia lanata* (Pursh) A.D.J. Meeuse & Smit) for the intermountain west region.

As a selected release, this plant will be referred to as Northern Cold Desert Germplasm winterfat to document its original collection location. It has been assigned the NRCS accession number 9067481. Northern Cold Desert Germplasm is released as a selected class of certified seed (manipulated).

This alternative release is justified because it is was selected for cold hardiness and should be better adapted to the northern regions of the natural range of winterfat and existing commercial sources of winterfat are inadequate.

Collection Site Information: Northern Cold Desert Germplasm is a composite of 9007812, 9007813, 9007816, 9007825 and 9007855. 9007812 was collected in 1974 southeast of Price, Carbon County, Utah. 9007813 was collected in 1974 near Castle Dale, Emery County, Utah. 9007816 was collected in 1975 six miles east of Kanab, Kane County, Utah on a loamy, deep, alkaline soil, 0-8 percent slope and elevation of 4925 feet. 9007825 was collected in 1976 at the Northfork Road, Highway 15, Washington County, Utah and was noted for its heavy, woody stems. 9007855 was received from the Upper Colorado Environmental Plant Center in 1977 and was originally collected in Rio Blanco County, Colorado. No other specific collection site information is available.

Description: Winterfat, *Krascheninnikovia lanata* is an erect shrub that can grow to three feet tall. 9067481 under irrigated conditions at Aberdeen, Idaho grows to about 2 feet wide by three feet tall. Under dryland conditions near Grantsville, Utah it grows to about 2 feet wide by 1.5 feet tall. 9067481 is mostly monocious. Leaves are alternate, narrowly linear, flat, with rolled under edges and densely hairy. Seed is a utricle

surrounded by silky, white hairs 1/8 to 1/4 inch long arranged in dense spreading tufts. It produces abundant seed.

Method of Selection: Northern Cold Desert Germplasm was selected from a collection of 45 accessions assembled and evaluated at the Aberdeen Plant Materials Center from 1978 to 1986. The five accessions were selected for their tolerance to cold temperatures and then were planted in a seed increase block that was not reproductively isolated. The seed from the increase block was bulked and given the accession number 9067481. Off-Center testing was conducted near Grantsville, Utah from 1995 to 2000 and near Boise, Idaho from 1998 to 2000 to evaluate the accession under field conditions.

Ecological Considerations and Evaluation: This release is from a species native to the intermountain region with one previous release made in 1985 ('Hatch'). This selection is from a species that is well documented as having beneficial qualities and no negative impacts on wild or domestic animals. The test plots supporting this release were in close proximity to natural and induced plant ecosystems. There was no evidence of negative impacts or invasion into those ecosystems. Northern Cold Desert Germplasm was documented as "OK to release" when evaluated through the "Worksheet for Conducting an Environmental Evaluation of NRCS Plant Releases".

Anticipated Use: The anticipated uses of Northern Cold Desert winterfat are rangeland restoration, erosion control, and for livestock and big game browse in arid to semi-arid and alkaline/saline areas. Its shape and root system provides excellent erosion control especially in areas where very little other vegetation can survive. Winterfat is especially useful as a winter browse for wildlife and livestock.

Area of Adaptation: Northern Cold Desert winterfat is potentially adapted to the colder, northern portions of the Intermountain western United States. Winterfat is most common on rangeland receiving 7 – 13 inches of annual precipitation. It can tolerate highly alkaline/saline areas as well as soils derived from limestone parent materials and very droughty conditions. Soil textures range from clay loams to gravelly loams, stony loams and rocky outcrops.

Availability of Plant Materials: G0 and G1 seed will be maintained by the Aberdeen Plant Materials Center. Growers may produce two generations (G2 and G3) from the G1 seed.

Prepared by: This notice of Release of Northern Cold Desert winterfat was prepared by Loren St. John, Team Leader, Aberdeen Plant Materials Center, and Dan Ogle, Plant Materials Specialist, USDA Natural Resources Conservation Service, Boise, Idaho for joint release by the Natural Resources Conservation Service in Idaho, Nevada, Oregon, Utah and Washington; and the Idaho Agricultural Experiment Station, University of Idaho.

Signatures for Release of:

Northern Cold Desert Germplasm winterfat (*Krascheninnikovia lanata*)

Richard W. Sims, State Conservationist, Idaho

Date

Nicholas Pearson, State Conservationist, Nevada

Date

Robert J. Graham, State Conservationist, Oregon

Date

Philip Nelson, State Conservationist, Utah

Date

Leonard Jordan, State Conservationist, Washington

Date

Diane Gelburd, Director, Ecological Sciences Division

Date

Richard Heimsch, Director, Idaho Experiment Station

Date

Release Documentation
For
9067481 Winterfat
Loren St. John, Aberdeen Plant Materials Center

In 1978 a winterfat Initial Evaluation Planting (IEP) was established at the Aberdeen Plant Materials Center (PMC) to evaluate 45 winterfat accessions for adaptation and potential use in rangeland seeding and other revegetation efforts. Evaluation data from the IEP identified 5 outstanding accessions: 9007812; 9007813; 9007825; and 9007855 (parent accessions of 9067481).

In 1983 a winterfat Inter-Center Strain Trial (ICST) was established with transplants at the Coffee Point Off-Center Test Site (located approximately 25 miles northwest of Aberdeen). The ICST included the parent accessions of 9067481 and three other winterfat accessions. Table 1 is a summary of evaluation data collected in 1983, 1984 and 1986.

The vigor of the parent accessions of 9067481 as a group was above the average of all the accessions in 1983 and 1986 and was equal to the average of all accessions in 1984. Plant height of the parent accessions of 9067481 as a group was slightly shorter than the overall average in 1983 and was slightly taller in 1984. Plant width of the parent accessions as a group was above the overall average in 1983 and less than the overall average in 1984. Seed set of the parent accessions as a group was slightly below the overall average.

These same accessions and 'Hatch' winterfat were also direct-seeded at Coffee Point in 1983 and were evaluated for vigor in 1984 and 1985. The accession with the best vigor rating in 1984 was 9007813 and in 1985, 9007855 had the best vigor rating.

The United States Department of Agriculture, Forest Service, released Hatch winterfat in 1985. However, the performance of field plantings of Hatch in the colder regions of the West was less than expected and did not match the cold tolerance of the parent accessions of 9067481. The parent accessions survived the extremely cold winters of 1982 and 1983 at Aberdeen, Idaho where the minimum temperature in 1982 was -24° F and -30° F in 1983. In late January and early February, 1989 a climatic event resulting in a 50° F swing in temperature (32° F to -18° F) over a 48 hour period occurred. The parent accessions of 9067481 were not affected by this unusual climatic event.

A crossing block established from seed of 9007812, 9007813, 9007816, 9007825 and 9007855 was established at the Aberdeen PMC Fish and Game Farm in 1991 and a new accession number 9067481 was established for offspring from the crossing block. Transplants from seed harvested in 1997 from the crossing block were established at the Aberdeen PMC Home Farm in July, 1999.

Accession number 9067481 was seeded at the Grantsville, Utah ICST (approximately 30 miles southwest of Salt Lake City) in April, 1995. The test site is located in a 10 – 12 inch annual precipitation area. The trial was seeded with a hand-pushed belt seeder. Included in the trial were accessions of fourwing saltbush and winterfat. The trial was a complete randomized block

design with four replications. Each plot was 20 feet long consisting of 4 rows spaced 4 feet apart. The seeding rate for all accessions was 15 pure live seeds (PLS) per foot. No supplemental water was provided at any time. Table 2 summarizes evaluation data of the fourwing accessions included in the trial.

Data was collected on plant height, percent canopy cover, plant density and vigor during the evaluation period from 1995 to 2000. Individual plant canopy width data was collected during the May 9, 2000 evaluation.

Accession No. 9067481 was consistently taller than Hatch and 9063535 throughout the entire evaluation period and was approximately the same height as 9028608 Pamirian winterfat (*Kraschennikovia ceratoides*, a non-native species introduced from Kzackastan for testing). The final evaluation showed 9067481 to average 45.0 cm in height as compared to 9028608 (47.0 cm), Hatch (37.3 cm) and 9063535 (26.8 cm).

Canopy cover data shows that 9067481 had greater cover than 9063535 and Hatch but less than 9028608 at the final evaluation. Percent canopy cover for Hatch was substantially lower than the other accessions throughout the evaluation period.

Individual canopy width evaluated on May 9, 2000 found a small difference between 9067481 (60.3 cm) and 9028608 (57.5 cm) but was substantially greater than Hatch (42.5 cm) and 9063535 (35.0 cm).

The difference in plant density between 9067481 and 9028608 was negligible throughout the evaluation period. At the final evaluation 9067481 and 9028608 had identical plant density (1.08 plants per meter²) as compared to 9063535 (0.94 plants per meter²) and Hatch (0.30 plants per meter²).

Vigor, a subjective rating of plant health and growth was also evaluated. The difference in vigor between 9067481 and 9028608 was also negligible during the evaluation period but both accessions had better vigor than 9063535 and Hatch during the evaluation.

Accession number 9067481 was also seed at the Range 26 ICST located approximately 30 miles south of Boise, Idaho in February, 1998. The test site is located in a 7 – 10 inch annual precipitation area. The trial was seeded with a hand-pushed belt seeder. Included in the trial were accessions of fourwing saltbush and winterfat. The trial is a complete randomized block design with four replications. Each plot is 20 feet long consisting of 4 rows spaced 4 feet apart. The seeding rate was 15 PLS per foot. No supplemental water was provided at any time.

Due to very dry conditions following planting (2.27 – 5.51 inches annually) plant establishment and growth is limited. The following summarizes the data collected in 2000:

9067481	35 plants	32.8 cm height
Hatch	18	21.5
9063535	4	12.8

Accession no. 9067481 established nearly twice the number of plants as the next best performing accession (Hatch) and was also 11 cm taller than Hatch.

Table 1.
1983 Winterfat Inter-Center Strain Trial
Coffeepoint, Idaho
Summary of Evaluation Data

Accession	Vigor ^{1/}		1986	Plant Height (cm)		Plant Width (cm)		Seed Set ^{1/} (1986)
	1983	1984		1983	1984	1983	1984	
9007812 *	5.0	7.5	6.8	13.7	8.8	11.7	10.5	2.0
9007813 *	8.8	9.0	9.0	7.6	-	5.0	-	9.0
9007816 *	1.8	7.3	6.8	14.5	7.3	15.0	8.5	9.0
9007825 *	2.2	8.0	9.0	18.0	28.0	14.0	14.0	9.0
9007855 *	7.2	7.6	6.8	10.8	10.0	10.0	8.5	4.0
9007852	6.4	8.8	8.6	10.6	5.0	7.0	9.0	9.0
9028608 ^{2/}	7.6	7.4	7.4	21.6	15.4	10.0	13.4	1.0
PI-478840	6.2	8.0	8.0	11.6	18.0	10.0	20.0	9.0
Average	5.7	7.9	7.8	13.6	13.2	10.3	12.0	6.5

^{1/} Rated 1-9 with 1 Best, 9 Worst.

^{2/} Accession number 9028608 *Krascheninnikovia ceratoides* (Pamirian winterfat), is a non-native species introduced for testing from Kazakstan.

* These accessions were later combined and designated no. 9067481.

Table 2
 Grantsville Inter-Center Strain Trial
 Summary of 1995-2000 Winterfat Evaluation Data
 Mean of four replications

Plant Height (cm)

Accession No.	Common Name	9/26/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
9028608	Pamirian Winterfat	33.5	25.5	43.3	33.5	40.5	39.8	45.8	42.0	43.5	44.8	47.0
9067481	Winterfat	34.0	22.5	42.8	36.3	39.8	38.5	43.8	41.5	37.0	45.0	45.0
9063535	Winterfat	23.8	16.3	34.5	24.3	24.0	27.0	30.8	30.0	28.8	32.0	26.8
Hatch	Winterfat	25.8	19.3	36.0	26.8	34.3	29.5	37.0	32.8	34.5	43.8	37.3

Percent Canopy Cover and Individual Plant Canopy Width (cm)

Accession No.	Common Name	5/17/95	9/26/95	5/7/96	5/7/97	5/6/98	5/6/99	5/9/00	Canopy Width 5/9/00
9028608	Pamirian Winterfat	27.0	41.3	53.0	44.5	45.8	45.8	64.3	57.5
9067481	Winterfat	19.5	34.0	37.8	37.3	43.5	43.5	49.3	60.3
9063535	Winterfat	16.5	23.3	26.8	23.3	31.0	31.0	46.0	35.0
Hatch	Winterfat	9.5	12.3	10.8	9.8	11.5	11.5	10.8	42.5

Plant Density (plants per m²)

Accession No.	Common Name	5/17/95	9/26/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
9028608	Pamirian Winterfat	2.75	2.48	1.58	1.40	1.21	1.06	1.01	0.91	1.01	1.01	0.93	1.08
9067481	Winterfat	2.89	2.49	1.67	1.37	1.16	1.10	1.14	1.03	1.04	1.14	0.84	1.08
9063535	Winterfat	1.50	1.60	1.16	1.04	0.96	0.96	1.08	0.93	0.96	1.08	0.82	0.94
Hatch	Winterfat	0.79	0.84	0.69	0.47	0.39	0.36	0.44	0.39	0.34	0.44	0.24	0.30

Vigor ^{1/2}

Accession No.	Common Name	5/17/95	9/26/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
9028608	Pamirian Winterfat	1.8	1.8	1.5	2.0	1.8	2.0	1.8	4.0	2.3	2.5	2.3	2.0
9067481	Winterfat	2.3	1.8	2.3	2.0	2.8	2.0	1.5	2.3	2.0	2.8	1.8	2.3
9063535	Winterfat	2.5	2.8	3.0	3.3	4.3	3.8	3.5	4.8	4.3	4.0	3.8	3.0
Hatch	Winterfat	3.3	4.5	5.0	4.8	5.5	4.0	5.0	4.3	5.3	5.8	6.0	4.5

^{1/2} Subjective rating of plant health and growth. Rated 1-9 with 1 best, 9 worst.

Exhibit 540-31 Worksheet for Documenting an Environmental Evaluation of NRCS Plant Releases

Introduction

This worksheet is used to conduct and document an Environmental Evaluation of Plant Materials releases. Criteria relating to the biological characteristics of a plant, the potential impact on ecosystems, the ease of managing the plant, and conservation need are scored. These scores and their interpretation are used with a decision flowchart to determine the appropriate course of action for making a release. As with any such ranking system, it is necessary to use sound judgement and experience when interpreting the final results.

Understanding this worksheet

The primary purpose for this worksheet is to determine if the plant release has the potential to adversely affect the environment or natural surroundings. It is possible for a plant to rate low on Part 1 (Impact on Habitats), and thus be released without further consideration, and still have a high rating on Part 4 (Biological Characteristics) indicating that the plant has the ability to propagate and maintain itself naturally. Good conservation plants usually need to persist to be able to solve the conservation problem or need for which they were intended. This is even more important for plants used in critical areas, i.e. severely eroding sites. In light of this fact, the most important criteria being used in this worksheet to determine release include those in Part 1 (Impact on Habitats) and Part 2 (Ease of Management). Parts 3 (Conservation Need) and 4 (Biological Characteristics) are used when the decision is not so clear and there is the potential for a high impact on habitats and control may be moderate to difficult.

Instructions

Rate the plant or release based on the following criteria by circling your assessment. If the criteria does not apply to the species or release, then do not rate for that criteria. If you do not have enough information on the species or plant release to complete at least Parts 1, 2 and 4 in Section A, then additional data must be accumulated through literature searches, cooperators, or studies to be able to complete these sections. Additional notes which may be used to clarify or interpret the ranking should be included in the margins of this worksheet. For plant releases which may be considered nearly unacceptable for release it may be helpful to have other PM staff or cooperators complete copies of this worksheet to provide additional documentation.

All rating criteria must be completed, even if it is found in Section A, Part 1 that the plant has a low impact on the environment. Evaluation of all criteria will provide documentation that a thorough evaluation was completed for the plant at the time of release. This documentation may be needed in the future if questions are raised about the potential invasiveness or control of the plant.

When finished with ranking, interpretation, and decision making, record the final decision on the next page of this worksheet. A completed worksheet must be included with the release documentation and a copy sent to the NPMC for filing.

Section A. Scoring of Criteria for Impact, Management, Need and Biological Characteristics

Circle the appropriate number for each of the following criteria. Add up the scores for each part and record at the end of each part. Comments which clarify answers or provide supporting information may be included in the right margin of the worksheet or attached on a separate sheet of paper.

Part 1: Impact on Habitats, Ecosystems, and Land Use

This section assesses the ability of the species or release to adversely affect habitats, ecosystems, and agricultural areas.

- 1) Ability to invade natural systems where the species does not naturally occur**
 - a) Species not known to spread into natural areas on its own **0**
 - b) Establishes only in areas where major disturbance has occurred in the last 20 years (e.g., natural disasters, highway corridors) **3**
 - c) Often establishes in mid- to late-successional natural areas where minor disturbances occur (e.g., tree falls, streambank erosion), but no major disturbance in last 20-75 years **6**
 - d) Often establishes in intact or otherwise healthy natural areas with no major disturbance for at least 75 years **10**

- 2) Negative impacts on ecosystem processes (e.g., altering fire occurrence, rapid growth may alter hydrology)**
 - a) No perceivable negative impacts **0**
 - b) Minor negative impacts to ecosystem processes **2**
 - c) Known significant negative impacts to ecosystems processes **6**
 - d) Major, potentially irreversible, alteration or disruption of ecosystem processes **10**

- 3) Impacts on the composition of plant communities where the species does not naturally occur**
 - a) No negative impact; causes no perceivable changes in native populations **0**
 - b) Noticeable negative influences on community composition **5**
 - c) Causes major negative alterations in community composition **10**

- 4) Allelopathy**
 - a) No known allelopathic effects on other plants **0**
 - b) Demonstrates allelopathic effects on seed germination of other plants **3**
 - c) Demonstrates allelopathic effects to mature stages of other plants **5**

5) Impact on habitat for wildlife or domestic animals (aquatic and terrestrial), including threatened and endangered species (coordinate with USFWS and state Heritage Programs as appropriate)	
a) No negative impact on habitat, or this criteria not applicable based on intended use for the plant	0
b) Minor negative impact on habitat (e.g., decreased palatability; lower wildlife value; decreased value for undesirable animal species)	2
c) Significant negative impact on habitat (e.g., foliage toxic to animals; significantly lower value for wildlife; excludes desirable animal species from an area)	5
6) Impact on other land use	
a) No negative impacts on other land uses	0
b) Minor impacts (plant could invade adjacent areas and decrease its value)	3
c) Significant impacts (plant may alter the system or adjacent lands significantly enough to prevent certain uses)	5
	Total Possible Points 45
	Total Points for Part 1 <u>0</u>

Part 2. Ease of Management

This part evaluates the degree of management which might be needed to control the species or release if it becomes a problem, or eradicate the species or release if it is no longer desirable.

1) Level of effort required for control	
a) Effective control can be achieved with mechanical treatment	0
b) Can be controlled with one chemical treatment	2
c) One or two chemical or mechanical treatments required or biological control is available or practical	5
d) Repeated chemical or mechanical control measures required	10
2) Effectiveness of community management to potentially control the plant release	
a) No management is needed, the plant release is short-lived and will significantly decrease or disappear within 5 years under normal conditions without human intervention	0
b) Routine management of a community or restoration/preservation practices (e.g., prescribed burning, flooding, controlled disturbance, pasture renovation) effectively controls the release	2
c) Cultural techniques beyond routine management can be used to control the release	4
d) The previous options are not effective for managing or controlling the release	10

- 3) Side effects of chemical or mechanical control measures**
- a) Control measures used on release will have little or no effect on other plants 0
 - b) Control measures used on release will cause moderate effects on other plants 3
 - c) Control measures used on release will cause major effects on other plants 5

**If spreads by seed, or both seed and vegetative means, go to #4

**If spreads by vegetative means only, go to #5

- 4) Seed banks**
- a) Seeds viable in the soil for 1 year or less 0
 - b) Seeds remain viable in the soil for 2-3 years 1
 - c) Seeds remain viable in the soil for 4-5 years 3
 - d) Seeds remain viable in the soil for more than 5 years 5

- 5) Vegetative regeneration under natural conditions**
- a) Regeneration from resprouting of cut stumps 1
 - b) Regeneration from pieces of the root left in the soil 3
 - c) Regeneration from root or stem parts left in the soil 5

- 6) Resprouts after cutting above-ground parts**
- a) Does not resprout or resprouts but the release is sterile and does not produce seed 0
 - b) Resprouts and produces seed in future years 3
 - c) Resprouts and produces seed in same year 5

Total Possible Points 40

Total Points for Part 2 10

Part 3. Conservation Need and Plant Use

This part evaluates the importance of the species or release to meet a conservation need.

- 1) Potential Use(s) of the Plant Release**
- a) Used for low-priority issues or single use 1
 - b) Has several uses within conservation 2
 - c) Has many uses within conservation as well as outside of conservation 4
 - d) Has high-priority use within conservation 5

- 2) Availability of Other Plants to Solve the Same Need**
- a) Many other plants available 1
 - b) Few other plants available 3
 - c) No other plants available 5

3) Consequences of Not Releasing This Plant

- | | |
|---|---|
| a) No impact to conservation practices | 0 |
| b) Minor impact on one or more conservation practice | 1 |
| c) Serious impact on one conservation practice | 3 |
| d) Serious impact on more than one conservation practices | 5 |

Total Possible Points 15

Total Points for Part 3 13

Part 4. Biological Characteristics

This part evaluates the biological properties which indicate the natural ability of the species or release to propagate and maintain itself under natural conditions. Note: these criteria relate to the species under natural conditions, as opposed to the species under managed conditions used to increase the species, i.e. seed increase programs, or specific propagation methods which do not normally occur in nature.

1) Typical mode of reproduction under natural conditions

- | | |
|---|---|
| a) Plant does not increase by seed or vegetative means (<u>skip to #11</u>) | 0 |
| b) Reproduces almost entirely by vegetative means | 1 |
| c) Reproduces only by seeds | 3 |
| d) Reproduces vegetatively and by seed | 5 |

2) Reproduction (by seed or vegetative) in geographic area of intended use

- | | |
|--|---|
| a) Reproduces only outside the geographic area of intended use | 1 |
| b) Reproduces within the geographic area of intended use | 3 |
| c) Reproduces in all areas of the United States where plant can be grown | 5 |

3) Time required to reach reproductive maturity by seed or vegetative methods

- | | |
|--------------------------------|---|
| a) Requires more than 10 years | 1 |
| b) Requires 5-10 years | 2 |
| c) Requires 2-5 years | 3 |
| d) Requires 1 year | 5 |

**** If reproduces only by seed, skip to #5**

4) Vegetative reproduction (by rhizomes, suckering, or self-layering)

- | | |
|--|---|
| a) Vegetative reproduction rate maintains population (plant spreads but older parts die out) | 1 |
| b) Vegetative reproduction rate results in moderate increase in population size (plant spreads <3' per year) | 3 |
| c) Vegetative reproduction rate results in rapid increase in population size (plant spreads >3' per year) | 5 |

** If reproduces only vegetatively, skip to #11

- 5) Ability to complete sexual reproductive cycle in area of intended use**
- a) Not observed to complete sexual reproductive cycle in the geographic area of intended use, but completes sexual reproduction in distant areas of the United States 1
 - b) Not observed to complete sexual reproductive cycle in the geographic area of intended use, but completes sexual reproduction in adjoining geographic areas 3
 - c) Observed to complete the sexual reproductive cycle in the geographic area of intended use 5
- 6) Frequency of sexual reproduction for mature plant**
- a) Almost never reproduces sexually 0
 - b) Once every five or more years 1
 - c) Every other year 3
 - d) One or more times a year 5
- 7) Number of viable seeds per mature plant each reproductive cycle**
- a) None (does not produce viable seed) 0
 - b) Few (1-10) 1
 - c) Moderate (11-1,000) 3
 - d) Many-seeded (>1,000) 5
- 8) Dispersal ability**
- a) Limited dispersal (<20') and few plants produced (<100) 1
 - b) Limited dispersal (<20') and many plants produced (>100) 3
 - c) Greater dispersal (>20') and few plants produced (<100) 7
 - d) Greater dispersal (>20') and many plants produced (>100) 10
- 9) Germination requirements**
- a) Requires open soil and disturbance to germinate 1
 - b) Can germinate in vegetated areas but in a narrow range or in special conditions 5
 - c) Can germinate in existing vegetation in a wide range of conditions 10
- 10) Hybridization**
- a) Has not been observed to hybridize outside the species 0
 - b) Hybridizes with other species in the same genera 3
 - c) Hybridizes with other genera 5

11) Competitive ability (of established plants)

- | | |
|--|----|
| a) Poor competitor for limiting factors | 0 |
| b) Moderately competitive for limiting factors | 5 |
| c) Highly competitive for limiting factors | 10 |

Total Possible Points 70

Total Points for Part 4 36

References

Many of the criteria used in this rating system were adapted from the following sources:

Hiebert, Ron D. and James Stubbendieck. 1993. Handbook for Ranking Exotic Plants for Management and Control. US Department of the Interior, National Park Service, Denver, CO.

Randall, John M., Nancy Benton, Larry E. Morse, and Gwendolyn A. Thornhurst. 1999. Criteria for Ranking Alien Wildland Weeds. The Nature Conservancy, Arlington, VA.

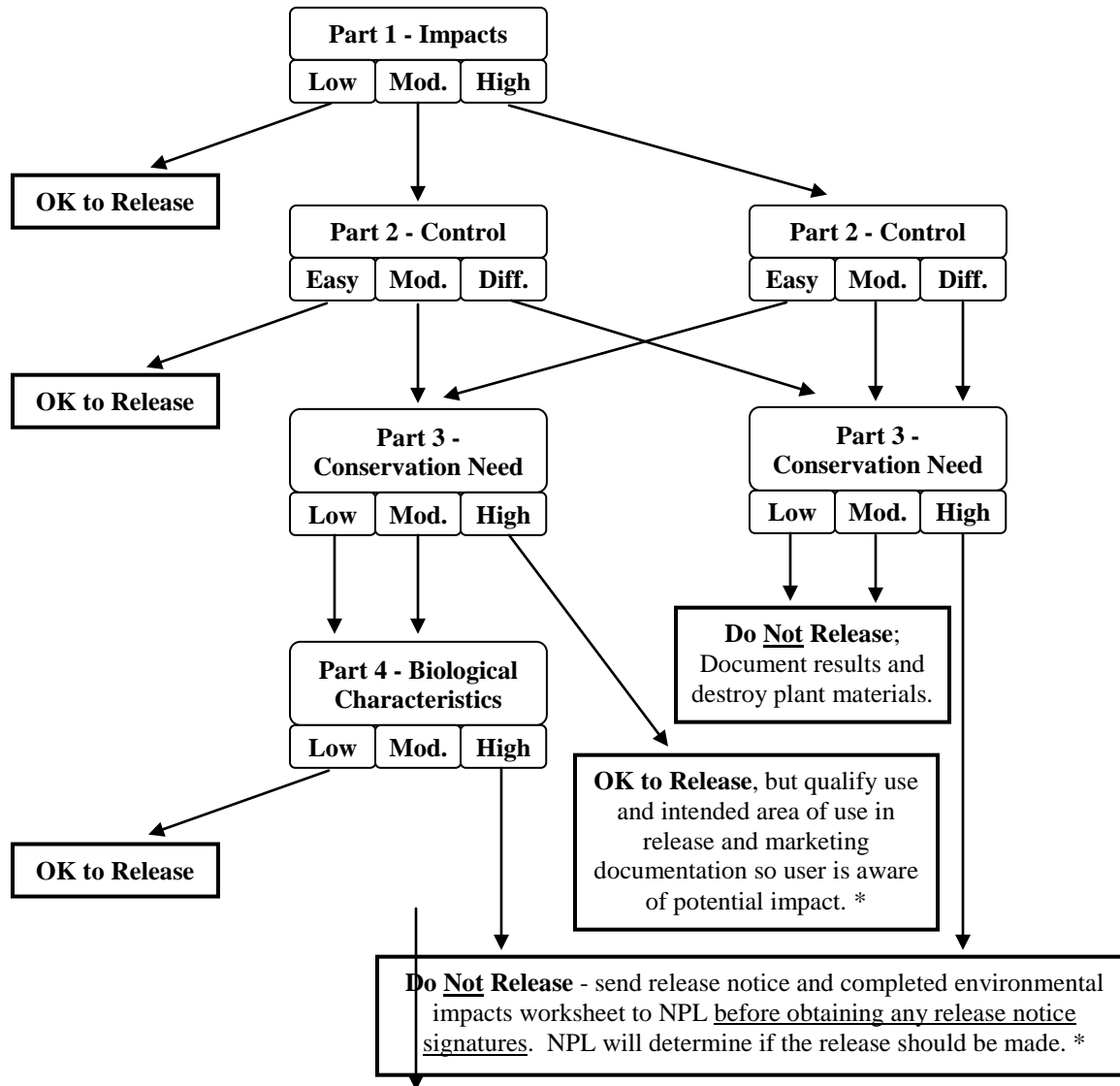
Section B. Scoring and Interpretation

Based on the scores from above, circle the points range you scored to determine the appropriate interpretation. The interpretation will be used to determine the course of action for the release.

Part	Points Scored	Interpretation
Part 1. Impacts on Habitats, Ecosystems, and Land Use	0-15 X	Low chance plant is going to affect the environment
	16-25	Moderate chance plant is going to affect the environment
	26-45	High chance plant is going to affect the environment
Part 2. Ease of Management	0-20 X	Easy to control
	21-30	Moderate to control
	31-40	Difficult to control
Part 3. Conservation Need and Plant Use	0-5	Low need
	6-9	Moderate need
	10-15 X	High need
Part 4. Biological Characteristics	0-25	Low chance plant is going to propagate and increase itself
	26-40 X	Moderate chance plant is going to propagate and increase itself
	41-70	High chance plant is going to propagate and increase itself

Section C. Action to Take for Releasing Plants

Based on the interpretation above, follow the decision tree below. Start with your interpretation rating for Part 1 (Low, Moderate, or High) and follow the appropriate arrow to the next level until you reach a decision box. Once you reach a decision box you may stop and record the decision on the first page of this worksheet.



* Indicates that an Environmental Assessment or Environmental Impact Statement may need to be prepared prior to release (see NPMM Part 540.73(a)(3)).

ON-CENTER ACTIVITIES

Foundation Seed Production at Aberdeen Plant Materials Center

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

The following table illustrates seed shipments from the Aberdeen Plant Materials Center for Fiscal year 1993 through 2001:

Cultivar	1993	1994	1995	1996	1997	1998	1999	2000	2001	TOTAL POUNDS
POUNDS PLS										
Appar Lewis flax	0	160	65	455	150	950	115	320	300	2262
Bannock thickspike wheatgrass	-	-	581	215	175	425	610	275	250	2281
Delar small burnet	0	200	350	0	0	550	0	451	150	1701
Ephraim crested wheatgrass	100	1148	790	713	1000	100	50	260	455	4411
Goldar bluebunch wheatgrass	452	558	638	175	200	200	370	175	100	3168
Hycrest crested wheatgrass	400	250	100	1000	1550	0 ^{1/}	0	0	0	3958
Magnar basin wildrye	395	400	202	0	250	180	901	517	1035	3095
Nezpar Indian ricegrass	50	150	0	0	325	350	100	900	150	2125
P-27 Siberian wheatgrass	600	225	110	250	1000	200	25	150	200	2960
Penstemon "Clearwater Selection"	-	-	1	0	0	1	0	1	10	13
Penstemon "Richfield Selection"	-	-	5	0	0	6	5	5	1	22
Paiute orchardgrass	725	810	550	400	250	0	250	101	450	3536
Regar meadow brome	300	604	144	10	0	305	800	670	1061	4234
Rush intermediate wheatgrass	-	718	195	75	400	1820	1000	215	525	4423
Sodar streambank wheatgrass	690	857	311	0	100	250	100	860	500	3784
Tegmar dwarf int. wheatgrass	0	0	250	0	0	200	0	100	0	550
Topar pubescent wheatgrass	0	0	0	0	0	0	0	0	0 ^{2/}	0
TOTAL POUNDS	3712	6080	4292	3293	5400	5537	4326	5000	5187	42827

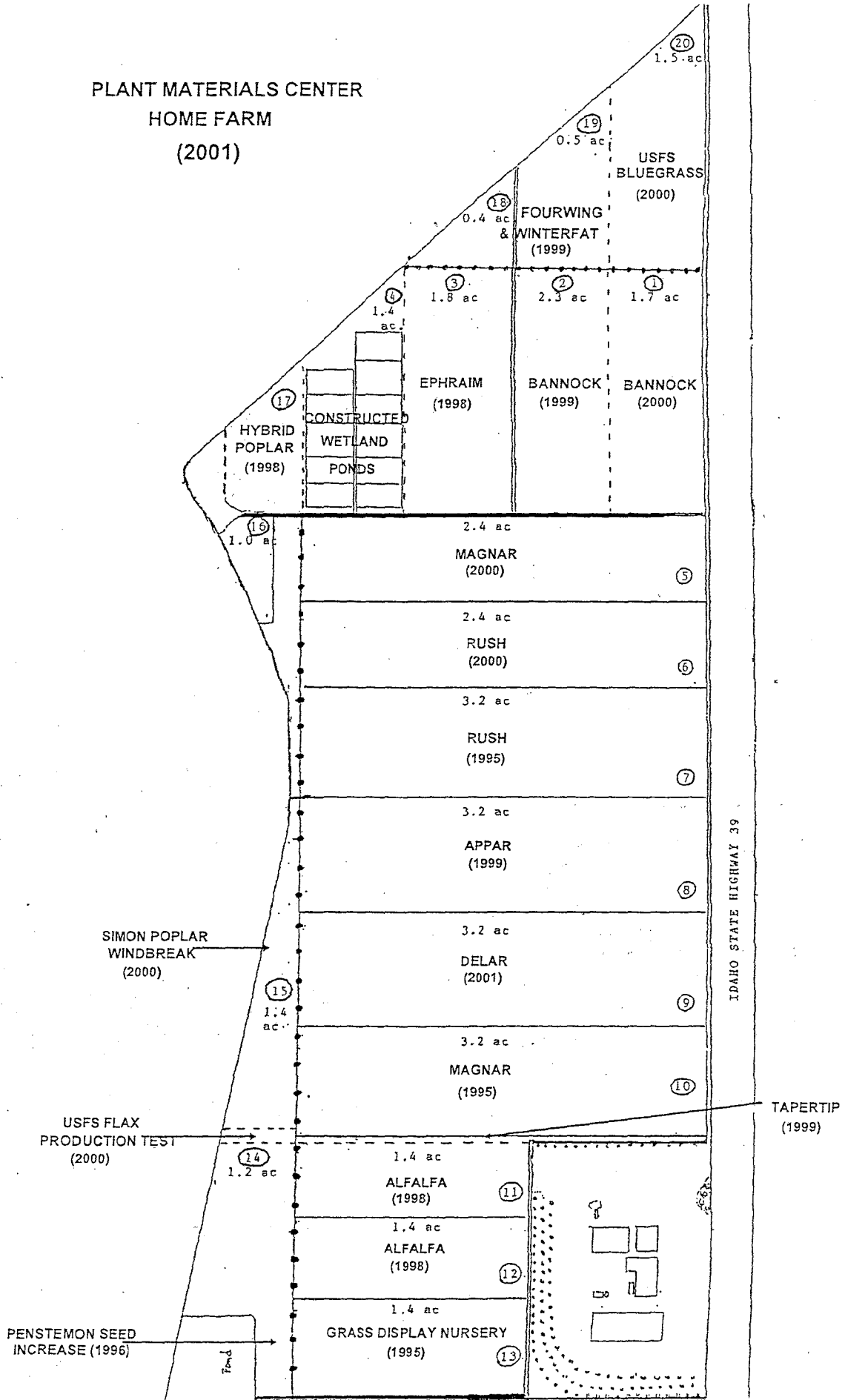
^{1/} Foundation seed production of Hycrest crested wheatgrass was transferred to Meeker, Colorado Environmental Plant Center.

^{2/} Discontinued production of Topar pubescent wheatgrass due to no demand and no commercial certified seed production since 1992 as directed by Northwest State Conservationist Advisory Group.

Aberdeen Plant Materials Center2001 FIELD ANNUAL PLAN OF OPERATIONHOME FARM

<u>Field</u>	<u>Acres</u>	<u>Crop</u>	<u>Operation</u>
1	1.5	Bannock (2000)	Manage for Foundation Seed production.
2	2.3	Bannock (1999)	Manage for Foundation seed production.
3	1.8	Ephraim (1998)	Manage for Foundation seed production.
4	1.4	Constructed Wetland Ponds (1992)	Manage per constructed Wetland project plan.
5	2.4	Magnar (2000)	Manage for Foundation seed production.
6	2.4	Rush (2000)	Manage for Foundation seed production.
7	3.2	Rush (1995)	Manage for Foundation seed production.
8	3.2	Appar (1999)	Manage for Foundation seed production.
9	3.2	Delar (2001)	Establish and manage for Foundation seed production.
10	3.2	Magnar (1995)	Manage for Foundation seed production.
11, 12	2.8	Alfalfa (1998)	Manage for hay production.
11N	-	Tapertip IDARNG (1999)	Manage for seed increase.
13	1.4	Grass Display Nursery (1995)	Maintain display of commonly used conservation grasses.
14	1.2	Woody Display Nursery (1995)	Maintain display of woody conservation plants. Manage Durar/Covar cover crop.
	-	Penstemon (1996)	Manage for Certified seed production.
15	1.4	Field windbreak (2000) USFS Flax test (2000)	Maintain Simon poplar field windbreak. Maintain and evaluate according to project Plan.
16	1.0	Seedbed Preparation Demo	Establish seedbed preparation demo for training session.
17	0.5	Hybrid Poplars (1998)	Manage and evaluate according to project plan.
18-19	0.9	Fourwing and winterfat (1999)	Manage for Certified seed production.
20	1.5	USFS Bluegrass (2000)	Manage for Certified seed production.
Headquarters			Maintain buildings and grounds.

PLANT MATERIALS CENTER
HOME FARM
(2001)



Aberdeen Plant Materials Center2001 FIELD ANNUAL PLAN OF OPERATIONFISH AND GAME FARM

<u>Field</u>	<u>Acres</u>	<u>Crop</u>	<u>Operation</u>
21	5.4	Alfalfa (2001)	Establish and manage for hay production and wildlife benefits.
21N	-	Bozoisky Cover crop	Maintain as needed.
22	5.4	Wildlife Food Plot	Plant corn for wildlife food plot.
22E	-	Willow IEP (1984)	Maintain as needed.
23W	2.7	Goldar (1999)	Manage for Foundation seed production.
23M	-	Windbreak	Maintain and irrigate as needed.
23E	2.7	Potatoes	U of I will plant 2.5 acres to potatoes. Establish corn borders for wildlife cover. After potato harvest, establish winter wheat for wildlife use.
24W	2.7	Paiute (2001)	Establish and manage for Foundation seed production.
24E	1.6	Durar Cover Crop	Maintain as needed.
25	5.4	Wildlife Food Plot	Plant wheat for wildlife food plot.
26W	1.7	Durar/Covar Cover Crop (1996)	Maintain as needed.
26E	1.7	Willow Increase Block (1994)	Irrigate according to irrigation plan and control weeds. Maintain Durar/Covar mix between rows for permanent cover. Establish Riparian native willow accessions.
27	5.4	Alfalfa (1995)	Manage for hay production and wildlife benefits.
28	5.4	Fallow	Fallow to control noxious weeds.
29W	2.7	Willows (1994)	Irrigate and control weeds according to Wetland Project plan.
29E	2.7	Goldar (2000)	Manage for Foundation seed production.

Aberdeen Plant Materials Center

2001 FIELD ANNUAL PLAN OF OPERATION (continued)

FISH AND GAME FARM

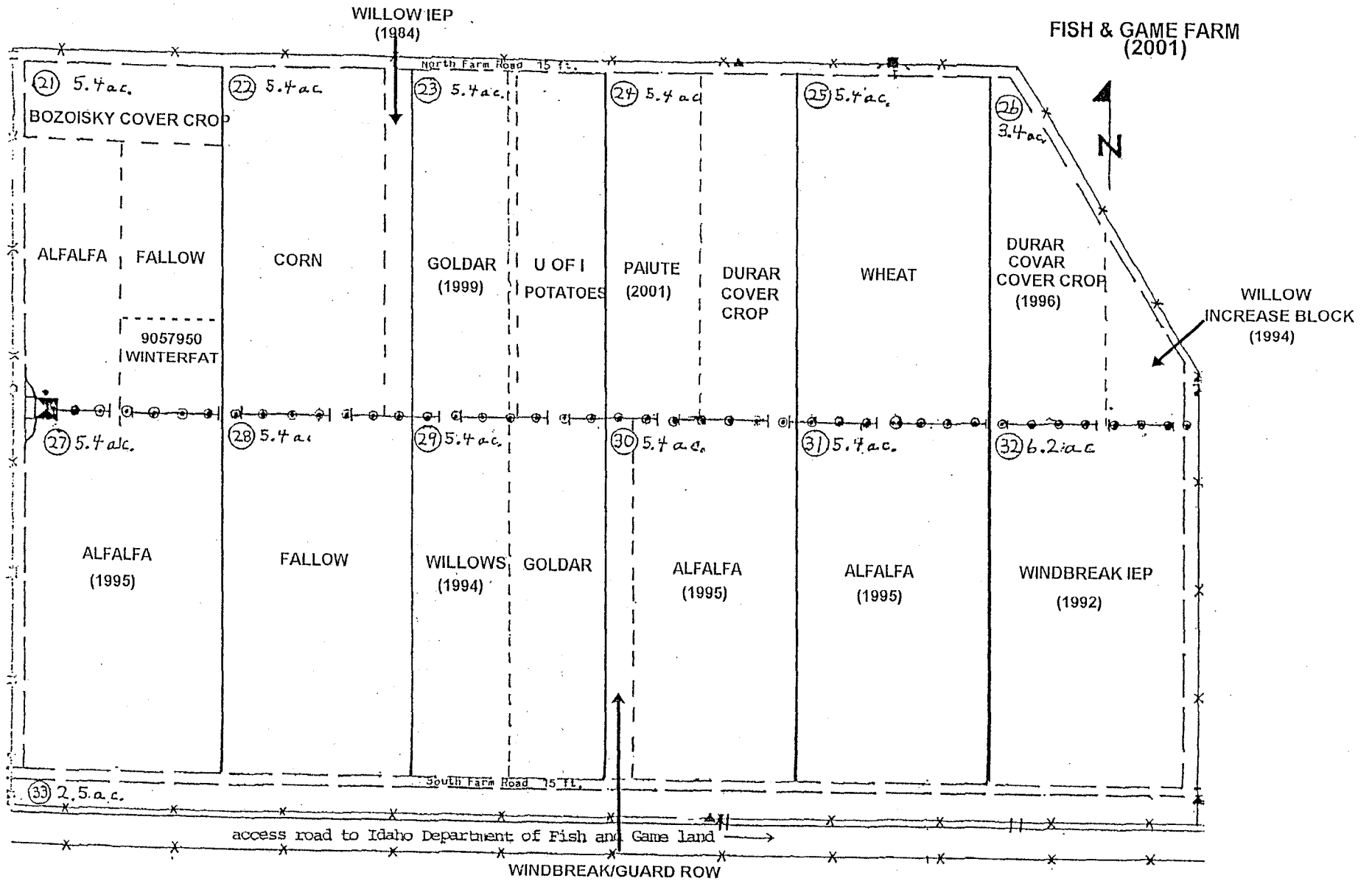
<u>Field</u>	<u>Acres</u>	<u>Crop</u>	<u>Operation</u>
30W	-	Windbreak/Guard Row	Maintain and irrigate as needed.
30	5.4	Alfalfa (1995)	Manage for hay production and wildlife benefits.
31	5.4	Alfalfa (1995)	Manage for hay production and wildlife benefits.
32	6.2	Windbreak IEP (1982)	Maintain as needed.

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)

<u>Field</u>	<u>Acres</u>	<u>Crop</u>	<u>Operation</u>
409	4.25	Nezpar (2000)	Manage for Foundation seed production.



1996 Native Bluegrass Evaluation Planting
Field 14, Aberdeen PMC Home Farm
1996 -2000 Summary Report
Loren St. John, Team Leader
Aberdeen Plant Materials Center

Native bluegrasses, which include species from the *Poa secunda* complex, are moderate to high producing, understory, cool season bunchgrasses found in areas receiving as little as 6 inches to above 18 inches of annual precipitation. These grasses could be used as a component of a native seed mixture for range seedings, wildfire rehabilitation, greenstrips and land retirement.

An initial evaluation planting was established at the Aberdeen PMC in 1991 with 72 accessions collected by NRCS personnel in Idaho, Oregon, Nevada, and Washington. Because the *Poa secunda* complex is apomictic (producing seed without pollination), the best method to improve performance is through additional seed collection from areas where previous collections of better performing plants occur. Data from the initial evaluation planting, coupled with climatic data from the collection sites, identified the areas to target for more intensive, localized seed collections for the second phase of evaluation.

One of the sites identified for further collections was Lincoln County, Nevada T2S R70E section 14, and elevation approximately 6000 feet. In 1994, the NRCS Field Office in Caliente, NV made 21 collections. Due to extremely dry conditions and grazing by wild horses, only 7 of those collections contained viable seed and no collection contained adequate amounts of seed for testing.

Improved moisture conditions during 1995 resulted in better seed production and on June 27, Loren St. John, Aberdeen PMC, assisted Paul Sladish from the Caliente Field office in collection efforts and 6 collections were made. On July 26, 1995 Paul Sladish made 2 additional collections. Seven of the 8 collections had enough seed for testing purposes. Table 1 shows the collection site locations and amount of clean seed for each accession collected.

Materials and Methods

Germination tests were completed for each of the accessions to determine seed viability and is also shown on Table 1. Accession no. 9076406 had the best germination of the collections, 62 percent. Based upon the germination tests and assuming purity of 80 percent, bulk seeding rates were calculated to seed 20 Pure Live Seed (PLS) per foot of row.

The evaluation planting was arranged in a complete randomized block design with 4 replications. 'Canbar' canby bluegrass and 'Sherman' big bluegrass were included as standards of comparison. Plots were composed of 4 rows, twenty feet in length spaced 1 foot apart. On May 21, 1996 the planting was seeded with a hand-pushed belt seeder. Depth of seeding was approximately 0.25 inches. The planting was kept moist with sprinkler irrigation through June.

1996 Evaluations

On June 11, 1996 the planting was evaluated for stand emergence using a subjective rating with 1 as best emergence and 9 as no emergence. All accessions emerged but some plots on the western edge of the planting had poor emergence. Hot, dry winds caused sprinkler irrigation skips resulting in reduced coverage of irrigation water on the western edge of the test block. Canbar had the best emergence rating and accession no. 9076404 had the worst emergence rating (Table 1).

In August, the planting was mowed to reduce weed growth.

On November 13, 1996 the planting was evaluated for percent stand, vigor, and plant height. The middle 2 rows of each plot were sampled. Percent stand data was collected utilizing a 20 foot rope marked with 1 foot increments stretched and anchored from one end of the plot to the other between the middle 2 rows. Cover was measured by the interception of plant parts along the rope at each 1 foot increment, which were then summed to give a cover estimate recorded as a percent. Vigor is a qualitative rating based upon plant health and growth rate. A plant rated 1 would be best whereas a 9 rating is very poor.

Percent stand data was statistically analyzed for one-way Analysis of Variance (ANOVA) and the Least Significant Difference Test was completed to show means separation and is also shown on Table 1. Accession no. 9076407 had the best stand (42.75 percent) and accession no. 9076405 had the poorest stand (3.50 percent).

Vigor ranged from 7.0 (worst) for accession no. 9076405 to 3.3 (best) for accession no. 9076407.

Plant height ranged from 1.8 cm for accession no. 9076404 and 9076405 to 6.0 cm for Sherman.

Due to the extremely hot, windy summer at Aberdeen, the plots did not establish as well as expected, even with irrigation.

1997 Evaluations

On May 6, 1997 the planting was evaluated for percent stand, vigor, and plant height. Percent stand ranged from 14.0 for 9076404 to 59.5 for 9076407. Percent stand data was statistically analyzed for one-way Analysis of Variance (ANOVA) and the Least Significant Difference Test was completed to show means separation and is shown on Table 1.

Vigor ranged from 7.3 (worst) for 9076404 to 3.0 for Canbar. Plant height ranged from 1.8 cm for 9076404 to 14.8 cm for Sherman.

On June 28, plots of Sherman, Canbar, 9076407 and 9076408 were harvested to evaluate seed production, which is shown as follows:

<u>Accession</u>	<u>Seed Yield (grams)</u>
9067407	50.4
9076408	30.9
Sherman	93.9
Canbar	5.2

The two middle rows of each plot were harvested and cleaned to determine weights. Sherman produced the most seed followed by 9076407, 9076408, and Canbar. The outer two rows of each plot of 9076407 and 9076408 were also harvested for seed increase.

1998 Evaluations

A late winter dormant seeding of the same accessions was accomplished on March 21 to evaluate performance as compared to the spring planting made in 1996. This planting was a failure due to severe soil crusting.

Plots were not irrigated during 1998 and on September 22, they were mowed to remove current years' growth.

On May 27, 1998 the planting was evaluated for percent stand, vigor, and plant height and is summarized in Table 1. All data was statistically analyzed for one-way Analysis of Variance (ANOVA). Plant height was the only evaluation data that was highly significant. There was no significant difference in percent stand or vigor. Percent stand ranged from 29.5 for 9076404 to 72.8 for 9076408. Vigor ranged from 5.3 (worst) for 9076405 and 9076404 to 2.3 (best) for 9076408 and Sherman. Plant height ranged from 23.8 cm for 9076404 to 40.5 cm for Sherman.

Harvesting seed from the plots to evaluate seed production was planned but a severe hailstorm on June 25 destroyed all of the seed heads.

1999 Evaluations

The plots were irrigated in May and early June 1999 to promote plant growth and seed development.

On June 4, 1999 the planting was evaluated for percent stand, vigor, and plant height and is summarized in the accompanying table. All data was statistically analyzed for two-way Analysis of Variance (ANOVA). Percent stand, vigor, and plant height data were highly significant. The Least Significant Difference Test was completed on percent stand data to show means separation and is shown on Table 1.

Percent stand ranged from 25.8 for 9076405 to 100.0 for 9076408. Vigor ranged from 5.0 (worst) for 9076404 to 1.0 (best) for 9076408. Plant height ranged from 24.5 cm for 9076405 to 59.5 cm for Sherman.

Because of the irrigation the plants grew extremely well as compared to previous years when they were not irrigated. Accession no. 9076407 and 9076408 had visual

characteristics of *Poa pratensis* that were very noticeable at the time of evaluation because of the ideal growing conditions. Jim Glennon, Idaho State University Herbarium Curator, positively identified accession no. 9076407 and 9076408 as *Poa pratensis*. These two accessions would no longer be considered for further evaluation.

On June 16, 1999 seed was harvested from each replication of accession no. 9076402 which was also positively identified by Jim Glennon as muttongrass, *Poa fendleriana*. The seed was cleaned and weighed 96.5 grams total, ranging from 14 to 34 grams per plot. Accession no. 9076402 was the best performing accession following the two *Poa pratensis* accessions (were dropped from evaluations) and Sherman. This seed will be used for seed increase and further evaluation.

The plots were burned on August 13, 1999 to remove plant residue and were irrigated in September to prepare the plants for winter dormancy.

2000 Evaluations

The plots were irrigated in May, 2000 to promote plant growth and seed development. On June 2, 2000 the planting was evaluated for percent stand, vigor, and plant height and is summarized in the Table 1.

Percent stand ranged from 8.8 for 9076405 to 63.3 for Sherman. There was a substantial decline in stand for all accessions from last year with the exception of Canbar in which the stand increased slightly. The decline in stand can probably be mostly attributed to burning the plots the previous fall. Vigor ranged from 6.5 (worst) for 9076405 to 1.8 (best) for Sherman. Plant height ranged from 16.3 cm for 9076405 to 57.5 cm for Sherman.

Seed was harvested from each replication of accession no. 9076402 on June 2. The seed was cleaned and yielded 59.0 grams. The total harvest of seed in 1999 and 2000 resulted in 155.5 grams of seed available. This seed will be used for seed increase and further evaluation. The plots were removed in the fall of 2000.

Future Work

A seed increase field of accession no. 9076402 will be planted in the spring of 2002. The seed increase field will also provide additional evaluation of accession no. 9076402 under larger scale seed production conditions. There is a significant demand for muttongrass in the Great Basin area. Releasing this accession as a source identified germplasm is being considered.

Table 1.
1996 Native Bluegrass Evaluation Planting
Summary of Evaluation Data (1996 - 2000)
Field 14, Aberdeen PMC Home Farm

Accession	Collection Site Legal Location	Clean Seed (grams)	Percent Germination	1/ Stand Emergence Rating		Vigor			
				6/11/96	11/13/96	5/6/97	5/27/98	6/4/99	6/2/00
9076407	T1N R70E Sec 34 NE	116.5	44	4.0	3.3	4.0	3.3	1.5	*
Sherman	Pullman PMC	-	91	3.8	4.0	3.5	2.3	1.3	1.8
9076408	T1N R70E Sec 27 SE	17.5	41	3.8	3.5	3.3	2.3	1.0	*
Canbar	Pullman PMC	-	79	1.0	4.5	3.0	2.8	3.5	3.8
9076402	T2S R70E Sec 17 SW	38.8	58	3.3	4.8	4.8	3.8	3.0	2.3
9076403	T2S R70E Sec 16 SW	14.1	47	5.0	5.5	6.5	4.8	3.5	3.8
9076406	T1N R67E Sec 23 SW	49.7	62	6.3	5.8	6.3	3.8	3.8	4.3
9076404	T2S R70E Sec 9 SW	31.0	52	6.5	6.8	7.3	5.3	5.0	5.5
9076405	T1S R70E Sec 1 SE	25.1	29	5.0	7.0	6.0	5.3	4.8	6.5

1/ Stand emergence is a subjective rating with 1 as best emergence and 9 as no emergence.

2/ Vigor is a subjective rating based upon plant health and growth; 1=Best, 9=Worst. Accessions marked with an * were removed from evaluation.

Accession	Percent Stand				
	11/13/96	5/6/97	5/27/98	6/4/99	6/2/00
9076407	42.7 a	59.5 a	71.0	77.0 ab	*
Sherman	34.0 ab	49.0 abc	62.3	72.0 ab	63.3
9076408	28.5 abc	57.7 ab	72.8	100.0 a	*
Canbar	23.0 abcd	44.7 abcd	58.5	42.8 bc	47.8
9076402	20.2 abcd	31.0 bcde	50.3	48.5 bc	43.5
9076403	11.5 bcd	22.7 cde	40.0	45.8 bc	33.5
9076406	9.0 cd	15.7 e	33.5	34.5 c	18.5
9076404	6.5 cd	14.0 e	29.5	30.8 c	20.8
9076405	3.5 d	18.2 de	32.5	25.8 c	8.8
Mean	19.87	34.72	50.04	53.02	33.74
CV	80.60	56.22	n/a	45.96	na/
LSD	23.26	28.34	n/a	35.5	n/a

Percent stand data was analyzed utilizing Least Significant Difference Test. P = 0.05. Means followed by the same letter are not significantly different. Accessions marked with an * were removed from evaluation.

Table 1 continued.
 1996 Native Bluegrass Evaluation Planting
 Summary of Evaluation Data (1996 - 2000)
 Field 14, Aberdeen PMC Home Farm

Accession	Plant Height (cm)				
	11/13/96	5/6/97	5/27/98	6/4/99	6/2/00
9076407	3.8	4.5	31.5	54.8	*
Sherman	6.0	14.8	40.5	59.5	57.5
9076408	4.0	4.8	32.8	58.5	*
Canbar	3.0	5.3	33.5	28.0	30.0
9076402	2.0	2.8	31.0	33.0	37.8
9076403	2.0	2.0	27.5	34.5	36.8
9076406	2.3	3.5	30.0	27.5	33.8
9076404	1.8	1.8	23.8	26.5	26.0
9076405	1.8	2.3	27.0	24.5	16.3

Accessions marked with an * were removed from evaluation.

2001 Progress Report
1998 Hybrid Poplar Initial Evaluation
Field 17, Aberdeen PMC
Loren St. John, Team Leader

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

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

Weed barrier material was installed prior to planting. The cuttings were then hand planted through the weed barrier on May 28, 1998 so that only one bud was above ground. Allowing only one bud to be above ground forces the cutting to develop a single trunk that is desirable for wood production. The planting was kept moist during the growing season with solid-set handlines. Weed control needs were minimal because of the installation of weed barrier material. On June 1, 1999 forty-three plots were re-planted. Most of the replacements were for those plots that did not establish during the first growing season.

In March, 2001 before buds began to break, the trees were pruned to remove all basal branches to encourage a single dominant trunk that is preferred for saw logs. No more than 50 percent of the branches on a single tree were removed. During the growing season sprouts and side branches below the prune line were removed periodically.

The between-row area was seeded to a mixture of 'Durar' hard fescue and 'Bighorn' sheep fescue (3.5 pounds PLS per acre of each species) on June 7, 2001. The seeding was kept moist during the growing season to ensure establishment.

The plots were evaluated on September 21, 2001 and the data is summarized in Table 1. 9076418 (OP-367) and 9076421 (52-225) continued to have the best survival and were the tallest. These two accessions appear to be the best-adapted accessions to the soil and climate in the Snake River Plains of southeastern Idaho. 9076418 (OP-367) and Robust had the best vigor ratings from the original planting. Accession no. 9076418 (OP-367) also had the largest D.B.H. (12.8 cm). Canam, Imperial, and 9076421 (52-225) plots exhibited chlorotic symptoms to varying degrees. No pests were observed on the plants this year.

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

The planting will be evaluated next year and then will be harvested in 8 to 9 years to evaluate wood production.

Table 1.
2001 Evaluation Data
1998 Hybrid Poplar Planting

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

Re-planted Hybrid Poplar 1999

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

^{1/} D.B.H. is diameter at breast height (1.4 m from ground surface)

^{2/} Rated 1 – 9, with 1 best, 9 worst

2001 Progress Report
Sandberg Bluegrass Release in Cooperation with Shrub Sciences Laboratory
Loren St. John, PMC Team Leader

In 1999, the Aberdeen PMC agreed to cooperate with the United States Department of Agriculture, Forest Service, Shrub Sciences Laboratory in the release and seed increase of accession number B5397G1818 Sandberg bluegrass *Poa secunda* (formerly *Poa sandbergii*). Sandberg bluegrass is an early maturing, cool-season, short statured, perennial bunchgrass. It is one of the earliest grasses to green up in spring and cures and goes dormant by early summer. The plant occurs in small tufts, with soft basal leaves, and few to many flowering stalks that are naked except for two small leaves. Plants seldom exceed 2 feet in height and are more commonly less than one foot in height. Sandberg bluegrass has extensive deep penetrating, coarse, fibrous roots that make it very drought tolerant, and resistant to grazing and trampling. Because of its small stature and early maturity, it does not provide much usable livestock forage. However, wild animals such as deer, pronghorn antelope, and mountain sheep utilize it in early spring for forage and birds and small mammals utilize the seed.

Accession number B5397G1818 was collected by the Shrub Sciences Laboratory in 1997 on the Air Force Saylor Creek Test Range in southwestern Idaho. It was compared to 25 other accessions from Idaho that were collected and evaluated by the Shrub Sciences Laboratory.

The PMC received 1.5 pounds bulk seed from the Shrub Sciences Laboratory in late August, 1999 intending to plant soon after. Because of extremely warm temperatures, seeding was delayed until May 23, 2000. During the fall of 1999, a germination test was conducted to determine seed viability. Germination percentage ranged from 77 to 85 percent. The seed was planted in field 20 at the PMC Home Farm.

After planting, the field was irrigated every 3 days for 3 hours each set until June 7. On June 13 irrigation set time was increased to 4 hours once per week for 2 weeks and on July 5 the field was irrigated for 8 hours. The field was then mowed to clip annual weeds and cultivated. On July 12 the field was irrigated for 8 hours and on July 18 the field was sprayed with malathion (32 oz. per acre) to control green bugs. Irrigation continued every 2 weeks through August and annual weeds were mowed. Observations during the summer of 2000 found the grass to be very slow growing reaching heights of 1 to 2 cm. By early August the plants had gone dormant. On September 6, 2000 the field was observed and the grass had begun fall re-growth and was 0.5 to 1 cm tall.

On April 20, 2001 the field was divided into 4 quadrants and a 50 foot transect was randomly located on a row in each quadrant to measure percent basal cover, or stand. Basal cover is measured by the interception of plant parts along a measuring tape at each 1 foot increment which are then summed to give a stand estimate recorded as a percent.

Percent stand ranged from 28 in the northwest quadrant, 48 in the northeast quadrant, 56 in the southwest quadrant to 76 in the southeast quadrant. The average percent stand was

52 percent. The southeast quadrant exhibited cover that would most nearly represent a good stand. Plant heights ranged from 3 to 9 cm tall and had good vigor. Annual weeds had not yet started growth.

The field was cultivated and hand rogued after annual weeds began growth. No herbicides for broadleaf control were used due to uncertainty of the effects it might have on the Sandberg bluegrass. Seed was hand harvested from the field on June 18, requiring 32 man hours to harvest. The seed was bagged, allowed to dry and cleaned. The clean seed yield was 0.4 pounds.

Because the stand was so thin and unproductive, the field was plowed in the fall of 2001. The PMC will plant a new field next spring if seed is made available.

2001 Progress Report
'Appar' and Native Blue Flax Comparison
Cooperative Study with Shrub Sciences Laboratory
Loren St. John, PMC Team Leader

In 1980, the United States Department of Agriculture, Forest Service Shrub Sciences Laboratory and the Natural Resources Conservation Service, Aberdeen Plant Materials Center cooperatively released 'Appar' blue flax. Appar is recommended as a component of a seed mix to provide diversity and beauty. It was originally identified as *Linum lewisii* but was later determined to be a naturalized introduced species from Europe. Appar is now recognized as *Linum perenne*. The Shrub Sciences Laboratory has been evaluating native blue flax collections and requested the PMC assist in a study to compare Appar to one of the more promising native collections.

On May 24, 2000 two rows each of Appar and Maple Grove G1 (generation 1) were seeded in field 15 at the PMC Home Farm. The rows are 84 feet long. Seed was planted with a Planet Junior seeder pulled by a tractor. The seeding rate was 25-30 PLS per foot and the rows are spaced 36 inches apart. During the establishment year, the Maple Grove accession had the best stand. On September 8, 2000 the plots were evaluated for percent stand, plant height, and vigor. Percent cover for Appar ranged from 40 – 45 percent and plants were 6 – 10 cm tall. The Maple Grove accession had a 65 – 75 percent stand and plants were 8 – 12 cm tall. Vigor for both accessions was good but the Maple Grove accession clearly had the best vigor.

Observations during the 2001 growing season indicated that the Maple Grove accession appeared to have a slightly better stand than Appar but overall plant health and vigor were equal. On June 1, both accessions were flowering. Appar had dark blue flowers and Maple Grove had light blue flowers. On July 2, the plots were observed for seed ripeness and both accessions were in the late milk to early dough stage. On July 24, sample plots were harvested from both accessions to compare seed yield and all Maple Grove plants were harvested for seed increase.

Three, 10 foot row samples were harvested from each accession for yield comparison. Seed was bagged, allowed to dry and then cleaned. The following table illustrates the yield comparison (pounds per acre) between Appar and Maple Grove:

	Maple Grove	Appar
Sample 1	568	421
Sample 2	565	664
Sample 3	571	761
Mean	568	615

This data shows that Maple Grove yielded 92 percent of what Appar produced in this comparison. Long-term yield data for Appar is 720 pounds per acre. Comparing this yield data of Maple Grove to the long-term data of Appar, Maple Grove may be able to yield 70 - 90 percent of Appar.

The total harvest of Maple Grove (including the sample data) yielded 4.173 pounds of seed. This is equivalent to 361 pounds of seed per acre, which is 50 percent of the long-term yield of Appar.

Bushel weight of the Maple Grove seed harvested was 41 pounds per bushel. The long-term bushel weight of Appar is 47.5 pounds.

Comparison of yield between Appar and Maple Grove will be repeated in 2002.

OFF-CENTER ACTIVITIES

Grantsville Off-Center Advanced Test Site
Summary of Progress 1994 - 2000
Loren St. John, Team Leader
Aberdeen Plant Materials Center

INTRODUCTION

The purpose of the Grantsville Off-Center Advanced Test Site is to evaluate and demonstrate the potential of grasses and shrubs for revegetation and forage for livestock and wildlife in areas of 10-12 inch average annual precipitation in northwestern Utah. Many areas within this region are heavily infested with cheatgrass. The site is in MLRA 28A, Great Salt Lake Area of the Western Range and Irrigated region of the Intermountain United States.

The test site was located approximately 5 miles southeast of Grantsville, Utah on land owned by the Grantsville Soil Conservation District. The site was fenced to exclude livestock. The off-center advanced test site was originally planted in 1988 by the Aberdeen Plant Materials Center but due to drought and grasshopper infestation the seeding failed.

The soil on the site is a Taylorsflat Loamy Substratum, 0 - 3 percent slope. Soils are very deep, formed in alluvium on terraces under greasewood and grasses. A typical profile has a pale brown loam surface layer 3 inches thick. The underlying layer is pale brown to very pale brown loam to a depth of 60 inches or more. Permeability is moderate and available water capacity is very low. The pH is 8.5 - 9.0. There are scattered pockets of deposited blow sand on the test site. The dominant vegetation of the natural plant community is bottlebrush squirreltail, Wyoming big sagebrush and greasewood. The site is a semidesert alkali loam range site. The elevation is 4350 feet, the average annual air temperature is 45 - 52°F and the frost free period is 110 - 140 days.

MATERIALS AND METHODS

The off-center advanced test site is composed of three components, the inter-center strain trial, row spacing trial and a display nursery. The inter-center strain trial includes a block of 31 grass accessions and a block of 7 shrub accessions, which are arranged into two separate complete randomized block designs with 4 replications.

The purpose of the row spacing trial was to demonstrate the effect of row spacing on plant growth and forage production. The trial may also identify the ideal spacing to exclude or reduce weedy species within a planting. The row spacing trial was composed of 'Hycrest' crested wheatgrass and 'Bozoisky' Russian wildrye arranged with three rows of each cultivar beginning at 6 inch row spacing gradually increasing to 48 inch row spacing over a distance of 150 feet and replicated twice. Permanent markers were established on the middle row of each variety to collect data representing average row spacing widths of 6, 12, 18, 24, 36, and 48 inches.

The display nursery included 48 accessions of grasses, forbs, and shrubs to allow landusers and agency personnel to view examples of released cultivars and promising accessions that are adapted to the general area.

The area had been used previously for testing purposes. However, cheatgrass and annual weeds were the dominant vegetation prior to seeding. The site was burned September 1,

1993. Early in the summer of 1994, the site was lightly disked. On November 14, 1994 the site was culti-packed three times and on November 15-16, 1994 the grass and forb plots and cover crop were planted. The shrub plots and row spacing trial were seeded with a hand pushed belt seeder on April 4, 1995. The reason for delaying planting of the shrub plots was to obtain the most fresh seed possible. The row spacing trial was delayed until spring, 1995 because of wet field conditions. The row spacing trial and shrub testing sites were treated with Roundup (Glyphosate) at a rate of 1 quart per acre prior to seeding to control cheatgrass. Table 1 lists the accessions that were planted and shows percent pure live seed (PLS) and the source for each accession. Figure 1 is a plot map showing the layout of the test site.

All seed except the shrub and row spacing trial was mixed with rice hulls prior to seeding to plant approximately 25 seeds per square foot. A double disk drill with press wheels was used. Plots were 6.67 feet wide x 20 feet long. Row spacing was 10 inches with the exception of basin wildrye and Russian wildrye accessions that were planted at 20 inch row spacing. Depth of seeding ranged from 0.25 - 0.75 inches dependent upon species. The shrub plots were composed of 4 rows, spaced 4 feet apart x 20 feet long, and were seeded at a rate of 15 pure live seeds per linear foot. The row spacing trial was seeded at a rate of approximately 25 seeds per linear foot.

Areas not seeded with test plots or display plots were seeded to a cover crop seed mixture composed of the following species and rates:

'P-27' Siberian wheatgrass	1.8 pounds PLS/ac
'Hycrest' crested wheatgrass	1.3
'Bannock' thickspike wheatgrass	1.1

The middle 2 rows of each plot were sampled for evaluation purposes. Percent stand (or basal cover) data was collected utilizing a 20 foot rope with 1 foot increments stretched and anchored from one end of the plot to the other between the middle 2 rows. Basal cover is measured by the interception of plant parts along the rope at each 1 foot increment which were then summed to give a cover estimate recorded as a percent. The row spacing trial cover data was collected in the same manner except only from the single test row between the outside guard rows. Percent stand data (or canopy cover) of the shrub plots was evaluated in the same manner except that interception of canopy cover was measured. Percent stand data from the replicated plots (except for the May, 1995 evaluation) was statistically analyzed for Analysis of Variance (ANOVA) and Duncan's Multiple Range Test was completed to show means separation.

Plant density was measured using a row count technique at the mid-point of the plot. Plants were counted from the middle 2 rows for a distance of 18.3 cm for 10 inch row spaced plots and 9.2 cm for 20 inch row spaced plots. The number of plants counted converts directly to the number of plants per square foot. Vigor is a qualitative rating based upon plant health and growth rate. A plant rated 1 would be best whereas a 9 rating is very poor. Data from the replicated plots is averaged while data from the non-replicated display plots is the actual data from that plot.

The row spacing trial was evaluated for plant height, vigor, forage production and between-row-weed-competition (BRWC). BRWC is a subjective rating of the influence of weeds between the rows on the productivity of the seeded varieties. BRWC was rated on a scale of 1 to 3 with 1 = low competition, 2 = medium competition, and 3 = high competition from weeds.

Forage production data was collected from the grass plots beginning in 1996, the second year of growth. The data collected from plots with 10 inch row spacing was accomplished by centering a 60 cm x 200 cm frame on the middle two rows of each plot, clipping the test material above the plant crown and placing the clippings into individual paper bags. Plots with 20 inch row spacing were clipped in the same manner but using a 120 cm x 200 cm frame. The samples were brought back to the PMC and air-dried, weighed, and the data converted to pounds per acre, dry weight. Because of extremely high variability within and between plots, further statistical analysis of forage production data was not completed.

Forage production data from the row spacing trial was obtained by clipping a 6 foot section of row at each sample point; air-drying, weighing and converting the data to pounds per acre dry weight.

The test site is located in a 10-12 inch precipitation zone. The following summarizes precipitation collected during the evaluation period. This data was provided by the Grantsville Irrigation Company and is collected at Grantsville Reservoir located approximately 6 miles west of the test site:

Crop year	1995	1996	1997	1998	1999	2000	Long term Average
				(inches)			
October	1.58	0.12	0.83	0.75	1.97	0.02	0.11
November	1.92	0.31	1.24	0.87	0.30	0.11	0.78
December	0.48	0.65	0.91	0.43	0.51	0.31	0.70
January	0.76	2.05	2.13	1.42	0.71	1.08	0.84
February	1.93	1.56	2.26	2.54	0.82	1.75	0.78
March	2.35	1.13	0.37	2.33	1.05	1.42	3.55
April	1.38	1.06	2.04	1.88	2.01	0.71	1.24
May	5.00	1.52	1.34	0.69	1.47	0.86	1.25
June	1.71	0.59	2.98	2.62	1.27	0.18	0.67
July	1.15	0.00	1.79	0.87	0.28	0.38	0.70
August	0.92	0.02	1.19	1.04	0.32	2.18	0.89
September	0.64	0.83	1.85	0.90	0.19	1.86	0.83
Total	19.82	9.84	18.93	16.34	10.90	10.86	12.34
Percent of Long term Average	160	80	153	132	88	88	

The Grantsville Reservoir is approximately 600 feet higher in elevation than the test site and does appear to receive additional precipitation over that received at the test site.

1995 EVALUATIONS AND DISCUSSION

Due to the very favorable amount and timing of precipitation just prior to seeding and during the establishment year, the majority of the stands established. General observations of the site on May 17 indicated heavy cheatgrass and bulbous bluegrass cover on most of the site. However, most plots had emerged and were competing with the weed cover. Some areas also had burr buttercup and volunteer crested wheatgrass.

Plant height data collected from the replicated grass plots during the May evaluation showed 'Vavilov' Siberian wheatgrass and SL-hybrid wheatgrass to have maximum heights

at 12.5 cm (Table 2). During the September evaluation, Hycrest crested wheatgrass was the tallest accession averaging 63.8 cm.

Percent stand during the May evaluation ranged from 0.0 percent for 'Paloma' Indian ricegrass, 'Volga' mammoth wildrye, 9024804 Columbia needlegrass, and 9040137 Columbia needlegrass to 45.8 percent for Vavilov Siberian wheatgrass. Overall, there was an increase in percent stand from the May 17 to the September 25 evaluation. Paloma, Volga, 9024804, and 9040137 continued to show no measurable stand. Hycrest, 'Tetracan' Russian wildrye, Vavilov Siberian wheatgrass, and 'Nordan' crested wheatgrass had the best stands at 59.5; 56.0; 54.0; and 50.3 percent respectively (Table 2).

Plant density for the grass plots during the May evaluation ranged from 0 plants per foot² to 6.8 plants per foot² for 'Ephraim' crested wheatgrass. By the September evaluation date, plant density dropped for most accessions because as seedlings establish, the weaker seedlings are crowded out and die. Vavilov Siberian wheatgrass had the best density at the fall evaluation averaging 4.5 plants per foot².

Vigor for the grass plots during the spring evaluation ranged from 9.0 (poorest) to 1.8 (best) for Hycrest crested wheatgrass. Syn A Russian wildrye, Hycrest and Tetracan had the best vigor during the fall evaluation.

The shrub plots were not evaluated for plant height during the May 17 evaluation because they were quite small. Plant height ranged from 22.3 cm for 9067480 fourwing saltbush to 34.8 cm for 'Wytana' fourwing saltbush during the fall evaluation. Percent stand ranged from 1.0 percent for 9067480 fourwing saltbush to 27.0 percent for Pamirian winterfat during the May evaluation. During the September evaluation, percent stand ranged from 12.3 percent for 'Hatch' winterfat to 41.3 percent for Pamirian winterfat (Table 3).

The number of plants counted in the middle 2 sample rows ranged from 6.3 for 'Rincon' fourwing saltbush to 43.0 plants for 9067481 winterfat during the May evaluation. During the fall evaluation, Hatch winterfat had the least number of plants (12.5) and 9067481 winterfat had the most (37.0).

The establishment of the shrub plots was quite impressive. Past experience has shown these shrubs to be very slow in establishing when direct-seeded. Herbicide application prior to seeding in the spring coupled with very favorable precipitation following seeding, greatly enhanced the establishment of the shrub plots.

Pre-plant herbicide application also benefited the row spacing trial. Evaluation of the trial in May indicated good emergence at each row spacing data collection point. However, ant hills and rodents damaged several plots over the summer that resulted in no collection of data from those plots in September.

During the May 17 evaluation there was no difference in vigor for Bozoisky Russian wildrye and Hycrest crested wheatgrass at all row spacings. Generally, vigor improved for both species during the September 25 evaluation (Table 4).

Plant height of Bozoisky was fairly uniform at all row spacings during the spring evaluation. During the fall evaluation, maximum plant height occurred at 12 inch row spacing and minimum plant height was at 6 inch row spacing. Percent cover was quite variable. During the spring evaluation, the least cover (10.0 percent) occurred at 48 inch

row spacing and at the fall evaluation, the maximum cover was 45.0 percent at 12, 18, and 36 inch row spacing.

Plant height of Hycrest was fairly uniform at all row spacings during the May evaluation. During the September evaluation, maximum height (41.0 cm) occurred at 48 inch row spacing and the minimum height (30.5 cm) occurred at the 6 inch row spacing. Cover was fairly uniform during the spring evaluation except for the 6 inch row spacing which averaged 40.0 percent. During the fall evaluation maximum cover was achieved at the 30 inch row spacing (85.0 percent) and minimum cover was at the 6 inch row spacing (42.5 percent).

Data was collected from the non-replicated display nursery and is shown in Table 5.

Due to the very favorable amount and timing of precipitation from just prior to seeding and during the establishment year, the majority of stands established. On October 15, 1995 the site was mowed to remove the current years' growth.

1996 EVALUATIONS AND DISCUSSION

The test site was evaluated on May 7 and data was collected on plant height, percent stand, plant density and vigor. On July 17, forage production and vigor data were collected from the inter-center strain trial and the row spacing trial. Vigor and number of plants per sample row were also collected from the shrub plots during the second evaluation. A summary of this data is presented in Tables 2 and 3.

During the 1996 crop year precipitation was 9.84 inches and was more near average as compared to the 1995 crop year when 19.82 inches were received.

At the May 17 evaluation, plant height ranged from 5.8 cm for 'Nezpar' Indian ricegrass to 32.3 cm for Syn-A Russian wildrye. On July 17, plant height ranged from 8.5 cm for 9019218 bottlebrush squirreltail to 65.0 cm for Bannock thickspike wheatgrass (Table 2).

Percent stand ranged from 0.8 percent for Nezpar to 67.3 percent for Tetraçan Russian wildrye. Plant density at the May evaluation ranged from 0.8 plants per foot² for Nezpar to 3.3 plants per foot² for Vavilov Siberian wheatgrass, Nordan crested wheatgrass, Bannock and 'Critana' thickspike wheatgrass.

Vigor ratings in May indicated that Tetraçan had the best vigor (1.5) and Nezpar had the worst rating (7.5). In July, Bannock thickspike wheatgrass had the best vigor rating (1.5) and Nezpar Indian ricegrass continued to have the worst rating (7.8). Accessions with 0 percent stand are excluded from this discussion.

Forage production ranged from 19 pounds per acre for PI-478833 Indian ricegrass to 957 pounds per acre for Vavilov. Nordan produced 846 pounds per acre followed by Hycrest (753) and Ephraim crested wheatgrass (725).

Shrub height ranged from 16.3 cm for 9063535 winterfat to 27.5 cm for Rincon fourwing saltbush at the May 7 evaluation. In July, shrub height ranged from 34.5 cm for 9063535 winterfat to 45.5 cm for Rincon. Percent stand ranged from 10.8 for Hatch winterfat to 53.0 percent for Pamirian winterfat (Table 3). Pamirian also had the greatest number of plants per sample rows at the July evaluation.

Vigor of the shrubs ranged from 1.5 for Pamirian to 5.0 for Hatch at the May evaluation and in July, 9067480 fourwing saltbush had the best vigor rating.

The row spacing trial was evaluated for height, percent cover, and a subjective rating for between-row weed competition (BRWC) was also recorded at the May 7 evaluation. In July, vigor, plant height and forage production data was collected (Table 4).

During the May evaluation, BRWC for Bozoisky Russian wildrye was lowest at the 30 inch row spacing and medium at all other row spacings. The maximum plant height occurred at the 48 inch row spacing and the maximum cover was achieved at the 12 inch row spacing. In July, the best vigor ratings were at the 30, 36 and 48 inch row spacing. The maximum plant height occurred at the 18 inch row spacing and the maximum forage production was achieved at the 6 inch row spacing.

BRWC for Hycrest crested wheatgrass was lowest at the 12 and 18 inch row spacing. Maximum plant height at the May evaluation was at the 48 inch row spacing and maximum cover was achieved at the 18 inch row spacing. Vigor ratings were best at the 30, 36, and 48 inch row spacing in July and maximum plant height was at the 36 inch row spacing. Maximum forage production was achieved at the 12 inch row spacing.

Wider row spacings appear to allow plants to achieve more height but does not result in greater forage production.

Data was collected from the non-replicated display plots and is also shown in Table 5.

During 1996 Vocational Agriculture students from Grantsville High School and the Northern Utah Section of the Society For Range Management toured the site.

1997 EVALUATIONS AND DISCUSSION

The site was first evaluated on May 7 and data was collected on plant height, percent stand, plant density and vigor. On July 15, forage production and vigor data were collected from the inter-center strain trial and the row spacing trial. Vigor and number of plants per sample row were also collected from the shrub plots during the second evaluation. A summary of this data is presented in Tables 2 and 3.

During the 1997 crop year precipitation was 18.93 inches, 153 percent of the long-term average of 12.34 inches.

At the May 7 evaluation, plant height ranged from 6.8 cm for 9019219 bottlebrush squirreltail to 31.0 cm for 'Secar' Snake River wheatgrass. On July 15, plant height ranged from 3.8 cm for 9052861 Indian ricegrass to 55.8 cm for PI-2745459 Siberian wheatgrass (Table 2).

Percent stand ranged from 2.0 percent for 9040187 bottlebrush squirreltail to 53.5 percent for Tetracan Russian wildrye. Plant density at the May evaluation ranged from 0.5 plants per foot² for 9040187 bottlebrush squirreltail to 4.0 plants per foot² for Bannock thickspike wheatgrass.

Vigor ratings in May indicated that Tetracan, Hycrest crested wheatgrass and Vavilov Siberian wheatgrass had the best vigor (1.3) and 'Sodar' streambank wheatgrass and

9040187 bottlebrush squirreltail had the worst rating (7.5). In July, Hycrest had the best vigor rating (1.8) and 'Rimrock' and 9052861 Indian ricegrass had the worst rating (8.3).

Forage production ranged from 9 pounds per acre for 9040189 bottlebrush squirreltail and 9052861 Indian ricegrass to 1533 pounds per acre for Hycrest. Nordan produced 1366 pounds per acre followed by PI-275459 Siberian wheatgrass (1198) and Vavilov (957).

Shrub height ranged from 24.3 cm for 9063535 winterfat to 44.0 cm for 9067480 fourwing saltbush at the May 7 evaluation. In July, shrub height ranged from 24.0 cm for 9063535 winterfat to 45.5 cm for 9067480 fourwing saltbush. Percent stand ranged from 9.8 for Hatch winterfat to 44.5 percent for Pamirian winterfat (Table 3). 9067481 fourwing saltbush and Rincon fourwing saltbush had the greatest number of plants per sample rows at the July evaluation.

Vigor of the shrubs ranged from 1.8 for Pamirian to 5.5 for Hatch at the May evaluation and in July, 9067480 fourwing saltbush had the best vigor rating. The replicated shrub plots appear to be gradually losing vigor as time progresses due to increasing competition from the cheatgrass understory which is becoming more pronounced.

The row spacing trial was evaluated for height, percent cover, and a subjective rating for between-row weed competition (BRWC) during the May 7 evaluation (Table 4). In July, vigor, plant height and forage production data was collected.

During the May evaluation, BRWC for Bozoisky Russian wildrye was least at the 6, 12 and 18 inch row spacing and became stronger as row spacing continued to increase. The maximum plant height occurred at the 48 inch row spacing and the maximum cover was achieved at the 12 inch row spacing. In July, the best vigor ratings were at the 6 and 12 inch row spacing. The maximum plant height occurred at the 48 inch row spacing and the maximum forage production was achieved at the 6 inch row spacing.

BRWC for Hycrest crested wheatgrass was lowest at the 6, 12, and 18 inch row spacing. Maximum plant height at the May evaluation was at the 48 inch row spacing and maximum cover was achieved at the 36 inch row spacing. Vigor ratings were best at the 36 inch row spacing in July and maximum plant height was at the 30 and 36 inch row spacing. Maximum forage production was achieved at the 12 inch row spacing.

Data was collected from the non-replicated display plots and is also shown in Table 5. 'Parkway' crested wheatgrass produced the most forage followed by 'Kirk'. None of the forb or shrub plots in the Display Nursery were able to compete with the cheatgrass cover and establish.

1998 EVALUATIONS AND DISCUSSION

The test site was first evaluated on May 6 and data was collected on plant height, percent stand, plant density and vigor. On July 16, forage production and vigor data were collected from the inter-center strain trial and the row spacing trial. Vigor and number of plants per sample row were also collected from the shrub plots during the second evaluation. A summary of this data is presented in Tables 2 and 3.

During the 1998 crop year precipitation was 16.34 inches or 132 percent of average.

All evaluation data collected during 1998 was collected in an identical manner as in previous years with the exception of the data collected in July. Due to extremely hot weather, only the first and second replications of the grass plots were evaluated in July.

At the May 6 evaluation, plant height ranged from 6.5 cm for Rimrock Indian ricegrass to 39.0 cm for Secar Snake River wheatgrass and Bozoisky Russian wildrye. On July 16, plant height ranged from 21.5 cm for Rimrock Indian ricegrass to 98.0 cm for Tetracan Russian wildrye (Table 2).

Percent stand ranged from 2.0 percent for Rimrock Indian ricegrass to 61.5 percent for Tetracan Russian wildrye. Plant density at the May evaluation ranged from 0.3 plants per foot² for Rimrock Indian ricegrass to 6.3 plants per foot² for 'Mankota' Russian wildrye.

Vigor ratings in May indicated that Tetracan and Hycrest crested wheatgrass had the best vigor (2.0) and Rimrock Indian ricegrass had the worst rating (7.8). In July, Vavilov Siberian wheatgrass had the best vigor rating (1.5) and Rimrock Indian ricegrass had the worst rating (7.5).

Forage production ranged from 315 pounds per acre for SL-Hybrid wheatgrass to 2415 pounds per acre for Nordan crested wheatgrass. Hycrest produced 2378 pounds per acre followed by Vavilov Siberian wheatgrass (1821 pounds per acre).

Shrub height ranged from 23.3 cm for Wytana fourwing saltbush to 45.8 cm for 9067480 fourwing saltbush at the May 6 evaluation. In July, shrub height ranged from 30.8 cm for 9063535 winterfat to 55.8 cm for 9067480 fourwing saltbush. Percent stand ranged from 11.5 for Hatch winterfat to 45.8 percent for Pamirian winterfat (Table 3).

Vigor of the shrubs ranged from 1.5 for 9067481 winterfat and 9067480 fourwing saltbush to 5.0 for Hatch at the May evaluation and in July, 9067480 fourwing saltbush had the best vigor rating.

The row spacing trial was evaluated for height, percent cover, and a subjective rating for between-row weed competition (BRWC) during the May 7 evaluation. In July, vigor, plant height and forage production data was collected (Table 4).

During the May evaluation, BRWC for Bozoisky Russian wildrye was least at the 6, 12 and 18 inch row spacing and was medium to high as row spacing continued to increase. The maximum plant height occurred at the 48 inch row spacing and the maximum cover was achieved at the 36 inch row spacing. In July, the best vigor rating was at the 48 inch row spacing. Maximum plant height and forage production was also achieved at the 48 inch row spacing.

BRWC for Hycrest crested wheatgrass was lowest at the 12 and 18 inch row spacing. Maximum plant height at the May evaluation was at the 30 inch row spacing and maximum cover was achieved at the 12, 18, and 36 inch row spacing. Vigor rating was best at the 12 inch row spacing in July and maximum plant height was at the 12 inch row spacing. Maximum forage production was also achieved at the 12 inch row spacing.

Data was collected from the non-replicated display plots and is shown in Table 5. 'Fairway' crested wheatgrass produced the most forage followed by Parkway. None of the forb or shrub plots in the Display Nursery have been able to compete with the cheatgrass cover.

The Plant Materials Center applied OUST™ herbicide to the display nursery and the replications I-III of the test grass plots on December 2, 1998. OUST is a dispersible granule that is mixed in water and applied as a spray to control annual grasses and broadleaf plants by both pre-emergence and post-emergence activity. The herbicide application was made to evaluate the herbicide effects on the plant materials established at the site. The application rate was 0.75 ounces per acre. The application was made using an 80 inch boom sprayer mounted on an all terrain vehicle (ATV). Weather conditions were ideal when the application was made; air temperature was 50 ° F, and wind speeds were 2 – 4 miles per hour.

1999 EVALUATIONS AND DISCUSSION

The test site was first evaluated on May 6 and data was collected on plant height, percent stand, plant density, plant vigor and herbicide efficacy (effectiveness). On July 15, plant height and vigor data were collected from the inter-center strain grass trial and the row spacing trial. Forage production data was collected from the row spacing trial but not the replicated grass plots because of the herbicide application. Vigor and number of plants per sample row were also collected from the shrub plots during the second evaluation. A summary of this data is presented in Tables 2 and 3. During the summer of 1999, the site experienced a heavy infestation of grasshoppers that were prevalent in the area.

During the 1999 crop year precipitation was 10.90 inches or 88 percent of the long-term average of 12.34 inches.

During the May 6 evaluation, plant height ranged from 3.7 cm for 9019219 bottlebrush squirreltail to 14.0 cm for Mankota Russian wildrye. On July 16, plant height ranged from 2.7 cm for 9052861 Indian ricegrass and 'Schwendimar' thickspike wheatgrass to 23.7 cm for 'Magnar' basin wildrye (Table 2). Plant heights during 1999 were significantly less than plant heights from previous years due to the herbicide application, dry conditions, and grasshopper damage.

Percent stand ranged from 1.7 percent for 9019219 bottlebrush squirreltail to 59.3 percent for Hycrest crested wheatgrass. Plant density during the May evaluation ranged from 0.3 plants per foot² for 'Trailhead' basin wildrye, Secar Snake River wheatgrass, SL hybrid wheatgrass and Rimrock Indian ricegrass to 3.3 plants per foot² for Hycrest.

Vigor ratings in May indicated that Ephraim crested wheatgrass had the best vigor (1.7) and 9019219 bottlebrush squirreltail had the worst rating (8.0). In July, Magnar basin wildrye had the best vigor rating (2.3) and Schwendimar thickspike wheatgrass had the worst rating (8.7).

Herbicide efficacy was rated best on plots that were well established prior to herbicide application. Observations of the sprayed plots on May 6 showed that plots with good stands of perennial grasses had excellent control of cheatgrass. Plots with poor establishment prior to herbicide application or had heavy amounts of litter had less effectiveness. Spring germinated cheatgrass was approximately 1-2 inches tall on May 6 but had poor vigor. The perennial grasses had very little chlorosis.

By July 15, most of the perennial grasses were dormant, and there had been heavy use by grasshoppers. There was no cheatgrass with viable seed present in the treated area.

Prickly lettuce *Lactuca serriola* had good vigor and it appears that OUST had no effect on it as stated on the herbicide label. The combined affects of herbicide application, dry conditions and grasshopper damage made it difficult to determine how effective the herbicide application was.

Shrub height ranged from 26.0 cm for Wytana fourwing saltbush to 51.8 cm for 9067480 fourwing saltbush at the May 6 evaluation. In July, shrub height ranged from 28.8 cm for 9063535 winterfat to 62.8 cm for 9067480 fourwing saltbush. Percent stand ranged from 11.5 for Hatch winterfat to 45.8 percent for Pamirian winterfat (Table 3). 9067481 winterfat and Pamirian winterfat had the greatest number of plants per sample rows during the July evaluation.

Vigor of the shrubs ranged from 1.8 for 9067480 fourwing saltbush to 5.3 for Hatch during the May evaluation and in July, 9067480 fourwing saltbush had the best vigor rating.

The row spacing trial was evaluated for height, percent cover, and a subjective rating for between-row weed competition (BRWC) during the May 6 evaluation. In July, vigor, plant height and forage production data was collected (Table 4).

During the May evaluation, BRWC for Bozoisky Russian wildrye was least at the 6, and 12 inch row spacing and was medium to high as row spacing continued to increase. The maximum plant height occurred at the 48 inch row spacing and the maximum cover was achieved at the 36 inch row spacing. In July, the best vigor rating was at the 48 inch row spacing. Maximum plant height was achieved at the 48-inch row spacing. Maximum forage production (1121 pounds per acre) was at the 6-inch row spacing.

BRWC for Hycrest crested wheatgrass was lowest at the 6, 12 and 18 inch row spacing. Maximum plant height at the May evaluation was at the 36 inch row spacing and maximum cover was achieved at the 36 inch row spacing. Vigor rating was best at the 36 inch row spacing in July and maximum plant height was at the 36 inch row spacing. Maximum forage production was also achieved at the 12 and 36 inch row spacing.

Data was collected from the non-replicated display plots and is also shown in Table 5. Parkway crested wheatgrass had the best stand.

On June 14, 1999 Loren St. John, Plant Materials Team Leader met with the Grantsville Soil Conservation District at the site to discuss activities and future plans for the site. The Supervisors expressed their approval of the work accomplished at the site and to continue cooperative work with the Plant Materials Center.

2000 EVALUATIONS AND DISCUSSION

The test site was first evaluated on May 9. Data collected from the grass plots included plant height, percent stand, plant density and plant vigor. The shrub plots were evaluated for plant height, percent stand, number of plants per sample rows, vigor and canopy width. The row spacing trial was evaluated for between row weed competition, height and cover.

On July 11, the grass plots were evaluated for plant height, vigor and forage production. The shrub plots were evaluated for plant height, number of plants per sample rows and vigor. The data is summarized in Tables 2 and 3.

During the 2000 crop year precipitation was 10.86 inches or 88 percent of the long-term average of 12.34 inches.

During the May 9 evaluation, plant height ranged from 4.0 cm for Sodar streambank wheatgrass to 31.7 cm for Magnar basin wildrye. On July 11, plant height ranged from 15.0 cm for Bannock thickspike wheatgrass to 48.3 cm for P-27 Siberian wheatgrass (Table 2).

Percent stand ranged from 1.0 percent for Sodar streambank wheatgrass to 59.7 percent for Vavilov Siberian wheatgrass. The percent stand data summarized from the evaluation in May, 2000 is arranged in order by percent stand from greatest to least and means followed by the same letters are not significantly different. There were significant declines in percent stand as compared to the data from 1999 for Secar Snake River wheatgrass, Schwendimar Bannock and Critana thickspike wheatgrass. The Oust herbicide application was very detrimental to those grass varieties.

Plant density during the May evaluation ranged from 0.3 plants per foot² for Secar Snake River wheatgrass, SL hybrid wheatgrass Rimrock Indian ricegrass and Sodar streambank wheatgrass to 2.7 plants per foot² for Nordan crested wheatgrass.

Vigor ratings in May indicated that Hycrest and Nordan crested wheatgrass and P-27 Siberian wheatgrass had the best vigor (2.0) and Secar Snake River wheatgrass had the worst rating (8.3). In July, Hycrest had the best vigor rating (2.3) and Trailhead basin wildrye had the worst rating (7.3).

Forage production ranged from 31 pounds per acre for Trailhead basin wildrye to 1140 pounds per acre for Nordan crested wheatgrass in the replicated plots.

Shrub height ranged from 27.3 cm for Wytana fourwing saltbush to 62.0 cm for 9067480 fourwing saltbush at the May 9 evaluation. In July, shrub height ranged from 26.8 cm for 9063535 winterfat to 62.5 cm for 9067480 fourwing saltbush. Percent stand ranged from 10.8 for Hatch winterfat to 64.3 percent for Pamirian winterfat. 9067481 winterfat and Pamirian winterfat had the greatest number of plants per sample rows during the July evaluation (Table 3).

Vigor of the shrubs ranged from 1.5 (best) for 9067480 fourwing saltbush to 6.0 (worst) for Hatch during the May evaluation and in July, 9067480 fourwing saltbush had the best vigor rating.

The row spacing trial was evaluated for height, percent cover, and a subjective rating for between-row weed competition (BRWC) during the May 9 evaluation (Table 4).

BRWC for Bozoisky Russian wildrye was least at the 6 and 12 inch row spacing and was greatest at the 30 and 36 inch row spacing. The maximum plant height occurred at the 48 inch row spacing and maximum cover was achieved at the 12 and 48 inch row spacing.

BRWC for Hycrest crested wheatgrass was lowest at the 6, 12 and 18 inch row spacing. Maximum plant height and maximum cover was achieved at the 36 inch row spacing.

Data was collected from the non-replicated display plots and is also shown in Table 5. Parkway crested wheatgrass had the best stand and Fairway crested wheatgrass produced the most forage (1449 pounds per acre).

CONCLUSION

The purpose of the Grantsville Off-Center Advanced Test Site was to evaluate the potential of grasses and shrubs for revegetation and forage for livestock and wildlife in areas of 10-12 inch average annual precipitation in northwestern Utah. Many areas within the region are heavily infested with cheatgrass. Due to the very favorable amount and timing of precipitation just prior to seeding and during the establishment year, many of the plots established. However, as time progressed and weed competition increased, those accessions able to compete remained.

Replicated Grass Plots

Plant performance is largely dictated by weather conditions from year to year and the most visible attribute is plant height. No one accession was consistently the tallest during the evaluation period. Hycrest crested wheatgrass was the tallest accession in 1995 and Bannock thickspike wheatgrass was the tallest in 1996. In 1997, PI-275459 Siberian wheatgrass was the tallest and in 1998, Tetracan Russian wildrye was the tallest accession. Magnar basin wildrye was the tallest accession in 1999 and P-27 Siberian wheatgrass was the tallest in 2000. Plant heights in 1999 were greatly decreased from previous years because of the herbicide application, dry conditions, and grasshopper damage. The effects of herbicide application on plant height of the grasses was still evident in 2000.

The evaluation of plant vigor shows as time progressed, more accessions declined in vigor. Table 2 illustrates that change over time. The top 5 performing accessions during the entire evaluation period were Vavilov Siberian wheatgrass, Syn A, Tetracan, and Mankota Russian wildrye and Nordan crested wheatgrass.

At the first evaluation in May, 1995 Ephraim crested wheatgrass had the greatest plant density. At the end of the first growing season and at the May, 1996 evaluation Vavilov Siberian wheatgrass had the greatest plant density. In 1997, Bannock thickspike wheatgrass had the greatest density and in 1998, Mankota Russian wildrye had the greatest plant density. The herbicide application in December, 1998 may have had some effect on the decline in plant density of some of the accessions as shown from comparing the 1998 and 1999 evaluation of plant density. Overall, Vavilov Siberian wheatgrass had the greatest density during the entire evaluation period.

As the change in plant vigor over time has been discussed, percent stand data also showed a general trend as time progressed with more accessions declining in cover. The top four accessions in terms of percent stand or basal cover at the last evaluation were Vavilov Siberian wheatgrass, Mankota Russian wildrye, Ephraim and Hycrest crested wheatgrass. There were substantial declines in percent stand following the herbicide application in 1998 for a number of accessions, all of them classified as native plants. Those included Magnar and Trailhead basin wildrye; Bannock, Critana, and Schwendimar thickspike wheatgrass; Secar Snake River wheatgrass; SL hybrid wheatgrass; Sodar streambank wheatgrass; and 9019218 and 9019219 bottlebrush squirreltail. Some of the accessions that had an increase in percent stand after the herbicide application may have done so because of the elimination of cheatgrass cover made it easier to see and evaluate the seeded plant materials.

Herbicide efficacy was rated best on plots that were well established prior to herbicide application. Plots with good stands of perennial grasses had excellent control of cheatgrass. Plots with poor establishment prior to the herbicide application or had heavy amounts of litter had less effectiveness.

Vavilov Siberian wheatgrass produced the most forage in 1996. Hycrest crested wheatgrass produced the most forage in 1997 and Nordan crested wheatgrass produced the most forage in 1998 and 2000. Nordan had the highest 4 year mean forage production.

Replicated Shrub Plots

The establishment of the shrub plots was quite impressive. Past experience has shown these shrubs to be very slow to establish when direct-seeded. Herbicide application (Roundup) prior to seeding in the spring coupled with very favorable precipitation following seeding greatly enhanced the establishment of the shrub plots.

The tallest accession at the final evaluation was 9067480 fourwing saltbush. The tallest winterfat accession was 9067481. There were no significant differences between the accessions in terms of percent stand except for Wytana fourwing saltbush and Hatch winterfat which had the poorest stands. Rincon fourwing saltbush had the greatest canopy width.

Pamirian winterfat and 9067481 winterfat had the greatest number of plants per sample rows. All accessions had good vigor with the exception of Hatch winterfat.

The data from the Grantsville Inter-Center Strain trial is being used to support the release of 9067480 fourwing saltbush (release name is Snake River Plains Germplasm) and 9067481 winterfat (release name is Northern Cold Desert Germplasm)

Row Spacing Trial

The purpose of the row spacing trial was to demonstrate the effect of different row spacing widths on plant growth, weed competition and forage production. The row spacing trial was composed of Hycrest crested wheatgrass and Bozoisky Russian wildrye. Data was collected from each variety at 6, 12, 18, 24, 36 and 48 inch row spacing.

All of the data from the row spacing trial was averaged and is shown on Table 4. The average vigor of Bozoisky Russian wildrye did not vary much between the different row spacing widths except at 24 inch spacing. The poorer vigor at the 24 inch was due to damage from rodents and ants. Average height increases as row spacing widths increased. The maximum average cover was at the 18 inch row spacing. Average between-row-weed-competition (BRWC) was generally less at the 6, 12, and 18 inch row spacing and was greater with the wider row spacing widths. The average forage yield for Bozoisky was greatest at the 6 inch row spacing.

The average vigor of Hycrest crested wheatgrass was best at the 18 inch row spacing. Maximum average height was at the 36 inch row spacing. Plants tend to grow taller as row spacing widens. The greatest average cover was at 36 inch row spacing. BRWC was least at 24 inch spacing and below. The maximum average forage yield for Hycrest was at the 12 inch row spacing.

Non-Replicated Display Plots

Kirk, Parkway, and Fairway crested wheatgrass seem to be better adapted to the conditions at the site than any of the other accessions included in the Display Plots. Fairway produced the most forage over the 4 year period followed by Parkway.

In 2000, the test site property was transferred to private ownership. The Plant Materials Center will not be able to evaluate the site for long-term plant performance. The Plant Materials Center expresses gratitude to the Grantsville Soil Conservation District and Natural Resources Conservation Service field personnel in Utah who assisted with planting and evaluations.

Table 1.
Materials Planted in Grantsville Inter-Center Strain Trial

Accession No.	Common Name	Scientific Name	Source	Percent PLS
Replicated Grass Plots				
9052861	Indian Ricegrass	<i>Achnatherum hymenoides</i>	Los Lunas	92.0
Rimrock	Indian Ricegrass	<i>Achnatherum hymenoides</i>	Bridger	71.4
Nezpar	Indian Ricegrass	<i>Achnatherum hymenoides</i>	Aberdeen	90.4
9035287	Indian Ricegrass	<i>Achnatherum hymenoides</i>	Los Lunas	95.0
Paloma	Indian Ricegrass	<i>Achnatherum hymenoides</i>	Los Lunas	88.0
Ephraim	Crested Wheatgrass	<i>Agropyron cristatum</i>	Aberdeen	92.2
Douglas	Crested Wheatgrass	<i>Agropyron cristatum</i>	ARS	78.0*
Nordan	Crested Wheatgrass	<i>Agropyron desertorum</i>	Commercial	81.3
Hycrest	Crested Wheatgrass	<i>A. cristatum x desertorum</i>	Aberdeen	80.1
Vavilov	Siberian Wheatgrass	<i>Agropyron fragile sibiricum</i>	ARS	78.0*
P-27	Siberian Wheatgrass	<i>Agropyron fragile sibiricum</i>	Aberdeen	91.6
PI-275459	Siberian Wheatgrass	<i>Agropyron sibiricum</i>	Pullman	48.7
9040189	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	Meeker	95.1
9019218	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	Bridger	75.6*
9040187	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	Meeker	80.7
9019219	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	Bridger	70.2*
Bannock	Thickspike Wheatgrass	<i>Elymus lanceolatus ssp. lanceolatus</i>	Aberdeen	95.1
Critana	Thickspike Wheatgrass	<i>Elymus lanceolatus ssp. lanceolatus</i>	Bridger	93.6
Sodar	Streambank wheatgrass	<i>Elymus lanceolatus ssp. lanceolatus</i>	Aberdeen	96.6
Schwendimar	Thickspike Wheatgrass	<i>Elymus lanceolatus ssp. lanceolatus</i>	Pullman	89.4
SL-hybrid	Hybrid Wheatgrass	<i>Elymus x Pseudoroegneria</i>	ARS	89.0*
Magnar	Basin Wildrye	<i>Leymus cinereus</i>	Aberdeen	93.7
Trailhead	Basin Wildrye	<i>Leymus cinereus</i>	Bridger	93.3
Volga	Mammoth Wildrye	<i>Leymus racemosus</i>	Pullman	25.7
Tetracan	Russian Wildrye	<i>Psathyrostachys juncea</i>	ARS	58.0*
Syn A	Russian Wildrye	<i>Psathyrostachys juncea</i>	ARS	83.0*
Mankota	Russian Wildrye	<i>Psathyrostachys juncea</i>	Bismark	83.5
Bozoisky	Russian Wildrye	<i>Psathyrostachys juncea</i>	Bridger	94.1
Secar	Snake River Wheatgrass	<i>Pseudoroegneria spicata ssp. spicata</i>	Pullman	69.4
9024804	Columbia Needlegrass	<i>Stipa nelsonii v. dorei</i>	Meeker	64.9
9040137	Columbia Needlegrass	<i>Stipa nelsonii v. dorei</i>	Meeker	69.0
Shrub Plots				
Wytana	Fourwing Saltbush	<i>Atriplex canescens</i>	Bridger	46.6
9067480	Fourwing Saltbush	<i>Atriplex canescens</i>	Aberdeen	27.9*
Rincon	Fourwing Saltbush	<i>Atriplex canescens</i>	Meeker	39.1
Pamirian	Winterfat	<i>Krascheninnikovia ceratoides</i>	Aberdeen	91.1
9067481	Winterfat	<i>Krascheninnikovia lanata</i>	Aberdeen	68.9
9063535	Winterfat	<i>Krascheninnikovia lanata</i>	Bridger	81.5*
Hatch	Winterfat	<i>Krascheninnikovia lanata</i>	Meeker	66.7
Non-replicated Display Plots				
Kirk	Crested wheatgrass	<i>Agropyron cristatum</i>	Canada	73.0*
Parkway	Crested wheatgrass	<i>Agropyron cristatum</i>	Canada	78.0*
Fairway	Crested wheatgrass	<i>Agropyron cristatum</i>	Commercial	79.6
9021471	Fringed sage	<i>Artemisia frigida</i>	Meeker	32.0*
Pryor	Slender wheatgrass	<i>Elymus trachycaulis</i>	Bridger	93.6
San Luis	Slender wheatgrass	<i>Elymus trachycaulis</i>	Meeker	30.9
Newhy	RS Hybrid	<i>Elytrigia x Pseudoroegneria</i>	ARS	82.8*
Timp	Utah Sweetvetch	<i>Hedysarum boreale</i>	Meeker	63.0
Immigrant	Forage Kochia	<i>Kochia prostrata</i>	Los Lunas	59.7
Whitmar	Beardless wheatgrass	<i>Pseudoroegneria spicata inermis</i>	Bridger	89.7

* Purity and germination data was not available from source. Germination tests were completed and purity was assumed to be 90 percent to calculate percent PLS.

Table 2. Continued
 Grantsville Inter-Center Strain Trial
 Summary of 1995-2000 Evaluation Data

Replicated Grass Plots
Plant Vigor ^{1/}

Accession No.	Common Name	5/17/95	9/25/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
Vavilov	Siberian Wheatgrass	1.8	2.0	2.0	2.5	1.3	2.5	2.5	1.5	2.3	3.7	2.3	3.3
Mankota	Russian Wildrye	2.5	2.0	2.0	2.5	1.8	2.3	2.8	4.0	2.3	7.3	2.3	3.3
Ephraim	Crested Wheatgrass	2.3	2.8	3.0	3.8	2.8	3.8	3.0	3.5	1.7	4.0	3.3	4.3
Hycrest	Crested Wheatgrass	1.8	1.5	2.0	2.5	1.3	1.8	2.3	2.0	2.7	5.0	2.0	2.3
Nordan	Crested Wheatgrass	2.3	2.8	3.0	3.8	1.8	2.3	2.5	2.5	2.7	4.0	2.0	3.3
Syn-A	Russian Wildrye	3.0	1.3	1.8	2.3	1.8	2.3	2.0	3.5	3.3	4.7	2.7	2.7
Tetracan	Russian Wildrye	4.0	1.5	1.5	3.0	1.3	2.3	2.0	3.5	2.7	6.3	2.3	3.0
Douglas	Crested Wheatgrass	2.8	3.8	3.0	3.5	2.3	4.8	3.5	3.5	2.7	5.0	3.3	3.7
PI-275459	Siberian Wheatgrass	4.8	3.5	3.5	4.8	2.0	2.5	2.8	2.5	2.7	4.7	2.3	3.0
Magnar	Basin Wildrye	4.5	4.3	3.0	3.0	3.0	4.0	4.0	5.5	3.7	2.3	3.0	3.0
P-27	Siberian Wheatgrass	3.8	3.3	3.5	5.0	3.5	5.0	4.3	3.0	2.3	3.0	2.0	2.7
Trailhead	Basin Wildrye	5.3	6.8	4.3	4.5	4.5	6.0	6.3	9.0	6.3	3.0	3.7	7.3
Bozoisky	Russian Wildrye	4.0	4.5	4.5	3.3	5.3	4.5	4.5	5.5	5.3	7.0	3.7	5.3
Bannock	Thickspike Wheatgrass	3.5	2.3	2.0	1.5	2.5	2.0	2.5	6.5	5.0	8.0	4.7	5.0
Critana	Thickspike Wheatgrass	4.3	3.3	3.8	5.0	5.5	6.5	5.5	5.5	7.5	8.3	5.3	9.0
Secar	Snake River Wheatgrass	8.3	7.8	4.5	4.8	3.3	4.8	2.8	3.0	6.7	8.3	8.3	9.0
SL-Hybrid	Hybrid Wheatgrass	3.3	3.0	3.0	4.0	3.5	5.0	3.8	4.0	7.7	8.3	8.0	9.0
*Rimrock	Indian Ricegrass	7.8	6.8	6.3	7.5	9.0	8.3	7.8	7.5	6.0	5.7	7.0	9.0
Sodar	Streambank Wheatgrass	3.3	4.0	4.5	4.5	7.5	8.0	6.0	6.0	6.5	9.0	7.7	9.0
Schwendimar	Thickspike Wheatgrass	7.8	4.0	4.5	3.8	5.0	4.0	4.0	6.5	7.7	8.7	9.0	9.0
9019219	Bottlebrush Squirreltail	5.8	6.3	4.3	9.0	7.0	9.0	5.3	9.0	8.0	9.0	9.0	9.0
9019218	Bottlebrush Squirreltail	4.3	5.5	3.3	7.3	3.0	8.0	6.0	9.0	9.0	9.0	9.0	9.0
9040187	Bottlebrush Squirreltail	7.0	3.0	5.5	5.5	7.5	9.0	9.0	9.0	9.0	9.0	9.0	9.0
9040189	Bottlebrush Squirreltail	3.3	2.8	4.0	5.0	9.0	8.0	9.0	6.0	9.0	9.0	9.0	9.0
9052861	Indian Ricegrass	6.5	5.3	5.8	7.0	9.0	8.3	9.0	9.0	9.0	8.3	9.0	8.3
Nezpar	Indian Ricegrass	8.0	8.0	7.5	7.8	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
9035287	Indian Ricegrass	8.3	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Paloma	Indian Ricegrass	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	7.3	9.0	7.3
Volga	Mammoth Wildrye	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
9024804	Columbia Needlegrass	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
9040137	Columbia Needlegrass	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0

^{1/} Vigor is a qualitative rating of plant health and growth. Rated 1 best, 9 worst.

Table 2. Continued
 Grantsville Inter-Center Strain Trial
 Summary of 1995-2000 Evaluation Data

Replicated Grass Plots ^{2/}
Percent Stand

Accession No.	Common Name	5/17/95	9/25/95	5/7/96	5/7/97	5/6/98	5/6/99	5/9/00	Herbicide Efficacy 5/6/99
Vavilov	Siberian Wheatgrass	45.8	54.0 ab	61.0 ab	50.3 ab	59.0 a	52.7 a	59.7 a	1.0
Mankota	Russian Wildrye	32.8	42.0 b-d	53.5 a-d	44.0 a-c	52.3 ab	55.0 a	56.0 a	1.0
Ephraim	Crested Wheatgrass	37.3	42.8 a-d	52.0 a-d	46.0 a-c	47.8 ab	54.3 a	53.7 a	2.0
Hycrest	Crested Wheatgrass	39.8	59.5 a	65.3 a	51.0 ab	50.3 ab	59.3 a	52.0 a	1.0
Nordan	Crested Wheatgrass	39.0	50.3 a-c	54.8 a-d	47.8 ab	48.3 ab	53.3 a	48.7 ab	1.7
Syn-A	Russian Wildrye	27.5	48.3 a-c	54.5 a-d	49.0 ab	49.0 ab	52.0 a	47.7 ab	1.3
Tetracan	Russian Wildrye	29.0	56.0 ab	67.3 a	53.5 a	61.5 a	53.7 a	47.0 ab	1.7
Douglas	Crested Wheatgrass	34.3	36.5 c-e	59.0 a-c	42.3 a-c	45.0 a-d	38.7 ab	43.3 a-c	2.3
PI-275459	Siberian Wheatgrass	12.0	29.5 d-g	40.8 c-f	44.0 a-c	45.8 a-c	39.3 ab	37.7 a-d	2.0
Magnar	Basin Wildrye	21.3	18.5 f-j	39.8 d-g	30.8 b-e	34.0 b-f	18.3 b-e	27.7 b-d	2.7
P-27	Siberian Wheatgrass	25.8	35.8 c-f	38.3 d-g	32.0 a-e	30.8 b-g	37.7 a-c	24.3 c-e	2.0
Trailhead	Basin Wildrye	16.5	7.0 i-k	25.3 e-h	18.5 d-g	24.0 c-h	15.0 de	17.7 d-f	4.0
Bozoisky	Russian Wildrye	14.8	16.5 g-k	27.0 e-h	17.8 d-g	23.5 c-h	25.0 b-d	17.0 d-f	2.7
Bannock	Thickspike Wheatgrass	29.8	40.3 b-d	46.0 b-d	35.8 a-d	39.5 a-e	20.3 b-e	6.0 ef	2.0
Critana	Thickspike Wheatgrass	25.8	34.8 c-f	42.8 b-e	16.5 d-g	23.3 c-h	17.0 c-e	2.0 f	4.0
Secar	Snake River Wheatgrass	2.5	2.0 jk	15.0 h-j	13.3 e-g	17.8 e-h	14.3 de	1.7 f	2.7
SL-Hybrid	Hybrid Wheatgrass	27.0	28.3 d-g	41.0 c-f	25.3 c-f	21.0 d-h	7.7 de	1.7 f	3.3
*Rimrock	Indian Ricegrass	7.0	5.0 i-k	4.5 ij	0.0 *	2.0 h	3.3 de	1.7 f	4.7
Sodar	Streambank Wheatgrass	22.0	27.8 d-g	22.5 f-I	8.3 fg	7.0 gh	3.7 de	1.0 f	3.3
Schwendimar	Thickspike Wheatgrass	5.0	16.3 g-k	23.3 f-h	15.8 d-g	22.3 c-h	11.0 de	0.0 *	3.3
9019219	Bottlebrush Squirreltail	7.5	7.3 i-k	12.8 h-j	3.3 g	4.0 h	1.7 e	0.0 *	3.3
9019218	Bottlebrush Squirreltail	19.0	21.5 e-i	22.0 g-I	17.8 d-g	12.5 f-h	0.0 *	0.0 *	3.3
9040187	Bottlebrush Squirreltail	4.0	14.0 g-k	13.5 h-j	2.0 g	0.0 *	0.0 *	0.0 *	4.0
9040189	Bottlebrush Squirreltail	15.3	25.0 d-h	23.0 f-h	0.0 *	0.0 *	0.0 *	0.0 *	2.0
9052861	Indian Ricegrass	9.5	8.5 h-k	8.8 h-j	0.0 *	0.0 *	0.0 *	0.0 *	2.7
Nezpar	Indian Ricegrass	5.8	0.8 jk	0.8 j	0.0 *	0.0 *	0.0 *	0.0 *	3.3
9035287	Indian Ricegrass	5.8	0.0 k	0.0 j	0.0 *	0.0 *	0.0 *	0.0 *	4.7
Paloma	Indian Ricegrass	0.0	0.0 k	0.0 j	0.0 *	0.0 *	0.0 *	0.0 *	2.7
Volga	Mammoth Wildrye	0.0	0.0 k	0.0 j	0.0 *	0.0 *	0.0 *	0.0 *	4.7
9024804	Columbia Needlegrass	0.0	0.0 k	0.0 j	0.0 *	0.0 *	0.0 *	0.0 *	3.3
9040137	Columbia Needlegrass	0.0	0.0 k	0.0 j	0.0 *	0.0 *	0.0 *	0.0 *	3.3
	Mean	18.1	23.5	29.5	30.2	32.7	30.2	28.8	
	CV (percent)	-	46.07	38.23	43.85	44.54	39.00	40.07	

^{2/} Percent stand is equal to basal cover. Data (except 7/17/95) was analyzed utilizing Duncan's Multiple Range Test: P=0.05. Means followed by the same letter are not significantly different. Accessions marked with an * were not included in analysis.

Table 2. Continued
 Grantsville Inter-Center Strain Trial
 Summary of 1995-2000 Evaluation Data

Replicated Grass Plots
Forage Production (pounds per acre air-dried)

Accession No.	Common Name	1996	1997	1998	2000	4 year mean
Vavilov	Siberian Wheatgrass	957	957	1821	830	1141
Mankota	Russian Wildrye	163	405	706	440	428
Ephraim	Crested Wheatgrass	725	781	1096	632	808
Hycrest	Crested Wheatgrass	753	1533	2378	1016	1420
Nordan	Crested Wheatgrass	846	1366	2415	1140	1442
Syn-A	Russian Wildrye	423	520	845	477	566
Tetracan	Russian Wildrye	340	423	1273	483	630
Douglas	Crested Wheatgrass	344	604	1319	768	759
PI-275459	Siberian Wheatgrass	465	1198	1765	1003	1108
Magnar	Basin Wildrye	149	251	381	471	313
P-27	Siberian Wheatgrass	177	511	947	1040	669
Trailhead	Basin Wildrye	47	56	0	31	34
Bozoisky	Russian Wildrye	47	135	334	142	165
Bannock	Thickspike Wheatgrass	697	687	409	111	476
Critana	Thickspike Wheatgrass	112	130	0	0	61
Secar	Snake River Wheatgrass	167	446	910	0	381
SL-Hybrid	Hybrid Wheatgrass	297	149	315	0	190
*Rimrock	Indian Ricegrass	19	18	0	0	9
Sodar	Streambank Wheatgrass	56	28	0	0	21
Schwendimar	Thickspike Wheatgrass	260	353	539	0	288
9019219	Bottlebrush Squirreltail	0	0	0	0	0
9019218	Bottlebrush Squirreltail	74	19	0	0	23
9040187	Bottlebrush Squirreltail	149	0	0	0	37
9040189	Bottlebrush Squirreltail	186	9	0	0	49
9052861	Indian Ricegrass	47	9	0	0	14
Nezpar	Indian Ricegrass	0	0	0	0	0
9035287	Indian Ricegrass	0	0	0	0	0
Paloma	Indian Ricegrass	0	0	0	0	0
Volga	Mammoth Wildrye	0	0	0	0	0
9024804	Columbia Needlegrass	0	0	0	0	0
9040137	Columbia Needlegrass	0	0	0	0	0

Table 3.
 Grantsville Inter-Center Strain Trial
 Summary of 1995-2000 Evaluation Data

**Replicated Shrub Plots
 Plant Height (cm)**

Accession No.	Common Name	9/26/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/6/00	7/11/00
Pamirian	Winterfat	33.5	25.5	43.3	33.5	40.5	39.8	45.8	42.0	43.5	44.8	47.0
9067481	Winterfat	34.0	22.5	42.8	36.3	39.8	38.5	43.8	41.5	37.0	45.0	45.0
Wytana	Fourwing Saltbush	34.8	23.0	43.3	33.0	28.8	23.3	40.5	26.0	35.0	27.3	34.0
9067480	Fourwing Saltbush	22.3	18.3	45.3	44.0	45.5	45.8	55.8	51.8	62.8	62.0	62.5
Rincon	Fourwing Saltbush	22.5	27.5	45.5	34.5	43.8	41.5	54.3	47.3	54.3	56.0	57.0
9063535	Winterfat	23.8	16.3	34.5	24.3	24.0	27.0	30.8	30.0	28.8	32.0	26.8
Hatch	Winterfat	25.8	19.3	36.0	26.8	34.3	29.5	37.0	32.8	34.5	43.8	37.3

**Replicated Shrub Plots
 Percent Stand^{3/} and Canopy Width**

Accession No.	Common Name	5/17/95	9/26/95	5/7/96	5/7/97	5/6/98	5/6/99	5/9/00	Canopy Width (cm)
Pamirian	Winterfat	27.0	41.3 a	53.0 a	44.5 a	45.8 a	45.8 a	64.3 a	57.5
9067481	Winterfat	19.5	34.0 ab	37.8 ab	37.3 a	43.5 a	43.5 a	49.3 a	60.3
Wytana	Fourwing Saltbush	1.8	29.5 ab	40.8 a	22.8 ab	29.3 ab	29.3 ab	21.8 b	33.0
9067480	Fourwing Saltbush	1.0	29.3 ab	37.5 ab	34.0 ab	40.8 a	40.8 a	63.3 a	71.3
Rincon	Fourwing Saltbush	3.8	24.3 ab	28.3 ab	33.5 ab	37.0 a	37.0 a	52.8 a	71.0
9063535	Winterfat	16.5	23.3 ab	26.8 ab	23.3 ab	31.0 a	31.0 a	46.0 a	35.0
Hatch	Winterfat	9.5	12.3 b	10.8 b	9.8 b	11.5 b	11.5 b	10.8 b	42.5
	Mean	11.3	27.7	33.5	29.3	40.8	40.8	44.0	
	CV (percent)		59.92	51.59	51.8	36.31	36.31	35.27	

^{3/} Percent stand is equal to canopy cover. Data (except 5/17/95) was analyzed utilizing Duncan's Multiple Range Test: P=0.05. Means followed by the same letter are not significantly different.

Table 3. Continued
 Grantsville Inter-Center Strain Trial
 Summary of 1995-2000 Evaluation Data

**Replicated Shrub Plots
 Number of Plants per Sample Rows**

Accession No.	Common Name	5/17/95	9/26/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
Pamirian	Winterfat	40.8	36.8	23.5	20.8	18.0	15.8	15.0	13.5	15.0	15.0	13.8	16.0
9067481	Winterfat	43.0	37.0	24.8	20.3	17.3	16.3	17.0	15.3	15.5	17.0	12.5	16.0
Wytana	Fourwing Saltbush	4.8	24.3	22.0	18.5	11.5	11.0	10.5	11.0	7.8	10.5	6.0	7.8
9067480	Fourwing Saltbush	6.5	20.3	18.3	13.3	13.0	12.5	12.5	11.8	12.3	12.5	10.3	11.0
Rincon	Fourwing Saltbush	6.3	19.0	14.8	12.3	12.0	16.3	11.8	11.0	10.5	11.8	10.3	10.3
9063535	Winterfat	22.3	23.8	17.3	15.5	14.3	14.3	16.0	13.8	14.3	16.0	12.3	14.0
Hatch	Winterfat	11.8	12.5	10.3	7.0	5.8	5.3	6.5	5.8	5.0	6.5	3.5	4.5

**Replicated Shrub Plots
 Vigor ^{1/}**

Accession No.	Common Name	5/17/95	9/26/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
Pamirian	Winterfat	1.8	1.8	1.5	2.0	1.8	2.0	1.8	4.0	2.3	2.5	2.3	2.0
9067481	Winterfat	2.3	1.8	2.3	2.0	2.8	2.0	1.5	2.3	2.0	2.8	1.8	2.3
Wytana	Fourwing Saltbush	3.8	1.0	3.5	2.3	3.8	3.0	3.8	3.5	4.8	3.5	5.3	3.0
9067480	Fourwing Saltbush	4.0	2.8	2.0	1.8	2.0	1.8	1.5	1.5	1.8	2.3	1.5	1.5
Rincon	Fourwing Saltbush	4.8	2.3	2.5	3.8	4.0	2.0	3.0	2.5	3.0	3.8	3.8	2.3
9063535	Winterfat	2.5	2.8	3.0	3.3	4.3	3.8	3.5	4.8	4.3	4.0	3.8	3.0
Hatch	Winterfat	3.3	4.5	5.0	4.8	5.5	4.0	5.0	4.3	5.3	5.8	6.0	4.5

^{1/} Vigor is a qualitative rating of plant health and growth. Rated 1 best, 9 worst.

Table 4.
Grantsville Row Spacing Trial Evaluation Summary

Row Spacing (inches)	6	12	18	24	30	36	48
Bozoisky Russian wildrye							
May 17, 1995							
Vigor ^{1/}	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Height (cm)	5.5	4.5	4.5	4.5	4.5	6.0	5.5
Cover (%)	20.0	12.5	25.0	12.5	12.5	25.0	10.0
September 25, 1995							
Vigor	3.5	3.0	3.0*	4.0*	3.5	3.0*	3.5
Height (cm)	9.5	18.5	16.0*	10.0*	11.5	18.0*	16.5
Cover (%)	27.5	45.0	45.0*	15.0*	32.5	45.0*	35.0
May 17, 1996							
BRWC ^{2/}	2.0	1.5	2.0	2.5	1.0	1.5	2.0
Height (cm)	24.5	39.0	34.0	34.5	40.0	43.5	47.5
Cover (%)	40.0	60.0	47.5	22.5	37.5	37.5	35.0
July 17, 1996							
Vigor	4.0	3.0	3.0	NA	2.0	2.0	2.0
Height (cm)	60.0	72.5	107.0	NA	73.0	72.0	85.0
Forage Yield (pounds/acre)	1280	880	1014	NA	672	827	750
May 7, 1997							
BRWC	1.0	1.0	1.0	2.5	2.5	2.5	3.0
Height (cm)	25.0	26.0	37.0	43.0	47.5	48.5	51.0
Cover (%)	30.0	60.0	42.5	12.5	42.5	50.0	42.5
July 15, 1997							
Vigor	3.0	3.5	5.5	9.0	6.0	6.0	5.5
Height (cm)	48.0	25.0	70.0	0.0	71.0	75.0	88.0
Forage Yield	1281	600	800	NA	640	1094	1001
May 6, 1998							
BRWC	1.5	1.0	1.5	3.0	2.5	2.5	3.0
Height (cm)	24.0	24.0	30.0	42.0	44.5	55.5	64.5
Cover (%)	35.0	43.5	45.0	30.0	40.0	57.5	50.0
July 16, 1998							
Vigor	4.5	6.5	6.5	9.0	6.5	6.0	3.0
Height (cm)	52.0	32.0	40.0	0.0	55.0	82.0	110.0
Forage Yield	1121	560	534	NA	544	960	1410
May 6, 1999							
BRWC	1.0	1.0	1.5	2.0	1.5	1.5	2.5
Height (cm)	21.0	23.0	29.0	28.5	30.0	37.5	46.5
Cover (%)	37.5	50.0	55.0	35.0	65.0	67.5	55.0
July 15, 1999							
Vigor	4.0	3.5	3.5	7.0	3.5	2.5	2.0
Height (cm)	19.0	19.5	20.0	22.0	21.5	35.0	39.0
Forage Yield.	1121	440	320	NA	304	574	660
May 9, 2000							
BRWC	1.0	1.0	2.0	2.0	2.5	2.5	2.0
Height (cm)	17.5	22.5	25.0	20.5	25.0	27.5	37.5
Cover (%)	37.5	60.0	47.5	25.0	50.0	50.0	60.0
Avg. Vigor	4.0	4.1	4.4	7.2	4.4	4.1	3.5
Avg. Height	44.8	48.9	59.3	22.0	55.1	66.0	80.5
Avg. Cover	32.5	55.2	63.9	28.0	54.4	51.3	46.3
Avg. BRWC	1.3	1.1	1.6	2.4	2.0	2.1	2.5
Avg. Forage Yield	1200	620	667	NA	540	864	955

Footnotes at end of Table.

Table 4 continued.
Grantsville Row Spacing Trial Evaluation Summary

Row Spacing (inches)	6	12	18	24	30	36	48
Hycrest crested wheatgrass							
May 17, 1995							
Vigor ^{1/}	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Height (cm)	4.0	6.0	4.0	2.5	4.5	4.0	4.5
Cover (%)	40.0	22.5	25.0	17.5	25.0	25.0	25.0
September 25, 1995							
Vigor	3.0	2.5	2.0	2.0*	2.0*	3.0*	2.5
Height (cm)	30.5	37.0	39.5	32.0*	40.0*	39.0*	41.0
Cover (%)	42.5	60.0	72.5	60.0*	85.0*	70.0*	57.5
May 17, 1996							
BRWC ^{2/}	1.5	1.0	1.0	2.0	2.0	2.0	3.0
Height (cm)	22.5	26.5	28.5	30.0	35.0	36.0	39.0
Cover (%)	57.5	57.5	67.5	45.0	57.5	60.0	60.0
July 17, 1996							
Vigor	9.0	3.5	2.5	3.0	2.0	2.0	2.0
Height (cm)	NA	51.5	57.5	59.0	74.0	77.0	62.0
Forage Yield (pounds/acre)	NA	2361	1094	1281	1760	1467	940
May 7, 1997							
BRWC	1.0	1.0	1.0	2.0	2.5	2.5	3.0
Height (cm)	27.5	30.5	33.0	34.0	37.5	40.0	40.5
Cover (%)	50.0	62.5	62.5	40.0	60.0	65.0	35.0
July 15, 1997							
Vigor	4.0	2.5	2.5	6.0	5.5	2.0	6.5
Height (cm)	44.5	51.0	55.5	60.0	70.0	70.0	52.0
Forage yield	1121	2481	1814	1520	1505	1748	300
May 6, 1998							
BRWC	1.5	1.0	1.0	2.5	2.5	3.0	3.0
Height (cm)	31.5	34.0	37.5	27.5	44.0	41.0	27.5
Cover (%)	40.0	55.5	55.0	50.0	47.5	55.0	30.0
July 16, 1998							
Vigor	7.0	2.5	3.5	7.0	6.0	6.0	7.5
Height (cm)	37.0	73.0	67.0	64.5	60.0	60.0	58.0
Forage Yield	NA	4883	1628	960	768	1094	300
May 6, 1999							
BRWC	1.0	1.0	1.0	1.5	3.0	2.5	2.0
Height (cm)	20.0	25.0	29.0	26.5	32.0	39.0	32.0
Cover (%)	60.0	57.5	57.5	52.5	60.0	67.5	52.5
July 15, 1999							
Vigor	7.0	3.5	3.5	6.5	5.0	3.0	6.5
Height (cm)	35.0	29.0	22.5	25.0	22.5	37.5	22.0
Forage Yield	NA	720	401200	192720	80		
May 9, 2000							
BRWC	1.0	1.0	1.0	2.5	3.0	3.0	3.0
Height (cm)	20.0	22.5	30.0	25.0	32.5	35.0	25.0
Cover (%)	50.0	62.5	65.0	47.5	50.0	70.0	37.5
Avg. Vigor	5.8	3.3	3.2	4.9	4.3	3.5	5.0
Avg. Height	27.5	51.0	50.6	52.1	56.6	61.1	48.5
Avg. Cover	50.0	59.3	63.3	49.2	60.0	64.6	45.4
Avg. BRWC	1.2	1.0	1.0	1.6	2.6	2.6	2.8
Avg. Forage Yield	1121	2611	1234	990	1056	1257	405

Footnotes at end of table.

Table 4 Footnotes

1/ Vigor is a subjective rating of plant health and appearance with 1=best and 9=worst

2/ BRWC is Between-Row-Weed-Competition. BRWC is a subjective rating of the influence of weeds between the rows on the productivity of the seeded species. BRWC was rated on a scale of 1-3 with 1=low competition, 2=medium competition and 3= high competition from weeds.

* indicates data is from one replication due to destruction of other replication.

Table 5.
 Grantsville Inter-Center Strain Trial
 Summary of 1995-2000 Evaluation Data

Non-replicated Display Plots
Plant Height (cm)

Accession No.	Common Name	5/17/95	9/25/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
Kirk	Crested Wheatgrass	12	53	33	46	22	50	30	62	10	8	25	33
Parkway	Crested Wheatgrass	12	53	25	43	21	43	22	49	10	10	25	35
Newhy	RS Hybrid	11	30	20	82	24	63	30	100	0	0	0	0
Fairway	Crested Wheatgrass	13	50	23	53	20	43	31	60	12	9	30	30
Whitmar	Beardless Wheatgrass	12	24	15	40	21	0	28	50	9	7	0	0
Timp	Utah Sweetvetch	3	0	0	0	0	0	0	0	0	0	0	0
Pryor	Slender Wheatgrass	0	47	15	0	18	0	29	70	0	7	0	0
San Luis	Slender Wheatgrass	0	0	0	0	0	0	0	0	0	0	0	0
Immigrant	Forage Kochia	0	0	0	0	0	0	25	32	0	30	0	0
9021471	Fringed Sage	0	0	0	0	0	0	0	0	0	0	0	0

Non-replicated Display Plots
Vigor ^{1/}

Accession No.	Common Name	5/17/95	9/25/95	5/7/96	7/17/96	5/7/97	7/15/97	5/6/98	7/16/98	5/6/99	7/15/99	5/9/00	7/11/00
Kirk	Crested Wheatgrass	3	3	2	3	3	3	3	5	2	7	3	4
Parkway	Crested Wheatgrass	3	3	3	2	1	2	2	4	3	6	2	4
Newhy	RS Hybrid	4	3	4	6	5	6	5	3	9	9	9	9
Fairway	Crested Wheatgrass	3	4	4	5	4	3	2	4	3	4	1	4
Whitmar	Beardless Wheatgrass	2	4	3	4	4	9	4	4	7	8	9	9
Timp	Utah Sweetvetch	2	9	9	9	9	9	9	9	9	9	9	9
Pryor	Slender Wheatgrass	9	5	3	9	4	9	4	3	9	8	9	9
San Luis	Slender Wheatgrass	9	9	9	9	9	9	9	9	9	9	9	9
Immigrant	Forage Kochia	9	9	9	9	9	9	4	5	9	5	9	9
9021471	Fringed Sage	9	9	9	9	9	9	9	9	9	9	9	9

^{1/} Vigor is a qualitative rating of plant health and growth. Rated 1 best, 9 worst.

Table 5. Continued
 Grantsville Inter-Center Strain Trial
 Summary of 1995-2000 Evaluation Data

Non-replicated Display Plots
Plant Density (plants per foot ²)

Accession No.	Common Name	5/17/95	9/25/95	5/7/96	5/7/97	5/6/98	5/6/99	5/9/00
Kirk	Crested Wheatgrass	3	3	3	2	1	2	2
Parkway	Crested Wheatgrass	3	4	4	5	3	4	3
Newhy	RS Hybrid	4	3	1	2	3	0	0
Fairway	Crested Wheatgrass	4	1	1	2	1	1	1
Whitmar	Beardless Wheatgrass	6	4	3	1	1	0	0
Timp	Utah Sweetvetch	1	0	0	0	0	0	0
Pryor	Slender Wheatgrass	0	1	2	1	2	0	0
San Luis	Slender Wheatgrass	0	0	0	0	0	0	0
Immigrant	Forage Kochia	0	0	0	0	0	0	0
9021471	Fringed Sage	0	0	0	0	0	0	0

Non-replicated Display Plots
Percent Stand ^{2/} and Herbicide Efficacy

Accession No.	Common Name	5/17/95	9/25/95	5/7/96	5/7/97	5/6/98	5/6/99	5/9/00	Herbicide Efficacy 5/6/99
Kirk	Crested Wheatgrass	27.0	53.0	70.0	45.0	28.0	18.0	35.0	1
Parkway	Crested Wheatgrass	22.0	53.0	73.0	80.0	83.0	63.0	73.0	1
Newhy	RS Hybrid	20.0	25.0	25.0	13.0	8.0	0.0	0.0	1
Fairway	Crested Wheatgrass	15.0	33.0	48.0	28.0	40.0	35.0	48.0	1
Whitmar	Beardless Wheatgrass	10.0	33.0	33.0	20.0	15.0	15.0	0.0	1
Timp	Utah Sweetvetch	1.0	0.0	0.0	0.0	0.0	0.0	0.0	NA
Pryor	Slender Wheatgrass	0.0	18.0	23.0	18.0	5.0	0.0	0.0	1
San Luis	Slender Wheatgrass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Immigrant	Forage Kochia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA
9021471	Fringed Sage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA

^{2/} Percent stand is equal to basal cover.

Table 5. Continued
 Grantsville Inter-Center Strain Trial
 Summary of 1995-2000 Evaluation Data

Non-replicated Display Plots
Forage Production (pounds per acre air-dried)

<u>Accession No.</u>	<u>Common Name</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>2000</u>	<u>4 year mean</u>
Kirk	Crested Wheatgrass	966	929	1003	446	836
Parkway	Crested Wheatgrass	1115	1226	1301	818	1115
Newhy	RS Hybrid	0	74	0	0	19
Fairway	Crested Wheatgrass	669	818	1635	1449	1143
Whitmar	Beardless Wheatgrass	223	0	0	0	56
Timp	Utah Sweetvetch	NA	NA	NA	NA	
Pryor	Slender Wheatgrass	0	0	595	0	149
San Luis	Slender Wheatgrass	NA	NA	NA	NA	
Immigrant	Forage Kochia	NA	NA	NA	NA	
9021471	Fringed Sage	NA	NA	NA	NA	

Mountain Home Air Force Base
Windbreak Installation and Demonstration
2001 Progress
Loren St. John, Plant Materials Team Leader

The Mountain Home Air Force Base and the Aberdeen Plant Materials Center have worked cooperatively since 1990 testing woody plant material for use in windbreaks. Based upon the cooperative work and the technical expertise from the Plant Materials Center, the Air Force requested assistance with the planning and installation of windbreaks at the Air Force Base. Through a reimbursable, cooperative agreement between the Air Force and the Plant Materials Center, 52,940 running feet of windbreak were installed during the years 1996 – 1999.

A new agreement was developed in 1999 to continue the installation of windbreaks beginning in 2000. Approximately 44,285 running feet of windbreak were to be installed during 2000 – 2003.

On March 20, 2001 the PMC planted Rocky Mountain juniper and installed weed barrier material for the windbreak that was planted in 2000. This row was delayed due to the unavailability of Rocky Mountain juniper in 2000. In addition to completion of this windbreak, 625 trees and shrubs were planted to replace dead materials in previously planted windbreaks.

Evaluation of the windbreaks was scheduled for the fall of 2001 but due to the national emergency on September 11, 2001 and the resulting heightened security at military installations, the evaluation is on hold. Observations in late May, 2001 indicated that many of the trees and shrubs were alive however, some browsing by ground squirrels was beginning to take place. During an observation of the windbreaks near the main gate, travel center, and hospital on September 24, 2001 some sections of drip irrigation system near the hospital were not being maintained resulting in death of entire sections windbreak. A more thorough review of all installed windbreaks could not be conducted.

Due to changes in staffing and contracting procedures at the Base along with the current international situation, future windbreak installation and demonstration is questionable.

IDAHO ARMY NATIONAL GUARD VEGETATIVE REHABILITATION PROJECT
1996 - 2001
FINAL REPORT

Loren St. John, Team Leader, Aberdeen Plant Materials Center

INTRODUCTION

The Idaho Army National Guard (IDARNG) and the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) Aberdeen Plant Materials Center (PMC) entered into a cooperative agreement in 1996 to evaluate and demonstrate the potential of native grasses, forbs and shrubs for vegetative rehabilitation on the Orchard Training Area (OTA). The South Bingham Soil Conservation District (SBSCD) also cooperated in the project, providing assistance to the PMC. The agreement expired September 30, 2001.

The OTA is located on Bureau of Land Management (BLM) managed lands south of Boise, Idaho. The IDARNG is committed to environmental stewardship and to defending the quality of natural resources as an integral part of their military mission. The NRCS Plant Materials Program tests and evaluates plant materials used in rehabilitating lands to prevent erosion, improve water quality and improve the effectiveness of land use.

Specific requests for assistance from NRCS included:

- 1) seed collection, seed increase, and plant establishment technique development for tapertip hawkbeard *Crepis acuminata* and sharpleaf penstemon *Penstemon acuminatus* and seed production nursery at Christmas Mountain
- 2) test performance of regionally adapted accessions of native grasses, forbs, and shrubs
- 3) demonstrate seedbed preparation, planting techniques, and pre-plant herbicide treatments of cheatgrass *Bromus tectorum*
- 4) test techniques for collection of winterfat *Krascheninnikovia lanata* seed
- 5) assistance in development of commercial seed production for large scale increase
- 6) assistance in installation of automated weather station on the southern portion of the OTA
- 7) assistance in acquiring and testing an all terrain vehicle (ATV), seeder and harrow, and transport trailer for field planting

SEED COLLECTION, SEED INCREASE AND PLANT ESTABLISHMENT TECHNIQUE DEVELOPMENT FOR TAPERTIP HAWKSBEARD AND SHARPLEAF PENSTEMON

Tapertip hawksbeard and sharpleaf penstemon have been identified as key forb species for rehabilitation of the OTA. There is little information on the propagation of these two species.

Tapertip hawksbeard

In December, 1996 and January, 1997 germination tests were conducted on tapertip hawksbeard seed collected by IDARNG personnel in 1993. Three different sources were used in this study. Source 1 was collected July 15, 1993; source 2 was collected on July 8, 1993; and the third source had no collection date listed. Two of the sources were tested in four replications and the third source was tested in two replications due to limited amounts of seed. Each replication was planted with 25 seeds on moistened, blue blotter paper placed in petri dishes. The petri dishes were placed in a germination chamber set at 20° C with 16 hours light and 8 hours dark. Germination was evaluated for 30 days. Germination ranged from 8 to 11 percent.

Seed was broadcast-planted in flats at the PMC greenhouse in January, 1997. The greenhouse was kept at 20° C and the flats were watered as needed to maintain moist soil conditions. The broadcast seeding also resulted in low germination and establishment. After emergence, healthy, vigorous plants were transplanted into 10 cubic inch conetainers to allow deeper root development with the intention of transplanting from the conetainers to a field setting. The tapertip hawksbeard seedlings produced a long, single taproot that rapidly outgrew the conetainers. Attempts to transplant into larger containers failed because the seedlings were extremely delicate. It was concluded from this study that transplanting container grown seedlings on a large scale to a field setting would not be successful.

During July, 1997 IDARNG personnel located collection sites for tapertip hawksbeard on the OTA. Only a small amount of seed was available for collection because the mature seed had already shattered from the plants. Attempts were made to collect additional seed off of the OTA. Two collection locations were identified. One site is approximately 23 miles northwest of Aberdeen, Idaho on the Big Desert. This site is referred to as the Springfield site. The second site is five miles north of Weiser, Idaho (Weiser site). Only small amounts were collected from these two sites in 1997 because seed had already shattered before the decision was made to collect from these sites off the OTA. During July, 1998 tapertip hawksbeard seed was collected from the following locations:

Tapertip Hawksbeard Collection Sites

East of Midvale, ID Along county road near Huddleston Place	T13 N R2W Sec 21	3400'	Elevation
East of Cambridge, ID Royce Schwenkfelder property	T14N R2W Sec 14	2840'	Elevation
North West of Aberdeen, ID 1/2 mile North of Sauce Pan catch Pen	T2S R30E Sec 23	4800'	Elevation
North of Boise Stage Stop, ID 200 yards from exit	T1N R4E Sec 29	3200'	Elevation

In late July, 1998 germination tests were conducted on tapertip hawksbeard seed collected that year. Five different seed sources were used in this study. Two collections were made by IDARNG personnel in the Orchard area; 1 collection was made from the Cambridge and Midvale areas; and 2 collections were made from the Springfield site. Twenty five seeds of each source was placed on moist, blue blotter paper in petri dishes and placed in the germination chamber at 20° C with 16 hours of light and 8 hours of dark. Germination was unsuccessful.

Another germination test of tapertip hawksbeard seed was conducted in the germination chamber in August, 1998 by planting seed into soil flats by hand placing seed so that the pappi (hairy bristles) were upright to simulate a more near natural placement, as would be accomplished by wind dispersal. Twenty five seeds were hand-planted in each row. Again germination was unsuccessful. This test was also planted in the field on August 3 with the same unsuccessful results. Observations indicated that tapertip hawksbeard may require an afterripening period before germination is possible.

A tetrazolium test (TZ) of the seed collected from the Springfield collection site in 1998 indicated 43 percent viability. TZ detects live seeds whether dormant or not. Based upon the experience gained from prior greenhouse propagation trials and the test plots, it appears that tapertip hawksbeard seed is alive but dormant for a period, and generally does not germinate the first year even under variable conditions of light and temperature.

In May, 1998 a test plot of tapertip hawksbeard was planted at the PMC using three different seed sources. Each collection was broadcast-planted by hand into a single, 20 foot long row and the seed was lightly pressed into the soil. Row 1 was seed from a gravel quarry near the OTA, collected in July, 1995. Row 2 was seed collected in July, 1997 from the impact area of OTA. Row 3 was seed collected in July, 1997 from the Springfield collection site. The Springfield collection had the best emergence. Only a few plants from the quarry and impact area germinated. During the summer of 1998, plants grew to approximately 2 cm tall and by late summer the surviving plants were dormant.

Additional emergence during the spring of 1999 indicated that tapertip hawksbeard seed is able to lay dormant for a period of time in the soil prior to germination. Additional plants in this plot germinated during the spring of 1999. During the 2000 growing season no additional germination and emergence occurred but plants which had emerged in prior years did green up in

May. By the middle of July the established plants were dormant. No significant growth took place during 2000 as the plants again grew to approximately 2 –3 cm before going dormant.

During the 2001 growing season the plants grew to a height of approximately 6 - 7 cm before going dormant in mid-July. None of the plants flowered during the evaluation period from May, 1998 through July, 2001.

It was concluded from these tests plots that the establishment of tapertip hawksbeard may be better accomplished with a dormant fall seeding rather than spring seeding. In November, 1999 five hundred six (506) plots were hand-seeded with the Springfield collection utilizing weed barrier material that was installed previously for the penstemon seed increase study at the PMC.

The plots were evaluated on June 2, 2000 and only 5 plants had emerged. The plots were observed again on July 14 and no plants were found. The test plots were reseeded in November, 2000. On May 14, 2001 the plots were evaluated and 12 plants had germinated and emerged. Of the 12 plants observed, 2 were older plants from the seeding in 1999 and were 3 - 4 cm tall. The newly emerged plants were less than 1 cm tall. The plots were again evaluated on June 19, 2001 and the same plants were still present but were starting to go dormant.

In July, 1999 the Plant Materials staff collected tapertip hawksbeard seed from the Springfield Site. This seed is available for future testing activities.

Tapertip hawksbeard is very difficult to germinate and the seed may require an after-ripening period. To date, no conclusive techniques of establishing tapertip hawksbeard have been determined. However, greenhouse propagation is not feasible because of the extremely delicate singular taproot, which grows rather rapidly. The delicate root structure is not conducive to handling during the process of transplanting. Dormant seeding of seed older than 1 year may also be important. It also appears to be a very slow establishing and maturing plant. Plants established at the PMC in 1998 and 1999 have yet to develop reproductive capabilities.

Sharpleaf penstemon

In late 1996, germination and stratification studies were conducted on sharpleaf penstemon seed collected by IDARNG personnel. The first germination test was 4 replications of 100 seeds each placed on moistened, blue blotter paper which was contained in petri dishes and placed in a germination chamber set at 20° C with 16 hours light and 8 hours dark. No stratification (pre-chilling) was used. The second, third and fourth tests were conducted by using seed that had been pre-chilled at -12° C for 4, 6, and 8 weeks respectively and then placed in the germination chamber with 100 seeds per replication. One half of the tests were conducted using moistened blue blotter paper and the other using moistened sand as the medium. The germination chamber was set for 16 hours light and 8 hours dark and temperature set at 20° C. An additional test was conducted as described above, but with the temperature set at 22° C. Each test was conducted for one month and no germination occurred.

In April, 1997 another stratification study was conducted. The seed was soaked in distilled water for 24 hours at -12° C prior to planting onto blotter paper and sand. Stratification of 4, 6 and 8

weeks were used. Two replications of 50 seeds each were placed in the germination chamber with the temperature set at 22° C and 16 hours light and 8 hours dark. This test also resulted in no germination.

A seed sample was sent to the Idaho State Seed Laboratory for tetrazolium tests which estimates seed viability. Seed viability of the sample was 92 percent.

Based upon earlier, successful studies with other penstemon species at the PMC, it was decided to attempt direct seeding in the field. On November 18, 1997 sharpleaf penstemon seed was hand planted into weed barrier material at the PMC farm for field testing. After installation of the weed barrier, 506 holes were burned into the fabric. The holes measured approximately 2.5 inches in diameter. Six to eight seeds were then planted in each hole and lightly covered with soil. In the spring of 1998, the plants were thinned to one plant per hole. In June, the plants were evaluated and counted and 422 plants were growing in the fabric. August evaluations showed that 58 off type plants needed to be removed from the plot. This resulted in 374 remaining sharpleaf penstemon plants (73 percent). Seed was collected in September and October from those plants as it matured. Not all plants produced seed heads the first year. These collections resulted in 0.85 pounds of clean seed.

During the summer of 1999, evaluations of the sharpleaf penstemon plants indicated they were all dying. After close monitoring, it was concluded that the plants were receiving too much water. Although the plants were not directly irrigated, the over-watering situation was due to the location of the plants. They were located between two existing seed increase fields at the PMC. This resulted in an overlapping of irrigation water on the penstemon block. It was decided to abandon this site. Penstemon species are also noted as being short-lived, with life spans of 3 to 5 years.

The work conducted at the PMC during 1997 - 1999 shows that sharpleaf penstemon seed can be produced commercially. Seed should be planted in the fall to break seed dormancy and should be planted on well-drained soils to avoid excessively, moist conditions. Sharpleaf penstemon appears to be rather short-lived. Dormant fall seeding of sharpleaf penstemon prechills the seed and breaks seed dormancy. Dormant planting allows natural stratification and appears to be the best method of establishment. Irrigation enhances germination and plant growth the first year of establishment, but caution should be taken after the establishment year because over irrigation appears to increase plant mortality.

SEED PRODUCTION NURSERY AT CHRISTMAS MOUNTAIN

In March, 1999 the PMC proposed to the IDARNG the development of a seed collection nursery to be located at the Christmas Mountain Test site. Approximately 1.5 acres within the enclosure was devoted to the seed nursery. The purpose of the nursery is to evaluate the feasibility of an on-site seed production nursery to enable IDARNG to collect seed from plants that would be protected from grazing or browsing. Approximately two thirds of the total area was devoted to winterfat seed production and the remaining third for sharpleaf penstemon production. Weed

barrier fabric was installed to help conserve moisture and enhance plant growth and seed production.

On April 30, 1999 winterfat seed obtained from IDARNG was seeded into 20 cubic inch containers at the PMC greenhouse. Two thousand five hundred containers were seeded. By May 8, approximately 60 percent of the containers had emerged plants. The empty containers were re-seeded. The plants were irrigated weekly and fertilizer was applied bi-monthly. The plants grew to a height of approximately 12 inches by the end of August. On September 8, the plants were pruned, sorted and placed in an outdoor holding facility to harden. 1668 plants (66 percent survival) were available to transplant at Christmas Mountain. Because of the success of direct seeding penstemon, seed was planted at the test site.

Due to the lack of soil moisture during the fall of 1999, IDARNG attempted to irrigate the site prior to transplanting. On November 15, 1999 PMC personnel traveled to Christmas Mountain and prepared the site adjacent to the test plots previously planted and installed weed barrier. Eleven rows of weed barrier 6 feet by approximately 260 feet long were installed. The weed barrier was spaced approximately 4 feet apart with a 10 foot access for equipment (watering trucks or seed harvesting operations) between every two rows of barrier. Holes were burned into the fabric at each planting location. Spacing for the sharpleaf penstemon was 18 x 18 inches. Two rows of plants were seeded in each row of barrier.

Plant spacing for the winterfat was approximately 2 feet alternating diagonally from side to side within the width of the weed barrier fabric. Because the soil was extremely dry even with attempts to irrigate, it was decided to wait until sufficient soil moisture became available to transplant the winterfat. On February 7, 2000 PMC personnel returned to the site and transplanted approximately 1,638 plants. One row of weed barrier was dedicated to direct seeding of winterfat and tapertip hawksbeard. The disturbed soil between the weed barrier fabric was seeded to a mixture of 50 percent 'Sherman' big bluegrass (6 pounds PLS per acre); and 25 percent each of 'Sodar' streambank wheatgrass (14 pounds PLS per acre) and 'Bannock' thickspike wheatgrass (16 pounds PLS per acre) using the IDARNG Truax broadcast planter. The seeding rate was developed from NRCS technical standards for a critical area planting.

On May 24, and September 12, 2000 the seed production nursery was evaluated. At the May evaluation, 35 penstemon plants had emerged (5 percent). Because penstemon is noted for seed dormancy, it is likely that some of the seed planted would still be dormant and could germinate and emerge after going through a wet, chilling period (winter). Five of the nine rows of winterfat were sampled to estimate survival. Because of browsing by Townsend ground squirrels, many of the plants had no leaves but still appeared to be alive. A count of plants that appeared to be alive but had no leaves and a count of plants with leaves was made and it was estimated from the sampling that survival ranged from 11 to 37 percent. Rodent control was ruled out because the site is part of the National Birds of Prey Conservation Area.

On September 12, 2000 seventeen penstemon plants were found alive (2 percent). A total count of the winterfat plants was completed and 292 were found to be alive (17 percent). All of the live winterfat plants had exceptionally good vigor and ranged from 10 - 25 cm tall. A few plants had even set a small amount of seed.

In January, 2000 attempts to start some replacement winterfat plants was made at the PMC greenhouse. Four separate plantings were made in order to have 500 replacement plants available. Due to declining seed germination, only 250 plants were established. The replacement plants were transplanted at Christmas Mountain on February 28, 2001 and one row of weed barrier of penstemon plants was also reseeded. The other row was left to evaluate germination of seed that was initially planted in the fall of 1999 to observe if the seed will germinate the second growing season after planting.

During 2001 the seed production nursery was evaluated on May 24 and September 12. There was no additional germination of penstemon from the original seeding. At the May evaluation, there were 16 penstemon plants (2 percent survival). Several plants had formed flowers but one had been heavily browsed. A total count of winterfat plants was made and 278 (17 percent) were alive. Yellow and tumble mustard dominated the site but were removed from around the transplants to eliminate competition. On September 12, there were no live penstemon plants observed. There were 197 live winterfat plants counted (12 percent survival).

The seed nursery concept could be feasible but the plants require some maintenance in the form of minimal weed and rodent control. Weed barrier material is the only justification for the plants that did survive.

TEST PERFORMANCE OF REGIONALLY ADAPTED ACCESSIONS OF NATIVE GRASSES, FORBS AND SHRUBS

The primary purpose of the project was to evaluate the potential of native grasses, forbs and shrubs for revegetation of impacted areas on the OTA. Test sites were located to test the performance of native plants, test seedbed preparation and planting techniques, test herbicide control of cheatgrass, and to install display nurseries to allow landusers to view examples of grasses, forbs and shrubs that are adapted to the general area surrounding the OTA.

Initially 2 sites were located for testing activities. Orchard, located northeast of the OTA and Range 26, located on the southern end of the OTA were originally chosen. The third site (Christmas Mountain) was later selected to better represent the conditions found in the northern part of the OTA. All three sites are in Major Land Resource Area (MLRA) 11 B, Snake River Plains of the Northwestern Wheat and Range region of the Intermountain United States.

Automated weather data for Orchard and Range 26 is provided by the Birds of Prey National Conservation Area. The weather station equipment at Range 26 was purchased in 1997 with funds from the memorandum of agreement between IDARNG and NRCS. The automated weather stations are part of a network of stations and are a cooperative effort of many agencies. They are monitored and maintained by the USDA - Agricultural Research Service. Weather data for the Orchard site is collected from the "Orchard 3" weather station located near the Orchard test site and data for Range 26 is collected from the "National Guard" station which is located in the enclosure at Range 26. IDARNG personnel collect precipitation data near the Christmas Mountain test site at Range 2 on the OTA.

SITE DESCRIPTIONS

Orchard

The Orchard site is located 3.8 miles south of the Orchard exit of Interstate 84. The enclosure is on land managed by the BLM. The PMC has used the site for plant materials testing since 1990. The test site has a Snowtel weather station operated by NRCS. Major land uses in the area include grazing and wildlife habitat. The site is located in the Bruneau Resource Area, Township 1 South, Range 4 East (B.M.), section 20. The topographic quadrangle is Orchard, Idaho. The average annual precipitation is 12 inches with the greatest portion (60 percent) falling as snow and winter rains. Thirty percent of the annual precipitation falls as rain in April through June. Summers are hot and dry.

The soils on the Orchard site are a Lankbush - Tindahay sandy loam with 0 - 2 percent slopes. The elevation is 3200 feet, average air temperature is 50° F, frost free period is 135 days, and the soil pH is 6.6 - 7.3. The soils in this complex are very deep and well drained brown sandy loam with moderately slow permeability. The root zone extends to a depth of 60 inches or more and the available water capacity is high. The ecological site is a Loamy, 10 -12 inch precipitation site with a potential natural plant community dominated by bluebunch wheatgrass, Thurber's needlegrass, and Wyoming big sagebrush.

Range 26

Range 26 site is located in the southern portion of the OTA. The site is also located in the Bruneau Resource Area, Township 3 South, Range 2 East (B.M), section 25. The topographic quadrangle is Big Foot Butte, Idaho. The average annual precipitation is 7 - 8 inches with the greatest portion (60 - 70 percent) falling as snow and winter rains. Plant growth begins about mid to late March and grasses and forbs usually mature by July 1. Shrubs will grow all summer but at reduced rates due to limited soil moisture. Much of the southern portion of the OTA is burned over winterfat - shadscale rangeland and the existing vegetation in the disturbed areas is cheatgrass, tumble mustard and Sandberg bluegrass.

The soils on the Range 26 site are a Garbutt - Weso - Trevino complex with 2 - 8 percent slopes. The Garbutt and Weso soil series dominate, comprising approximately 50 percent of the site. The elevation is 2800 feet, average air temperature is 52° F, the frost free period is 140 days, and the soil pH ranges from 7.9 - 9.0

The Garbutt soil is very deep and well drained, light brownish grey silt loam with moderate permeability, high available water capacity, and potential rooting depth of 60 inches or greater. The ecological site is a Silty, 7 -10 inch precipitation, with a potential natural plant community dominated by winterfat, Indian ricegrass, and bottlebrush squirreltail.

The Weso soil is deep and well drained, pale brown loam. The potential rooting depth is 60 inches or greater. Permeability is moderate and available water capacity is high. The ecological site is a Calcareous Loam, 7 - 10 inch precipitation, with a potential natural plant community

including shadscale, bud sagebrush, Indian ricegrass, Thurber's needlegrass, bottlebrush squirreltail, and Sandberg bluegrass.

Christmas Mountain

The Christmas Mountain site is located in the northwestern portion of the OTA, to the west of Christmas Mountain, and east of Brooks Road. The site is degraded and the annual vegetation includes tumble mustard, pepper weed, Russian thistle and cheatgrass. Perennial vegetation includes bottlebrush squirreltail, Sandberg bluegrass and Wyoming big sagebrush. The site is in the Bruneau Resource Area, Township 1 South, Range 2 East (B.M.), section 32. The topographic quadrangle is Christmas Mountain, Idaho.

The soils on the site are a Trevino - Minikota complex with 0 - 30 percent slopes. The elevation of the site is 3400 feet, the average air temperature is 51° F, approximately 135 frost free days, and the annual precipitation is 9 - 10 inches. The pH of the soil complex is 6.6 - 7.8. It is a Loamy, 8 - 10 inch precipitation, ecological site with a potential natural plant community dominated by Wyoming big sagebrush and Thurber's needlegrass.

The Trevino soil is a shallow, well drained pale brown, very stony loam with moderate permeability, low available water capacity, and a potential rooting depth of 10 -20 inches. The Minikota soil is a moderately deep, well drained brown silt loam with moderate permeability, moderate available water capacity, and a potential rooting depth of 20 - 40 inches.

MATERIALS AND METHODS

In March, 1997 the BLM was contacted to discuss site location and project objectives. The NRCS and BLM entered into an agreement for the BLM to provide cultural resource inventories and to supply fencing materials for the planned enclosure at Range 26. The enclosure fence was installed at Range 26 in April, 1997. At that time, approximately one-half of the 300 x 300 foot enclosure was moldboard plowed. The site was visited again in September, 1997 anticipating further ground preparation. However, the lack of soil moisture prohibited the use of tillage equipment. A small number of large weeds were removed by hand.

A portion of the Orchard site was also moldboard plowed in April, 1997 to prepare the site for planting and the enclosure fence was repaired. The Orchard site was culti-packed in September, 1997 for weed control.

The Christmas Mountain site was selected in June, 1997 and NRCS and BLM entered into a new agreement for the BLM to provide a cultural resources inventory and fencing material. The enclosure fence was installed in September, 1997. No mechanical seedbed preparation was conducted at this site as this site was selected for herbicide and direct seeding testing.

The PMC provided to IDARNG personnel a suggested planting list of regionally adapted accessions of native grasses, forbs and shrubs to be planted at the test sites for evaluation. The list was finalized and seed ordered from PMCs, Agricultural Research Service (ARS), Forest

Service, IDARNG, Ag Research Canada, and commercial seed growers. Seed was prepared and packaged for planting in the Fall of 1997.

The native plant performance test includes 20 grass accessions and 7 shrub accessions, which are arranged in a complete randomized block design with 4 replications at Orchard and Range 26. The display nursery includes 26 accessions of grasses, forbs, and shrubs. The Orchard and Range 26 test sites were moldboard plowed in April, 1997 to remove existing vegetation. Tables 1 and 2 list the accessions that were planted and shows percent pure live seed (PLS) and the source for each accession. Figures 1, 2, and 3 are plot maps showing the layout of the Orchard, Range 26, and Christmas Mountain sites respectively.

Accession no. 9076413 Thurbers needlegrass (*Stipa thurberiana*) and 9076414 Bottlebrush squirreltail (*Elymus elymoides*) were planted with a hand pushed belt seeder because the amount of seed available was quite small. All other grass accessions were planted with a double disk drill with press wheels. The seed was mixed with rice hulls prior to seeding to assure that the proper amount of seed was planted per linear foot. Grass plots are 7 feet x 20 feet with row spacing of 10 inches. Shrub plots were planted with a hand pushed belt seeder in plots 16 feet x 20 feet with row spacing of 48 inches. Each shrub plot has 4 rows. Seeding depth for all accessions ranged from 0.25 - 0.75 inches depending upon species.

Areas which were cultivated but not seeded in plots were seeded to a cover crop seed mixture composed of 1.8 pounds PLS per acre 'P-27' Siberian wheatgrass; 1.3 pounds PLS per acre 'Hycrest' crested wheatgrass; and 1.1 pounds PLS per acre 'Bannock' thickspike wheatgrass.

Evaluation data collected from the grass plots included plant height, percent stand, plant density and vigor. Data collected from the forb and shrub display plots included plant height, vigor, and the number of plants from the middle two rows of each plot.

The middle 2 rows of each plot are sampled for evaluation purposes. Percent stand data is collected utilizing a 20 foot transect with 1 foot increments stretched from one end of the plot to the other between the middle two rows. Basal cover is measured by the interception of plant parts along the transect at each 1 foot increment which are then totaled to give a cover estimate recorded as a percent stand. Plant density is measured using a row count technique at the mid point of the plot. Plants are counted from the middle 2 rows for a distance of 18.3 cm. The number of plants counted converts directly to the number of plants per square foot. Vigor is a qualitative rating based on plant health and growth rate. A plant rated 1 would be best whereas a 9 rating is very poor or dead. Data from the replicated plots is averaged while data from non-replicated display plots is the actual data from that plot. Tables 1 and 2 summarize the evaluation data collected from 1998 through 2001.

The Christmas Mountain test site was planted March 16-18, 1999. This test site is composed of three components: 1) the native plant performance test trial; 2) planting demonstration; and 3) Oust™ applications for cheatgrass control applied in the fall of 1997 and spring of 1998.

The native plant performance test at Christmas Mountain includes 9 grass accessions, which are arranged in a complete randomized block design with 4 replications in four treatment blocks.

The herbicide treatments are fall, 1997 Oust application, spring, 1998 Oust application both prior to seeding and a post seeding spray application and a control (no chemical application). The following table lists the accessions that were planted and shows PLS and the source for each accession.

Idaho Army National Guard Christmas Mountain Inter-Center Strain Trial

Accession No.	Common Name	Scientific Name	Source	Percent PLS
9076410	Sandberg Bluegrass	<i>Poa secunda</i>	IDARNG	60*
Canbar	Sandberg Bluegrass	<i>Poa secunda</i>	Commercial	84.00
Sodar	Streambank Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Aberdeen	94.72
Critana	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Bridger	88.35
Bannock	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Aberdeen	89.24
Schwendimar	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Pullman	61.99
Nezpar	Indian Ricegrass	<i>Achnatherum hymenoides</i>	Aberdeen	94.72
9076409	Indian Ricegrass	<i>Achnatherum hymenoides</i>	IDARNG	70 *
Sand Hollow	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	ARS	70 *

*Purity and germination data was not available from source, estimated.

These grass accessions were selected from the 1998 performance evaluations of the Orchard and Range 26 test sites.

1998 - EVALUATIONS AND DISCUSSION

Tables 4, 5, and 6 summarize weather data collected at each of the test sites. Precipitation at the Orchard site was above normal during the 1997 and 1998 water years (October - September). Generally, precipitation was above normal during April, May and June with July, August, and September receiving little precipitation and above normal temperatures. Collection of data from the new automated weather station at Range 26 began in late October, 1997. Precipitation and temperatures were considered to be above normal during the 1998 crop year at Range 26.

Orchard

In order to achieve proper seedbed preparation, adequate moisture is required. The Orchard site was monitored during the fall of 1997 for soil moisture conditions and on December 1-3, 1997 the site was prepared and planted. The site was culti-packed 3 times to prepare a firm seedbed prior to planting. Precipitation following planting was much above normal and the majority of the plots established. The replicated shrub plots were seeded with a hand pushed belt seeder on March 13, 1998. The reason for delaying the shrub planting was to ensure fresh seed was planted. Tumble mustard (*Sisymbrium altissimum*) and fiddleneck (*Amsinckia spp*) emerged in very thick stands during the growing season and were shading and competing with the test plots. On August 19, 1998 the plots were clipped to a height of approximately 6 inches.

The Orchard test site was evaluated on June 4, 1998 and data was collected on plant height, percent stand, plant density, and vigor. A summary of data is presented in Table 1. Plant height data collected from the replicated grass plots ranged from 1 cm for 9019219 bottlebrush squirreltail to 27.5 cm for 'Bannock' thickspike wheatgrass. The non-replicated grass plots

ranged from 0 cm for 9043501 Salina wildrye to 30 cm for PI- 275459 Siberian wheatgrass. The non-replicated forb and shrub display plots ranged from 0 cm for the penstemon accessions and hopsage to 13 cm for "ARCA" silver sagebrush (Table 1).

Percent stand data ranged from 0.8 percent for 9019219 and 9019218 bottlebrush squirreltail to 50.3 percent for 9078408 Sandberg bluegrass in the replicated plots. Percent stand data was analyzed utilizing analysis of variance (ANOVA) and Duncan's Multiple Range Test. Means shown on Table 1 which are followed by the same letter are not significantly different. The non-replicated grass plots ranged from 0 percent for 9043501 Salina wildrye to 33 percent for 'CD-II' crested wheatgrass. The non-replicated forb and shrub plots ranged from 0 percent for the penstemon and hopsage accessions to 85 percent for "ARCA" silver sagebrush.

Plant density ranged from 0 plants per square foot for 9019218 and 9019219 bottlebrush squirreltail to 10.8 plants per square foot for 9076410 Sandberg bluegrass in the replicated plots. The non-replicated grass plots ranged from 0 plants per square foot for 9043501 Salina wildrye, 'Whitmar' beardless wheatgrass, and 'Douglas' crested wheatgrass to 11 plants per square foot for CD-II crested wheatgrass. The non-replicated forb and shrub plots ranged from 0 plants per square foot for the penstemon, hopsage and fourwing saltbush accessions to 5 plants per square foot for "ARCA" silver sagebrush.

Vigor for the replicated grass plots ranged from 8.0 (poorest) for 9019218 bottlebrush squirreltail to 1.0 (best) for Bannock thickspike wheatgrass. The non-replicated grass plots ranged from 9 for 9043501 Salina wildrye to 2 for CD-II crested wheatgrass. The non-replicated forb and shrub display plots ranged from 9 for the penstemon and hopsage accessions to 1 for "ARCA" silver sagebrush.

The replicated shrub plots were not evaluated because of the heavy infestation of tumble mustard and fiddleneck. The shrub plants could not be observed.

As summer temperatures were above normal and many days were in excess of 100 degrees F., the second evaluation in September showed only very dry dormant plants and no visible changes from the June evaluation.

Range 26

An attempt to prepare the Range 26 test site for seeding was made on December 1, 1997. The soil was extremely dry and would not pack to prepare a firm seedbed. Rains in January, 1998 were sufficient to prepare the site and on February 16-18, the site was culti-packed 3 times and then planted.

The Range 26 test site was evaluated on June 5, 1998 and data was collected on plant height, percent stand, plant density, and vigor. A summary of data is presented in Table 2. The second evaluation in September showed only very dry dormant plants and no visible changes from the June evaluation.

Plant height data collected from the replicated grass plots ranged from 0.8 cm for 9019219 bottlebrush squirreltail to 5.8 cm for 9076409 Indian ricegrass. The non-replicated grass plots ranged from 1 cm for 'Sherman' big bluegrass to 8 cm for PI-275459 Siberian wheatgrass. In the non-replicated forb and shrub plots, plant height ranged from 0 cm for the penstemon accessions, 9021471 fringed sage and 9016134 saltbush to 2 cm for 'Timp' Utah sweetvetch and "ARCA" silver sagebrush.

Percent stand data ranged from 0 percent for 9019219 bottlebrush squirreltail to 20.8 percent for 'Sodar' streambank wheatgrass in the replicated grass plots. Percent stand data was analyzed utilizing analysis of variance (ANOVA) and Duncan's Multiple Range Test. Means shown on table 2 which are followed by the same letter are not significantly different. The non-replicated grass plots ranged from 3 percent for Sherman big bluegrass, 'Nordan' and 'Fairway' crested wheatgrass, and 'Vavilov' Siberian wheatgrass to 28 percent for 'Bozoisky' Russian wildrye. The best accessions in the non-replicated forb and shrub plots were Timp Utah sweetvetch at 18 percent and ARCA silver sagebrush at 13 percent. Other accessions ranged from 8 percent to 0 percent.

Plant density ranged from 0 plants per square foot for 9019218 bottlebrush squirreltail to 10.5 plants per square foot for 9076411 bottlebrush squirreltail in the replicated plots. The non-replicated grass plots ranged from 0 plants per square foot for PI-275459 Siberian wheatgrass, Sherman big bluegrass, Nordan crested wheatgrass, and SL-Hybrid wheatgrass to 11 plants per square foot for Hycrest crested wheatgrass. ARCA silver sagebrush had 18 plants per square foot.

Vigor for the replicated grass plots ranged from 8.3 (poorest) for 9019218 and 9019219 bottlebrush squirreltail to 2.5 (best) for Sodar streambank wheatgrass and 9076409 Indian ricegrass. The non-replicated grass plots ranged from 7 for Sherman Big bluegrass to 2 for PI-275459 Siberian wheatgrass and Hycrest crested wheatgrass. The non-replicated forb and shrub plots ranged from 9 for 9021471 fringed sage, 9016134 saltbush, 9076417 sharpleaf penstemon, and spiny hopsage to a 1 for ARCA silver sagebrush.

Data recorded from the replicated shrub plots was number of plants per sample rows and vigor. Plant height for all accessions was less than 1 cm at the time of evaluation. The number of plants per sample row ranged from 10.5 for 'Wytana' fourwing saltbush to 0.3 for 'Rincon' fourwing saltbush. Vigor ranged from 8.0 (poorest) for Rincon to 2.8 (best) for 9067481 winterfat.

1999 - EVALUATIONS AND DISCUSSION

Table 4 summarizes weather data from the Orchard site. During the 1999 water year (October, 1998 through September, 1999), 9.09 inches of precipitation were recorded. Precipitation during April through September was significantly below normal and temperatures were above normal. At Range 26 (Table 5) total precipitation during the 1999 water year was 5.51 inches versus 8.03 inches recorded during the 1998 water year. Precipitation data from Christmas Mountain (Table 6) shows 5.60 inches were recorded during the 1999 calendar year.

Orchard

The Orchard test site was evaluated on May 25, 1999 and data was collected on plant height, percent stand, plant density and vigor. A summary of 1999 data is presented in Table 1. Plant height data collected from the replicated grass plots ranged from 0 cm for 'Nezpar' Indian ricegrass to 24.3 cm for 'Magnar' basin wildrye. The non-replicated grass plots ranged from 0 cm for 9043501 Salina wildrye and SL-Hybrid wheatgrass to 39 cm for 'CD-II' crested wheatgrass. In the non-replicated forb and shrub display plots, only U13-97 forage kochia and 'Immigrant' forage kochia survived. Plant height ranged from 8 cm for Immigrant to 12 cm for the U13-97.

General conclusions when comparing the 1999 plant height evaluations with the 1998 evaluations from the replicated grass plots were:

- 1) Overall plant height from the replicated grass plots decreased from 1998. The reduction in height is attributed to drier conditions during 1999.
- 2) Of the Sandberg bluegrass accessions, 9076410 and 'Canbar' did increase in plant height from the 1998 to the 1999 evaluation.
- 3) There was a decrease in plant height for the thickspike wheatgrass accessions from 1998 to 1999.
- 4) Bottlebrush squirreltail accessions 9019218 and 9010219 had greater height in 1999 than in 1998.
- 5) The Indian ricegrass and Thurber's needlegrass accessions had marked declines in plant height from 1998 to 1999.
- 6) 'Magnar' basin wildrye had increased plant height at the 1999 evaluation as compared to 1998 while 'Trailhead' had decreased plant height in 1999 as compared to 1998.

Percent stand data ranged from 0 percent for Nezpar and 9076409 Indian ricegrass to 60.3 percent for 9078408 Sandberg bluegrass in the replicated plots. Percent stand data was analyzed utilizing analysis of variance (ANOVA) and Duncan's Multiple Range Test. Means shown for percent stand data on Table 1 which are followed by the same letter are not significantly different.

During 1999, the non-replicated grass plots ranged from 0 percent for 9043501 Salina wildrye and SL-Hybrid wheatgrass to 83 percent stand for CD-II crested wheatgrass. U13-97 forage kochia had a 23 percent stand and Immigrant forage kochia had a 12 percent stand in the non-replicated forb and shrub plots.

General observations from two years of percent stand data from the replicated grass plots were:

- 1) Overall percent stand increased during 1999 indicating that plant basal cover is growing as the plants become established.
- 2) All bluegrass accessions increased in percent stand at the 1999 evaluation with the exception of Canbar which decreased by 10.5 percent from 1998 to 1999.
- 3) The thickspike wheatgrass accessions declined in percent stand from 1998 to 1999.
- 4) Of the bottlebrush squirreltail accessions, all stands increased during 1999 with the notable exception of 9076411 which decreased by 28.2 percent from 1998 to 1999.
- 5) The basin wildrye accessions decreased in percent stand from 1998 to 1999.
- 6) The Indian ricegrass accessions had large decreases in percent stand and appeared to be dying out.

Plant density ranged from 0 plants per square foot for five accessions to 6.3 plants per square foot for 9076408 Sandberg bluegrass in the replicated plots. The non-replicated grass plots ranged from 0 plants per square foot for five accessions to 5 plants per square foot for CD-II crested wheatgrass. The non-replicated forb and shrub plots had 0 plants per square foot for all plant accessions with the exception of U13-97 which had 3 plants per square foot.

Observations from plant density studies were:

- 1) Sand Hollow and 9076411 bottlebrush squirreltail are the only replicated grass accessions that had a minor increase in plant density. All other grass accessions in the replicated grass plots had a decrease in density.
- 2) In the non-replicated grass plots, 'Nordon' crested wheatgrass was the only accession that showed an increase in plant density. Density for all the other non-replicated accessions decreased from the previous year.
- 3) In the non-replicated forb and shrub display plots, U13-97 forage kochia was the only accession that had measurable plant density and remained the same as the prior year.

Vigor for the replicated grass plots ranged from 9.0 (poorest) for Nezpar Indian ricegrass to 1.5 (best) for 9078408 Sandberg bluegrass. The non-replicated grass plots ranged from 9 for 9043501 Salina wildrye and SL-Hybrid hybrid wheatgrass to 1 for CD-II crested wheatgrass and 'Vavilov' Siberian wheatgrass. The non-replicated forb and shrub display plots ranged from 9 to 2. Immigrant forage kochia was rated 2, accession no. U13-97 forage kochia was rated 3 and all other plant accessions were rated 9 (very poor).

Vigor ratings may also be used as an indicator of plant competitiveness. Plant accessions having high vigor proved to be the best defenders against cheatgrass invasion.

General observations of vigor were:

- 1) In the replicated grass plots all ricegrass accessions appear to be dying out, while 9019218, Sand Hollow and 9076414 bottlebrush squirreltail appear to be showing increase in plant vigor. Vigor from all other accessions did not change significantly from the previous year.
- 2) There appeared to be no significant differences in plant vigor in the non-replicated grass plots from 1998 to 1999 except for SL-Hybrid wheatgrass, which died.
- 3) Immigrant and U13-97 forage kochia are the only successful plant accessions in the non-replicated forb and shrub display plots. Both of these accessions appear to have better plant vigor than in the previous year.

The second evaluation in September showed only very dry, dormant plants and no visible change in plant growth from the May evaluation. The plots were rated in September for their competitive ability to compete against invasive weeds, primarily cheatgrass. They were rated on a scale of 1 (best competitive vigor) to 9 (poor competitive vigor) and the data is summarized on Table 1. In the replicated grass plots, accession no. 9078408 Sandberg bluegrass had the best rating (1.8) and there were eight accessions with a rating of 9.0. In the non-replicated grass plots CD-II and Nordan crested wheatgrass had the best competitive vigor rating. None of the non-replicated forb and shrub accessions displayed strong competitive vigor.

No plants in the replicated shrub plots at Orchard established.

Range 26

Because of the extreme environmental conditions and limited plant establishment at the Range 26 site, plant height, density, percent stand and vigor were not evaluated. Data on plant numbers and general observations were recorded during the May 26, 1999 evaluation. All live plants were less than 4 cm in height. Data is summarized in Table 2.

In the replicated shrub plots, accession no. 9067481 winterfat was the most successful with a total of 12 live plants. Accession no. 9063535 winterfat had 3 live plants; accession no. 9076415 winterfat had 9 live plants; and 'Hatch' winterfat had 4 live plants. Only the plants from the 9063535 winterfat plots had been grazed by rodents.

'Wytana' appeared to be the best performing fourwing saltbush, with 7 live plants. 'Rincon' had 2 live plants; and 9067480 fourwing saltbush had only 1 living plant. All of the Wytana plants had been grazed by rodents.

In the replicated grass display plots, plot number 217 (9076411 bottlebrush squirreltail) was the only plot that contained live plants. There were a total of 17 live plants in the plot.

Of the forty display plots planted, only 10 had live plants. Russian wildrye, Siberian wheatgrass and forage kochia appear to be the only accessions surviving in the brittle environment of the Range 26 site.

The second evaluation on September 15, 1999 showed very dry, dormant plants at the Range 26 site, except for Immigrant and U13-97 forage kochia. These 2 accessions showed a significant increase in plant numbers from the spring evaluation. Very impressive plant stands of Immigrant (97 plants/plot) and U13-97 (79 plants/plot) forage kochia were observed.

Christmas Mountain

The Christmas Mountain test site was monitored during the fall of 1998 and winter of 1999 for soil moisture conditions. This site was planted on March 17-18, 1999. Precipitation following planting was not adequate for seed germination and plant establishment. It was hoped that the seeds would lie dormant and germination would occur during the spring of 2000. No evaluation data could be collected from the Christmas Mountain test site during 1999.

2000 - EVALUATIONS AND DISCUSSION

During the 2000 water year, 10.01 inches of precipitation was recorded at Orchard and 7.26 inches were recorded at Range 26. Christmas Mountain received 9.88 inches during the 2000 calendar year. Average maximum and minimum temperatures at Orchard and Range 26 were higher in 2000 than in previous years. Average relative humidity at Orchard was 58.20 percent as compared to 59.40 and 65.6 percent in 1999 and 1998 respectively. Average relative humidity at Range 26 was 53.71 percent during the 2000 water year.

Orchard

The Orchard test site was evaluated on May 23, 2000 and data was collected on plant height, percent stand, plant density and vigor. Data is summarized in Table 1. Plant height data collected from the replicated grass plots ranged from 7.3 cm for 'Sodar' streambank wheatgrass to 34.8 cm for 'Bannock' thickspike wheatgrass. The non-replicated grass plots ranged from 24 cm for 'Tetracan' Russian wildrye to 44 cm for 'CD-II' crested wheatgrass. In the non-replicated forb and shrub display plots, only the U13-97 forage kochia and 'Immigrant' forage kochia survived. Plant height for both accessions was 17 cm.

The following comparisons of plant height from the replicated grass plots from the evaluations conducted in 1999 and 2000 were:

- 1) Overall plant height from the replicated grass plots in May, 2000 increased from 1999. The increase in plant height is likely due to the warmer-than-normal spring growing conditions in 2000.
- 2) Of the Sandberg bluegrass accessions, the most notable change in plant height was accession no. 9078408, which was 32.0 cm tall at the May 23, 2000 evaluation and was 7.3 cm tall in May, 1999.

3) The only accession that decreased in plant height from the 1999 evaluation to the May, 2000 evaluation was 'Sodar' streambank wheatgrass.

Percent stand data ranged from 1.5 percent for 9019219 bottlebrush squirreltail to 71.0 percent for 9078408 Sandberg bluegrass in the replicated plots. Percent stand data was analyzed utilizing analysis of variance (ANOVA) and Duncan's Multiple Range Test. Means shown for percent stand data shown on Table 1 which are followed by the same letter, are not significantly different. During 2000, the non-replicated grass plots ranged from 3 percent for Tetracan Russian wildrye to 58 percent stand for 'Nordan' crested wheatgrass. U13-97 forage kochia had a 30 percent stand and Immigrant forage kochia had a 13 percent stand in the non-replicated forb and shrub plots.

Comparisons of the 1999 and 2000 evaluations of percent stand from the replicated plots indicated:

- 1) Overall percent stand during 2000 declined from 1999. The decline can be attributed to the warmer conditions during 2000 as compared to 1999 as well as increasing competition from other vegetation (most notably cheatgrass, volunteer annual rye, and bulbous bluegrass).
- 2) During 1999 only two accessions (9076409 and 'Nezpar' Indian ricegrass) were recorded with 0 percent stand. In 2000, 9019218 bottlebrush squirreltail, 9076413 Thurber's needlegrass and 'Rimrock' Indian ricegrass also produced no stands.
- 3) The only accession which increased in percent stand from the 1999 to 2000 evaluation was 9078408 Sandberg bluegrass (60.3 percent in 1999 to 71.0 percent in 2000).
- 4) 'Sodar' streambank wheatgrass had the largest decline in percent stand from 1999 (29.8 percent) to 2000 (3.3 percent).

Plant density ranged from 0.3 plants per square foot for 'Trailhead' and 'Magnar' basin wildrye to 8.3 plants per square foot for 9078408 Sandberg bluegrass in the replicated plots. The non-replicated grass plots ranged from 1 plant per square foot for 'Douglas' crested wheatgrass to 4 plants per square foot for 'Ephraim' crested wheatgrass. Of the non-replicated forb and shrub plots, U13-97 forage kochia had 3 plants per square foot.

Observations from the plant density evaluations were:

- 1) Plant density for all replicated accessions declined at the May, 2000 evaluation as compared to the May, 1999 evaluation with the exception of Sandberg bluegrass accession no. 9078408. This accession increased in plant density from 6.3 plants per square foot in 1999 to 8.3 plants per square foot at the May, 2000 evaluation.

2) In the non-replicated grass plots, all accessions showed a decline between the two evaluation dates with the exception of 'Ephraim' crested wheatgrass and U13-97 forage kochia which had the same density at both evaluation periods.

Vigor for the replicated grass plots ranged from 7.8 (poorest but still alive) for 9019219 bottlebrush squirreltail to 1.3 (best) for 9078408 Sandberg bluegrass. In the non-replicated grass plots, Nordan and CD-II crested wheatgrass had the best vigor ratings. In the non-replicated forb and shrub display plots accession no. U13-97 forage kochia was rated 2 and 'Immigrant' rated 4.

Observations of vigor were:

1) Overall plant vigor for the replicated accessions declined from the May, 1999 evaluation to the May, 2000 evaluation.

2) Accession no. 9019218 bottlebrush squirreltail; 9076413 Thurber's needlegrass; and 9076409 and 'Rimrock' Indian ricegrass appear to have died out between the two evaluation periods.

3) In the non-replicated grass plots, 'Mankota' and Syn A Russian wildrye; 'Sherman' big bluegrass; and 'Whitmar' beardless wheatgrass appeared to have died out between the two evaluation periods.

4) In the non-replicated forb and shrub plots, U13-97 increased in vigor and 'Immigrant' decreased in vigor between the two evaluation periods.

The second evaluation in September showed only very dry, dormant plants and no visible change in plant growth from the May evaluation.

Due to lack of plant establishment, no data was available from the replicated shrub plots at the Orchard site.

Range 26

A summary of the evaluations conducted at the Range 26 Test Site during 2000 is shown in Table 2. The replicated shrub plots were evaluated on May 24 for total number of plants for each accession, plant height, and vigor. On September 12, the shrub plots were again evaluated for plant height and vigor.

Accession no. 9067481 winterfat had the most plants (35) and 9067480 fourwing saltbush had the fewest number of plants (1). Plant height on May 24 ranged from 0.5 cm for 9067480 fourwing saltbush to 17.5 cm for 9076415 winterfat. At the September 12 evaluation 9067481 winterfat was the tallest accession (32.8 cm).

Vigor for the replicated shrub plots at the May, 2000 evaluation ranged from 2.3 (best) for 9076415 winterfat to 8.5 (worst, but still alive) for 9067480 fourwing saltbush. In September, 2000 accession no. 9067481 winterfat had the best vigor (2.5).

Of the twenty grass accessions planted in the replicated trial at the Range 26 Test Site, only five accessions had live plants at the May, 2000 evaluation. Sandberg bluegrass accession 9078408 had the most plants. In September no evaluations of the grass plots was completed due to senescence of the plants.

In the non-replicated grass display plots, eight of the seventeen plots planted had live plants in May, 2000. The accessions with the most plants were 'Bozoisky' and 'Mankota' Russian wildrye.

The only two successful accessions in the non-replicated forb and shrub display plots ('Immigrant' and U13-97 forage kochia) were rated for percent cover, plant height and plant density as summarized on Table 2.

Because of the extreme environmental conditions at the Range 26 Test Site, one should be quite impressed with the accessions that have survived since planting in February, 1998.

Christmas Mountain

The Christmas Mountain Test Site was planted on March 17-18, 1999. Precipitation following planting was not adequate for seed germination and plant establishment of the materials that were seeded.

2001 EVALUATIONS AND DISCUSSION

The Orchard site received 8.84 inches of precipitation during the 2001 water year (Table 4). Range 26 received 7.83 inches of precipitation during the 2001 water year (Table 5). No data was available from Christmas Mountain. The mean maximum and minimum temperatures at Orchard and Range 26 were cooler than the previous three years of available data.

Orchard

On October 27, 2000 the University of Idaho in cooperation with the PMC sprayed test applications of Plateau® and Oasis® on the replicated grass plots at Orchard. Plateau is a broad-spectrum imidazoline herbicide labeled for weed control and growth suppression in rough or unimproved turf found in non-crop areas such as roadsides and industrial areas. Oasis is a premix of Plateau and 2,4-D. These herbicides show promise for control of annual grasses such as cheatgrass and medusahead rye prior to seeding perennial grasses. Plateau controls weeds by inhibiting protein synthesis and cell growth.

The south half of each replicated grass plot was sprayed with 10 oz per acre Plateau plus 1 qt per acre methylated seed oil (MSO). The north half of each replicated grass plot was sprayed with 12 oz per acre Oasis plus 1 qt per acre MSO. Plots were sprayed with a handheld spray boom. MSO is a spray adjuvant to aid in deposition and uptake of Plateau herbicide.

The test site was observed on April 18, 2001. Cheatgrass and volunteer rye were beginning to show damage from the herbicide application. On May 23, 2001 the plots were evaluated and data was collected on plant height, percent stand, plant density and vigor. Data is summarized in Table 1. Cheatgrass and annual rye in the plots that were sprayed in October, 2000 were dead.

Plant height data from the replicated grass plots ranged from 1.8 cm for Sodar streambank wheatgrass to 21.5 cm for Bannock thickspike wheatgrass. Height of the non-replicated grass display plots ranged from 20 cm for Ephraim crested wheatgrass to 38 cm for CD-II crested wheatgrass. In the non-replicated forb and shrub display plots, Immigrant and U13-97 forage kochia were the only accessions which survived. Plant height for both these accessions was 13 cm.

The following comparisons of plant height data from the replicated grass plots from the evaluations conducted in 2000 and 2001 were:

- 1) Overall plant height from the replicated grass plots in May 2001 were less than half of the overall plant heights recorded in May 2000. The decrease in plant height is most likely a result of the herbicide application made in October, 2000. Weather conditions may also have influenced the difference between the years.
- 2) The most notable change in plant height between the 2000 and 2001 evaluations was accession no. 9078408 Sandberg bluegrass which averaged 32.0 cm height in 2000 and only 5.8 cm in 2001.
- 3) The only accession which had increased plant height in 2001 from 2000 was accession no. 9019218 bottlebrush squirreltail. In 2000, no plants of this accession were observed. The herbicide application allowed for the plants to be observed by removal of the annual grasses.

Percent stand data ranged from 1.5 percent for 9019219 bottlebrush squirreltail to 49.8 percent for accession no. 9078408 Sandberg bluegrass. Due to extreme variability in the data (CV = 87.35 percent) further statistical analysis was not appropriate. Percent stand data in Table 1 is arranged from greatest to least percent stand for the data collected in 2001. During 2001, the non-replicated grass display plots ranged from 3 percent stand for Syn A Russian wildrye to 63 percent stand for Nordan crested wheatgrass. In the non-replicated forb and shrub display plots, U13-97 forage kochia had 38 percent stand and Immigrant forage kochia had 13 percent stand. These 2 accessions were the only materials in the shrub and forb display nursery to survive since the first evaluation in 1998.

Comparisons of the 2000 and 2001 evaluations of percent stand from the replicated grass plots were:

- 1) Overall percent stand continued to decline from 12.2 percent in 2000 to 9.3 percent in 2001. The decline has always been in a downward trend which can mostly be attributed to increasing competition each year from the annual vegetation.

2) There was a very noticeable decline in percent stand for 9078408 Sandberg bluegrass from 71.0 percent in 2000 to 49.8 percent in 2001. This appears to be attributed to damage from the herbicide application.

3) Four accessions had an increase in percent stand from 2000 to 2001. Those accessions were Bannock thickspike wheatgrass; Sand Hollow bottlebrush squirreltail; Trailhead basin wildrye; and 9019218 bottlebrush squirreltail.

Plant density ranged from 0.3 plants per square foot for 9076411 and 9076414 bottlebrush squirreltail; Trailhead basin wildrye; and Secar Snake River wheatgrass to 3.3 plants per square foot for 9078408 Sandberg bluegrass in the replicated plots. The non-replicated grass display plots ranged from 1 plant per square foot for Whitmar beardless wheatgrass; Nordan, CD-II, Fairway, and Hycrest crested wheatgrass to 3 plants per square foot for Ephraim crested wheatgrass. U13-97 forage kochia had 1 plant per square foot in the non-replicated forb and shrub plots.

Comparisons of the 2000 and 2001 evaluations of plant density were:

- 1) All accessions (except 9076411 bottlebrush squirreltail) declined in plant density from 2000 to 2001.
- 2) The largest decline in plant density was 9078408 Sandberg bluegrass (from 8.3 to 3.3 plants per square foot). This decline may be mostly attributed to the herbicide application.
- 3) The increase in plant density from 2000 to 2001 for 9076411 bottlebrush squirreltail may be due to the herbicide application which removed annual grasses and allowed observation of the accession.

Vigor for the replicated grass plots ranged from 8.8 (poorest but still alive) for Schwendimar thickspike wheatgrass to 6.0 (best) for Sand Hollow bottlebrush squirreltail. In the non-replicated grass display plots Nordan crested wheatgrass had the best vigor rating and U13-97 forage kochia had the best vigor rating from the non-replicated forb and shrub display plots.

Comparisons of the 2000 and 2001 evaluations of vigor were:

- 1) Overall plant vigor for the replicated grass plots declined from the May 2000 to May 2001 evaluations.
- 2) The only accession that increased in plant vigor (from 9.0 in May, 2000 to 8.3 in May 2001) was 9019218 bottlebrush squirreltail.
- 3) The most notable decline in vigor from the replicated grass plots from 2000 to 2001 was 9078408 Sandberg bluegrass. This accession appears to have been negatively impacted from the herbicide application.

The second evaluation in September showed only very dry, dormant plants and no visible change in plant growth from the May 2000 evaluation. The replicated shrub plots did not establish after planting.

Range 26

A summary of the evaluations conducted at the Range 26 test site during 2001 is shown on Table 2. The shrub plots were evaluated May 24 for total number of plants for each accession, plant height and vigor. The replicated and non-replicated grass plots were evaluated for total number of plants per accession. Immigrant and U13-97 forage kochia were the only accessions that established in the non-replicated forb and shrub display and they were evaluated for percent cover, plant height and plant density. On September 12, the shrub plots were again evaluated for plant height and vigor.

Accession no. 9067481 winterfat had the most plants (35) and 9067480 fourwing saltbush had the fewest number of plants that were still alive (1). Plant height on May 24 ranged from 1.3 cm for 9067480 fourwing saltbush to 20.0 cm for 9067481 winterfat. At the September 12 evaluation 9067481 winterfat was the tallest accession.

Vigor for the replicated shrub plots at the May, 2001 evaluation ranged from 2.0 (best) for 9067481 winterfat to 8.3 (worst but still alive) for 9067480 fourwing saltbush. In September, 2001 accession no. 9067481 winterfat had the best vigor (4.0).

Of the twenty grass accessions planted in the replicated plots at Range 26, only five accessions had live plants at the May, 2001 evaluation. Accession no. 9076411 bottlebrush squirreltail had the most plants. Note the decline of 9078408 Sandberg bluegrass, from 125 plants in May, 2000 to 0 plants in May, 2001. The only explanation for this decline may be the timing of precipitation during late winter and early spring during 2000 and 2001.

Only eight of the twenty grass accessions planted in the non-replicated grass display nursery were observed May 24, 2001. The Russian wildrye and Siberian wheatgrass accessions were doing very well in comparison to the other accessions that were planted.

Immigrant and U13-97 forage kochia were very nearly identical in cover, plant height and plant density at the May 24, 2001 evaluation.

Because of the extreme environmental conditions at Range 26, one should be quite impressed with the accessions that have survived since planting in February, 1998.

CONCLUSIONS FROM NATIVE PLANT TEST SITE EVALUATIONS

The purpose of this aspect of the project was to evaluate the potential of native grasses, forbs and shrubs for revegetation of impacted areas on the OTA.

Orchard

The Orchard site was planted December 1-3, 1997. Although the seedbed was prepared in the most optimal way to achieve successful plant establishment, the pre-existing vegetation dominated by cheatgrass and annual rye created an ideal seed bank for continued infestation. The continual infestation of cheatgrass and annual rye presented a high level of competition for the accessions seeded at Orchard. The below normal precipitation received in 2000 and 2001 was also detrimental to the persistence of many of the accessions seeded at the Orchard site.

Plant performance is largely dictated by weather conditions from year to year and the most visible attribute is plant height. Bannock thickspike wheatgrass was the tallest accession each year except for 1999 when Secar Snake River wheatgrass was the tallest accession in the replicated grass plots. The test application of Plateau and Oasis herbicides in October, 2000 likely resulted in an overall decline in plant height of more than half from the evaluation conducted in 2000 to the evaluation conducted in 2001.

Percent stand and plant density are attributes that best measure a plants ability to protect the soil resource. Accession no. 9078408 Sandberg bluegrass consistently had the best stand during the evaluation period at Orchard. That accession even had the best stand at the final evaluation in May, 2001 despite the reduction in stand most likely attributed to the application of Plateau and Oasis herbicide. The PMC intends to continue monitoring the performance of the test accessions to evaluate the effectiveness of the herbicide application.

It should be noted that the best performing accessions in terms of percent stand are the Sandberg bluegrass accessions. Accession no. 9078408 Sandberg bluegrass, the best performing accession at the Orchard test site was recently released as the High Plains Selected Class Natural Germplasm by the Bridger, MT PMC and should be available commercially in the next several years.

Accession no. 9078408 Sandberg bluegrass also had the best plant density during the evaluation period. Accession no. 9076410 Sandberg bluegrass and Bannock thickspike wheatgrass also had above average number of plants per square foot.

Vigor is a subjective rating of plant health. The first evaluation in 1998 found Bannock thickspike wheatgrass to have the best vigor. In 1999 and 2000, accession no. 9078408 Sandberg bluegrass had the best vigor and in 2001 Sand Hollow bottlebrush squirreltail had the best vigor rating.

Although no statistically valid conclusions can be made from the non-replicated display plots, some observations of plant performance can be made. Immigrant and U13-97 forage kochia were the only accessions in the forb and shrub display plots to persist during the evaluation

period. Accession no. U13-97 had a greater stand than Immigrant, which maintained a steady state since the second year of evaluation. Neither accession of forage kochia is spreading aggressively from the plots they were planted in.

CD-II crested wheatgrass was the tallest accession each year of evaluation and Nordan crested wheatgrass had the greatest stand during the last 2 years of evaluations. Ephraim crested wheatgrass had the greatest plant density the last 2 years of evaluations and Nordan crested wheatgrass had the best vigor rating at the final evaluation in 2001.

Range 26

The Range 26 site was moldboard plowed in April, 1997 to remove existing vegetation and an attempt to plant the site was made on December 1, 1997. The soil was extremely dry at that time and would not pack to prepare a firm seedbed. Rains in January, 1998 were sufficient to complete seedbed preparation and on February 16-18 the site was culti-packed 3 times and then planted. Looking back with perfect hindsight, the site probably should not have mechanically prepared because the calcareous, silt loam soils sealed readily following planting and caused the soil surface to harden like concrete. We recommend chemical site preparation in the future on similar soils in annual precipitation zones below 8 inches to control vegetative competition followed by drill seeding of desired seed mixture.

At the first evaluation in 1998, all the replicated grass and shrub accessions had emerged. The replicated grass plots ranged from 0.8 cm to 4.0 cm in height and percent stand ranged from 0.0 to 20.8 percent. Plant density ranged from 0.0 to 10.5 plants per square foot and vigor ranged from 8.3 (poorest) to 2.5 (best). All of the non-replicated grass display plots had emerged. Four of the nine non-replicated forb and shrub plots did not have emergence at the May, 1998 evaluation.

However, by the second evaluation in May, 1999 plant performance had reduced drastically. There was so little of the seeded vegetation present that evaluations of total number of plants was not only feasible, but was the only meaningful data that could be collected from the replicated grass plots. Accession no. 9076411 bottlebrush squirreltail was the only accession in the replicated grass plots that had plants. In May, 2000 there were five accessions that had live plants and accession no. 9078408 Sandberg bluegrass had the greatest number of plants but by May, 2001 no plants of this accession were observed. Accession no. 9076411 bottlebrush squirreltail was consistently observed each year.

The conditions at Range 26 do not appear to be well suited for fourwing saltbush. The only accession remaining in September, 2001 was 9067480 which had 1 live plant.

Winterfat accession no. 9067481 was consistently the best performer of the winterfat accessions in total number of plants, plant height, and vigor during the evaluation period.

It should be noted that 9067481 winterfat was recently released by the Aberdeen PMC in cooperation with the Idaho Agricultural Experiment Station as Northern Cold Desert Germplasm (Selected Class) winterfat. Accession no. 9067480 fourwing saltbush was also recently released

by the Aberdeen PMC in cooperation with the Pullman, WA PMC and the Idaho Agricultural Experiment Station as Snake River Plains Germplasm (Selected Class) fourwing saltbush.

The Russian wildrye and Siberian wheatgrass accessions in the non-replicated display nursery were very impressive in terms of number of plants. At the May, 2001 evaluation those accessions had established well enough to be able to attempt reproduction by forming seed heads.

Immigrant and U13-97 forage kochia were the only accessions planted in the non-replicated forb and shrub display nursery that have survived. Although a few plants have volunteered outside of their plots, neither accession appears to be aggressive in their rate of spread and both accessions protect the soil quite well.

Because of the extreme environmental conditions at the Range 26 test site, one should be quite impressed with the accessions that survived during the evaluation period.

Christmas Mountain

The Christmas Mountain test site was selected for herbicide and direct seeding testing. The only seedbed preparation was the application of Oust herbicide in late fall, 1997 and early spring, 1998 as separate treatments in separate blocks prior to seeding. The test site was monitored for soil moisture conditions during the fall and winter of 1998-99 and was planted on March 17-18, 1999. The plots have been observed each year since planting but precipitation was not adequate for seed germination and plant establishment of the materials seeded. Due to the extremely dry conditions, it is also possible that some residual herbicide remained following planting that prohibited plant establishment. The following section of the report will provide details on the herbicide trials using Oust.

DEMONSTRATE SEEDBED PREPARATION AND PLANTING TECHNIQUES AND PRE-PLANT HERBICIDE TREATMENTS OF CHEATGRASS

Seedbed preparation and planting depth are critical in the establishment of any seeding. In order to develop proper seedbed techniques for site specific applications on the OTA, trials of different seedbed preparation and planting depths were implemented on the Orchard and Range 26 test sites. In addition to the seedbed and planting depth trials, herbicide trials were also conducted at all three sites to evaluate pre-plant control of cheatgrass.

Seedbed Preparation and Planting Techniques

Materials and Methods

Seedbed preparation trials were established at Orchard and Range 26 by using three methods of soil preparation prior to planting. The three methods of soil preparation left the seedbed in firm, medium, and soft soil condition. Hycrest crested wheatgrass and Bannock thickspike wheatgrass were seeded in alternate 7 foot drill rows across each section of ground preparation. Three test trials of seeding depth were used. Seeding depths of test species were broadcast, 0.5-0.75 inches,

and greater than one inch. This study provided plant performance data based upon the three seeding depths in each of the soil preparation conditions. Final seedbed preparation and seeding were conducted on the same date the native plant test accessions were seeded at each site. Seeding rates for Bannock thickspike wheatgrass and Hycrest crested wheatgrass was 8 pounds PLS per acre and 5 pounds PLS per acre respectively in each of the treatments.

Evaluations

On June 5-6, 1998 the seedbed preparation demonstrations at Orchard and Range 26 were first evaluated for percent stand and plant height. Table 3 summarizes the data collected during the entire evaluation period.

At the Orchard site, the poorest stand of Bannock was in the medium seedbed condition with deep seeding. Bannock had the best stands at the 0.5-0.75 seeding depth on both medium and soft seedbed conditions. Hycrest had the best stands on both firm and medium seedbed conditions. There was not much difference between normal seeding depth and broadcast seeding which may be attributed to the moist spring weather conditions. Generally, the tallest plants were in the firm seedbed conditions.

At Range 26, Bannock had the poorest stands in soft and medium broadcast conditions as well as the medium condition, deep seeding. The best stand was achieved in the 0.5-0.75 seeding depth, soft seedbed. Hycrest had the poorest stands at the firm broadcast and soft, deep seeding condition. Hycrest produced the best stands at the 0.5-0.75 seeding depth on both the firm and medium seedbed conditions. There was not much difference in plant height among the treatments.

During the evaluations conducted in 1999, no live plants were found at the Range 26 seedbed preparation trial. At Orchard, the best stand of Bannock (30 percent) was recorded in the soft seedbed and broadcast seeded. The next best stand (18 percent) was broadcast seeded in the firm seedbed preparation. The tallest plants were in the soft, broadcast plot.

The best stands of Hycrest (60 percent) occurred in the planting depth of 0.5 - 0.75 inches in the firm and medium seedbed preparation trials. Plant height was greatest in the firm seedbed preparation with a planting depth of 0.5 - 0.75 inches.

The Bannock stands decreased from the previous year except for the broadcast firm, broadcast medium and >1.0 inch medium plots where cover increased from 1998. Plant height also decreased from 1998 to 1999 for Bannock in all treatments.

Hycrest cover increased in all test trials of seeding depth and seedbed conditions. Plant height was lower in all trials as compared to 1998, probably due to less spring moisture.

In 2000, at the Orchard site, Bannock thickspike wheatgrass had the best stand (10 percent) in the firm, surface planted (broadcast) seedbed. The next best stands (both 8 percent) were in the medium and soft broadcast seedbeds. The tallest Bannock plants were in the medium, broadcast seedbed.

Hycrest crested wheatgrass had the best stand (50 percent) at the 0.5-0.75 depth in the soft seedbed followed by the deep seeding (15 percent) and broadcast (10 percent). The tallest Hycrest plants were in the firm seedbed and broadcast seeded. In the soft seedbed treatment Bannock had the best stand (8 percent) in the broadcast treatment but stands were not much different from the other seeding depth treatments in the soft seedbed.

In the medium seedbed treatment Bannock had an 8 percent stand in the broadcast treatment while no stand was present in the other seeding depth treatments. The best stand of Hycrest (30 percent) was in the broadcast treatment followed by the deep seeding (23 percent) and the 0.50-0.75 seeding depth (18 percent). In the firm seedbed treatment, the only stand of Bannock was in the broadcast treatment (10 percent). There were no differences in stands for Hycrest between the different seeding depths.

Due to poor environmental conditions for plant establishment at the Range 26 site, no evaluations of the seedbed preparation demonstration were conducted during 2000 and 2001.

During 2001, the best stands of Bannock (5 percent) were in the soft, > 1.0 inch seeding depth followed by the medium, broadcast treatment (3 percent) and medium, 0.5-0.75 inch treatment (2 percent). All other treatments had no measurable stands. Plant height was uniform among all treatments that still had live plants. Hycrest had the best stand (43 percent) in the firm, 0.5-0.75 inch seeding depth followed by the firm, broadcast treatment (35 percent). Plant height did not vary much between the treatments. As in 1999 and 2000, there were no plants to evaluate at the Range 26 seedbed preparation trial.

Conclusions

The best stands of Bannock during the first year were in the medium and soft seedbeds at the 0.5 - 0.75 inch seeding depth. By the end of the study, the stands on all treatments had declined to 5 percent or less. The effect of several dry years (2000 and 2001) was detrimental to Bannock in this trial.

The best stand of Hycrest during the first year of evaluation was in the medium, broadcast treatment. By the end of the study, the best stand was in the soft, 0.5 - 0.75 inch treatment.

The following table summarizes the means of percent stand across all treatments at Orchard:

Bannock Thickspike Wheatgrass

Seeding depth	Seedbed Condition			Mean
	Firm	Medium	Soft	
0.5 - 0.75	7.75	6.25	8.00	7.33
> 1.0	4.00	3.25	7.00	4.75
broadcast	12.00	11.00	14.00	12.33
Mean	7.92	6.83	9.67	

Hycrest Crested Wheatgrass

Seeding depth	Seedbed Condition			Mean
	Firm	Medium	Soft	
0.5 - 0.75	32.50	27.00	34.50	31.33
> 1.0	23.75	25.25	17.25	22.08
broadcast	19.00	32.00	19.00	23.33
Mean	25.08	28.08	23.58	

Between the different seedbed treatments, Bannock had the best overall percent stand in the soft seedbed. Broadcast seeding produced the best overall stand when comparing seeding depths.

Hycrest produced the best stands in the 0.5 - 0.75 inch seeding depth and the best stands were produced in the medium seedbed.

Pre-plant Herbicide Treatments of Cheatgrass

Controlling weeds in native plant stands can be difficult, as native plants tend to be very poor competitors with weeds. Cheatgrass (*Bromus tectorum*) is a winter annual grass introduced to North America from Europe. This plant is an invader on North American rangelands due to its aggressive annual nature, shallow root system and is highly flammable when mature. Cheatgrass is unpalatable to wildlife and livestock at maturity and provides inadequate protection of the soil resource. There has been success by other researchers and land management agencies to control cheatgrass using Oust™ herbicide at other locations and it was determined that this product should be tested for its application and potential on the OTA.

Oust is a dispersible granule that is mixed in water and applied as a spray to control annual grasses and broadleaf plants by both pre-emergence and post-emergence activity. Oust must be applied 180 days prior to seeding and is generally applied in the fall prior to seeding.

The Christmas Mountain test site was planted in March, 1999. This native plant performance test included 9 grass accessions that were arranged in a complete randomized block design with four replications in four herbicide treatments. The treatments included a fall application, a spring application (both applications were made at least 180 days prior to seeding), a post seeding application and a control. As mentioned earlier in this report, precipitation following planting the Christmas Mountain Test site in March, 1999 was not adequate for seed germination and plant establishment.

Materials and Methods

The Oust herbicide test trials on the Orchard, Range 26, and Christmas Mountain test site were implemented using a "fall" and "spring" application of the chemical. One ounce per acre of Oust was applied to existing vegetation on undisturbed soils within each test site. On December 3, 1997 Oust was applied on strips of 20' x 300' on all three test sites and is referred to as the "fall" application. On February 26, 1998 another 20' x 300' test strip of Oust was applied at all three test sites and is referred to as the "spring" application. A 20' x 300' control strip was left

untreated for comparison purposes. Observations were recorded on cheatgrass control and the effect of the herbicide on the existing vegetation at each site.

1998 Observations and Discussion

Orchard:

The fall application of Oust resulted in 100 percent control of cheatgrass and other annual plants. Perennial grasses turned yellow and had stunted seed heads especially on Russian wildrye. The spring application resulted in approximately 50-75 percent control on cheatgrass and other annuals, but did not have as severe effect on the perennial plants as did the fall application.

Range 26:

There appeared to be little difference between the spring and fall application of Oust. All cheatgrass was controlled. The bottlebrush squirreltail remained healthy, but the budsage was severely damaged. This damage could be attributed to burning the perimeter of the test site along the enclosure fence to remove Russian thistle and the heat may have damaged all vegetation.

Christmas Mountain:

The fall application killed almost everything growing in the plot including cheatgrass and Sandberg bluegrass. Bottlebrush squirreltail was stunted and had a yellowish appearance. The spring application also killed most plants, but there were spots of healthy Sandberg bluegrass with no seed heads. Bottlebrush squirreltail was in better condition on the spring application as compared to the fall application.

1999 Observations and Discussion

Orchard:

- 1) Heavy infestations of cheatgrass still existed in the non-treated areas. The spring application, which had about 50 percent cheatgrass control, showed evidence of re-infestation of cheatgrass. The fall application (100 percent cheatgrass control) showed only minor re-infestations of cheatgrass, probably due to a reduction of a viable seed bank.
- 2) All perennial plants appeared to have gone dormant sooner in the non-treated areas than in the treated areas. Earlier dormancy of the perennial plants could be attributed to the high plant density (mostly cheatgrass) resulting in high levels of competition for moisture, space, nutrients and sunlight.
- 3) The cheatgrass which did establish in spring and fall treated areas had more vigorous growth than in the untreated test plot which can be attributed to reduced competition for moisture, space, nutrients and sunlight.
- 4) Cheatgrass appeared to have a longer life cycle in the chemically treated areas than in the non-treated areas. Plants were taller, had completed seed formation and had shattered seed.

- 5) Plants in the non-treated area were shorter and still had immature seed attached - thus a shorter life cycle.
- 6) The herbicide applications thinned the cheatgrass to a point where the cheatgrass was no longer competing with itself for moisture, nutrients, space and sunlight.
- 7) The spraying of Oust herbicide may not be ecologically nor economically effective without re-seeding of desirable plants. There is little recruitment of desirable perennials because cheatgrass is much more vigorous and invasive.

Range 26:

- 1) There was no re-growth of Sandberg bluegrass or budsage in the fall application test plot.
- 2) Sandberg bluegrass had a 60% re-growth in the spring application. There was no re-growth of budsage.

Christmas Mountain:

- 1) Most of the Sandberg bluegrass was dead from the fall application. The spring application was less severe on the bluegrass, with some plants re-emerging.

The use of Oust to control cheatgrass invasion may be most beneficial in conjunction with another type of disturbance such as fire. Fire followed by herbicide application will maximize reduction in the cheatgrass seed bank but it will also be necessary to follow with seeding to maximize establishment of desirable perennial vegetation.

2000 and 2001 Observations and Discussion

In 2000 and 2001, observations found no differences from those observed in 1999. The effects of Oust on perennial vegetation that survived the applications appear to be no longer present and cheatgrass has re-invaded the treatments at the Orchard site. No significant re-invasion of cheatgrass has occurred at Range 26 or Christmas Mountain, which is attributed to lack of sufficient moisture to establish and produce cheatgrass seed.

The use of Oust to control cheatgrass invasion may be most beneficial when used in conjunction with another type of disturbance such as fire and may not be ecologically nor economically effective without reseeding of desirable plants after herbicide application.

TEST TECHNIQUES FOR COLLECTION OF WINTERFAT *Krascheninnikovia lanata* SEED

Winterfat, *Krascheninnikovia lanata* is a native shrub and is a major component of many of the vegetation types on the OTA. It is especially important on the southern portion of the OTA and there is potential to establish winterfat on the OTA but seed is limited.

Winterfat seed is a utricle (an indehiscent, one-seeded, bladdery fruit) covered with fine, white, silky hairs to ½ inch long. Harvesting seed is best accomplished by hand removal. Mechanized

harvesting has been used, but seed requires additional conditioning to properly dry and remove leaves, stems and other inert matter. Harvested seed is usually threshed by debearding or run through a hammermill to remove the fine, silky hairs that cover the seed. Removal of the hairs from the seed is necessary to allow the seed to flow through planting equipment.

Winterfat that is native to the OTA ranges in height from 8 to 12 inches and stands are usually sparse. These 2 factors make seed collection by hand very difficult and time consuming. In September 1997, winterfat seed was collected on the OTA by hand and by using a portable, mechanical seed stripper. The seed stripper is hand held with an 18 inch wide nylon sweeper brush powered with a small 2 cycle gas engine that combs seed off the plant into a detachable hopper. Hand collections reduce the amount of inert matter collected but is slow and tedious. The seed stripper was quicker in collecting bulk material but a large amount of inert matter was also collected. The extra inert matter makes the seed cleaning process much more difficult and more pure seed is lost in the cleaning process. It was also difficult to harvest seed that was close to the ground because of the design of the stripper where the hopper is located below the stripping mechanism.

In 1998, it was decided by IDARNG staff to discontinue this portion of the project.

ASSISTANCE WITH THE DEVELOPMENT OF COMMERCIAL SEED PRODUCTION FOR LARGE SCALE INCREASE

Most native plants in arid environments are conservative seed producers. They have evolved for long term survival in harsh environments, allocating more energy for survival and less for sexual reproduction (seed production). However, seed yields of many native grasses can be quite good when grown under conditions of ideal soil moisture, fertility and good cultural practices.

To achieve the goal of rehabilitating large areas of the OTA with locally adapted native plants, large amounts of seed would be required. Commercial seed growers would be needed to supply large quantities of quality seed and procedures are needed to contract with commercial seed growers to procure seed.

Contacts were made by NRCS personnel with a number of commercial seed growers to solicit interest in growing seed for IDARNG. Those growers contacted expressed interest in producing penstemon, Thurber's needlegrass, bottlebrush squirreltail and tapertip hawksbeard.

The following is an example of a seed increase agreement that could be used as a template for contracting seed production:

SEED INCREASE AGREEMENT

Between name and address of seed grower or company, and Idaho Army National Guard.

The Idaho Army National Guard allots Generation 0 seed of species name and source to the above grower for increase during specify years to be produced (i.e. 2001-2004). The grower agrees to grow this seed in accordance with the rules and regulations for certified seed for Certified class of seed and to follow approved seed production practices for the above mentioned class of seed. The grower agrees to plant this seed on ___ acres of land and to

produce maximum seed possible. The grower agrees to enter the crop for certification with the Idaho Crop Improvement Association, Inc.

The grower further agrees that the Idaho Army National Guard will retain the right to allocate or dispose of all the seed produced under this agreement. The grower will receive \$___ **per pound PLS** for all seed produced according to the rules and regulations of the Idaho Crop Improvement Association, Inc. In addition, the grower will receive \$___ **per pound clean bulk weight** for cleaning seed to Certification standards as set forth by the Idaho Crop Improvement Association, Inc.

For the production of this seed, the grower agrees to:

Plant, fertilize, apply pesticides if necessary, harvest, clean, package, and deliver seed to Idaho Army National Guard.

For the production of this seed, the Idaho Army National Guard agrees to:

Supply Generation 0 seed with Idaho State Seed Laboratory Seed Analysis Report. **Specify any other agreed to items that would be provided by Idaho Army National Guard.**

In the event the crop fails to pass certification, the grower will sell it into commercial channels (non-certified) unless directed by Idaho Army National Guard. The grower will retain the total non-certified sale price and receive no other payment.

Include appropriate signatures and dates of responsible parties.

ASSISTANCE IN INSTALLATION OF AUTOMATED WEATHER STATION ON THE SOUTHERN PORTION OF THE OTA

A weather station was needed on the southern portion of the OTA to collect climatic data. The site chosen to install the weather station was the Range 26 test site. NRCS developed an agreement with the Agricultural Research Service (ARS) to acquire an automated weather station for the site. The equipment for the weather station was purchased in 1997 with funds from the memorandum of agreement between IDARNG and NRCS. The weather station is part of a network of automated stations and is a cooperative effort of many agencies. Collection of data and maintenance of the equipment is performed by ARS. Weather data from the network can be viewed or downloaded from the internet at <http://www.nwrc.ars.usda.gov/databases/srbop/downloads.html> The weather station equipment is owned by IDARNG.

ASSISTANCE IN ACQUIRING AND TESTING AN ALL TERRAIN VEHICLE (ATV) SEEDER AND HARROW AND TRANSPORT TRAILER FOR FIELD PLANTING

To facilitate revegetation efforts by IDARNG, specialized field equipment was needed. Through funds from the memorandum of agreement between IDARNG and NRCS a Truax WF-32 wildflower seed planter and harrow, all-terrain vehicle (ATV), and transportation trailer were purchased. Equipment was delivered to the Aberdeen PMC in April, 1998.

Initial field testing of the equipment at the Aberdeen PMC identified minor modifications to the equipment were needed. The modifications completed by the PMC staff were: strengthening the loading ramps of the equipment trailer; attaching a drag chain and pipe to harrow for better seed cover; and building a seed catcher for the planter in order to properly calculate seeding rates.

On April 12, 1998 the equipment was field tested by planting Bannock thickspike wheatgrass and a general pasture mix on approximately 0.5 acres near Aberdeen. This activity was in conjunction with the South Bingham Soil Conservation District natural resources tour for fourth grade school students from Aberdeen.

On August 18, 1998 all equipment was delivered to the IDARNG. PMC personnel demonstrated operation of the four wheel drive ATV and the planter to National Guard Resource Staff and supplied them with supporting operation and maintenance manuals for the equipment. The WF-32 wildflower seed planter provides 3 seed boxes with vertical row dividers and independent rate adjustments for all boxes. As seed from different species vary greatly in size, shape, and weight, it was necessary to demonstrate the use and calibration of the seeder. The calculations to calibrate the 32 inch seeder is as follows:

Truax Broadcast Seeder Calibration

To calibrate measure off and mark a 100 foot run. Use calibration catch pan to collect seed. Set drill openings for seeding and engage drive pin in drive wheel. Drive a few feet before start of 100 foot strip in order to prime drill flutes. Empty catch pan after priming. Replace pan and then drive the 100 foot test at approximate speed of seeding in the field. Carefully remove catch pan and weigh seed collected. Then adjust drill settings until desired amount of seed is achieved. Several test runs may be required in order to obtain the desired rate. Use the following formulas to determine calibration rates:

Truax planter seeds 30" wide swath or 2.5 ft.

2.5 ft. x 100 ft. Run = 250 sq.ft.

There are 43,560 square feet per acre

$$\frac{43,560 \text{ sq. ft.}}{250 \text{ sq. ft.}} = 174.24$$

250 sq. ft.

174.24 is how many 100 ft. Runs required to seed one acre

Example 1:

10 pounds seed per acre is desired rate.

$$\frac{10 \text{ lbs.}}{174.24} = 0.057 \text{ lbs. needed per 100 ft. run.}$$

174.24

Since 0.057 pounds is difficult to weigh on most scales simply convert to grams; there are 454 grams in one pound.

$$0.057 \text{ lbs.} \times 454 = 26 \text{ gr. needed per 100 foot run}$$

Example 2:

15 pounds seed per acre is desired rate.

$$\frac{15 \text{ lbs.}}{174.24} = 0.086 \text{ lbs.}$$

0.086 lbs. x 454 gr. = 39 gr. needed per 100 foot run

Example 3:

20 pounds seed per acre is desired rate.

$$\frac{20 \text{ lbs.}}{174.24} = 0.114 \text{ lbs.}$$

0.114 lbs. x 454 gr. = 52 gr. needed per 100 foot run

This calibration method is quite accurate and can be used for any species.

Table 1.
Idaho Army National Guard
Orchard Inter-Center Strain Trial
Summary of 1998 - 2001 Evaluation Data

Replicated Grass Plots

Accession No.	Common Name	Scientific Name	Source	Percent PLS	6/4/98	Plant Height (cm) (date of evaluation)		
						5/25/99	5/23/00	5/23/01
Bannock	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Aberdeen	89.24	27.5	22.3	34.8	21.5
Trailhead	Basin Wildrye	<i>Leymus cinereus</i>	Bridger	81.13	21.3	18.8	25.3	16.8
Sand Hollow	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	ARS	70 *	16.5	15.3	24.0	14.3
Secar	Snake River Wheatgrass	<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	Pullman	86.90	22.8	14.0	21.3	13.8
Magnar	Basin Wildrye	<i>Leymus cinereus</i>	Aberdeen	91.72	19.3	24.3	27.0	13.3
9076411	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	IDARNG	50 *	17.5	11.8	20.5	8.8
9019219	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	Bridger	70 *	1.0	4.5	12.8	8.5
9076414	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	USFS	70 *	13.5	12.8	16.8	8.0
Critana	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Bridger	88.35	23.8	13.3	19.5	7.3
9076410	Sandberg Bluegrass	<i>Poa secunda</i>	IDARNG	60 *	10.3	12.8	20.3	6.5
9078408	Sandberg Bluegrass	<i>Poa secunda</i>	Bridger	60 *	9.3	7.3	32.0	5.8
Canbar	Sandberg bluegrass	<i>Poa secunda</i>	Commercial	84.00	9.5	9.8	15.0	5.5
9019218	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	Bridger	70 *	1.3	13.0	0.0	5.0
Schwendimar	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Pullman	61.99	25.5	12.8	25.3	3.8
9076412	Sandberg Bluegrass	<i>Poa secunda</i>	USFS	60 *	6.8	4.3	15.5	3.0
Sodar	Streambank wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Aberdeen	94.72	20.3	14.8	7.3	1.8
Nezpar	Indian Ricegrass	<i>Achnatherum hymenoides</i>	Aberdeen	94.72	14.0	0.0	0.0	0.0
9076409	Indian Ricegrass	<i>Achnatherum hymenoides</i>	IDARNG	70 *	18.3	4.0	0.0	0.0
9076413	Thurber's Needlegrass	<i>Achnatherum thurberiana</i>	USFS	70 *	16.3	3.0	0.0	0.0
Rimrock	Indian Ricegrass	<i>Achnatherum hymenoides</i>	Bridger	71.44	10.8	4.3	0.0	0.0

* Purity and germination data was not available from source, Pure Live Seed (PLS) percentage estimated.

Table 1 continued.
 Idaho Army National Guard
 Orchard Inter-Center Strain Trial
 Summary of 1998 - 2001 Evaluation Data

Non-replicated Grass Display Plots

Accession No.	Common Name	Scientific Name	Source	Percent PLS	6/4/98	Plant Height (cm)		
						(date of evaluation)		
						5/25/99	5/23/00	5/23/01
CD-II	Crested Wheatgrass	<i>A cristatum X desertorum</i>	ARS	70*	31	39	44	38
Mankota	Russian Wildrye	<i>Psathyrostachys juncea</i>	Bismark	92.01	11	16	0	33
Nordan	Crested Wheatgrass	<i>Agropyron desertorum</i>	Commercial	92.48	30	29	43	33
Douglas	Crested Wheatgrass	<i>Agropyron cristatum</i>	ARS	70*	23	18	36	30
Hycrest	Crested Wheatgrass	<i>A cristatum X desertorum</i>	Aberdeen	90.00	30	26	37	30
Bozoisky	Russian Wildrye	<i>Psathyrostachys juncea</i>	Bridger	93.56	14	18	26	28
Vavilov	Siberian Wheatgrass	<i>Agropyron fragile</i>	ARS	70*	30	26	31	26
Whitmar	Beardless Wheatgrass	<i>Pseudoroegneria spicata inermis</i>	Pullman	86.12	20	15	0	25
PI-275459	Siberian Wheatgrass	<i>Agropyron fragile</i>	Pullman	77.71	30	25	28	25
Syn-A	Russian Wildrye	<i>Psathyrostachys juncea</i>	ARS	80*	12	16	0	25
Fairway	Crested Wheatgrass	<i>Agropyron cristatum</i>	Commercial	88.61	20	27	28	25
P-27	Siberian Wheatgrass	<i>Agropyron fragile</i>	Aberdeen	89.20	23	22	27	25
Ephraim	Crested Wheatgrass	<i>Agropyron cristatum</i>	Aberdeen	87.00	17	16	41	20
9043501	Salina Wildrye	<i>Leymus salinus</i>	Meeker	87.00	0	0	0	0
Sherman	Big Bluegrass	<i>Poa secunda</i>	Pullman	86.27	17	23	0	0
Tetracan	Russian Wildrye	<i>Psathyrostachys juncea</i>	ARS	80*	18	15	24	0
SL-Hybrid	Hybrid Wheatgrass	<i>Elymus X Pseudoroegneria</i>	ARS	80*	19	0	0	0

Non-replicated Forb and Shrub Display Plots

Immigrant	Forage Kochia	<i>Kochia prostrata</i>	Commercial	50*	10	8	17	13
U13-97	Forage Kochia	<i>Kochia prostrata</i>	USFS	50*	10	12	17	13
9021471	Fringed sage	<i>Artemisia frigida</i>	Meeker	73.00	8	0	0	0
Timp	Utah Sweetvetch	<i>Hedysarum boreale</i>	Meeker	95.00	6	0	0	0
9016134	Saltbush	<i>Atriplex falcata</i>	Bridger	30*	5	0	0	0
ARCA	Silver sagebrush	<i>Artemisia cana</i>	USFS	15*	13	0	0	0
Richfield sel.	Firecracker penstemon	<i>Penstemon eatonii</i>	Aberdeen	50.00	0	0	0	0
9076417	Sharpleaf penstemon	<i>Penstemon acuminatus</i>	IDARNG	50*	0	0	0	0
	Spiny Hopsage	<i>Grayia spinosa</i>	IDARNG	30*	0	0	0	0

* Purity and germination data was not available from source, Pure Live Seed (PLS) percentage estimated.

Table 1 continued.
 Idaho Army National Guard
 Orchard Inter-Center Strain Trial
 Summary of 1998 - 2001 Evaluation Data

Accession No.	Common Name	Scientific Name	Replicated Grass Plots			
			6/4/98	5/25/99	5/23/00	5/23/01
				Percent Stand ^{1/}		
				(date of evaluation)		
9078408	Sandberg Bluegrass	<i>Poa secunda</i>	50.3 a	60.3 a	71.0 a	49.8
9076410	Sandberg Bluegrass	<i>Poa secunda</i>	46.5 ab	46.0 b	41.5 b	32.5
9076412	Sandberg Bluegrass	<i>Poa secunda</i>	30.8 b-e	35.8 bc	24.8 c	24.5
Canbar	Sandberg bluegrass	<i>Poa secunda</i>	36.5 a-c	26.0 c-e	18.3 c-e	16.5
Bannock	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	35.3 a-d	25.3 c-e	20.3 cd	12.0
Sand Hollow	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	9.0 f-h	10.3 e-h	10.3 d-g	11.3
Magnar	Basin Wildrye	<i>Leymus cinereus</i>	30.8 b-e	17.3 d-g	5.8 e-g	9.0
9076414	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	15.8 e-h	18.5 d-f	10.3 d-g	7.5
9076411	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	38.5 a-c	10.3 e-h	5.8 e-g	5.8
Trailhead	Basin Wildrye	<i>Leymus cinereus</i>	17.3 d-g	14.8 d-h	4.5 e-g	5.3
Secar	Snake River Wheatgrass	<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	14.5 e-h	8.5 f-h	4.8 e-g	3.5
9019218	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	0.8 h	1.5 h	0.0 g	2.5
Critana	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	35.3 a-d	21.5 c-f	15.3 c-f	2.0
9019219	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	0.8 h	0.8 h	1.5 fg	1.5
Sodar	Streambank wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	36.8 a-c	29.8 cd	3.3 fg	0.8
Schwendimar	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	11.3 f-h	7.0 f-h	6.0 e-g	0.8
Nezpar	Indian Ricegrass	<i>Achnatherum hymenoides</i>	25.5 c-f	0.0 h	0.0 g	0.0
9076409	Indian Ricegrass	<i>Achnatherum hymenoides</i>	22.3 c-g	0.0 h	0.0 g	0.0
9076413	Thurber's Needlegrass	<i>Achnatherum thurberiana</i>	5.3 gh	0.8 h	0.0 g	0.0
Rimrock	Indian Ricegrass	<i>Achnatherum hymenoides</i>	4.5 gh	0.8 h	0.0 g	0.0
		Mean	23.4	16.7	12.2	9.3
		CV	49.11 %	59.83%	69.7 %	87.35 %

^{1/} Percent stand is equal to basal cover. Data (except 5/23/01) was analyzed utilizing Duncan's Multiple Range Test: P = 0.05. Means followed by the same letter are not significantly different. Due to extreme variability in data collected 5/23/01 (CV = 87.35 %), further analysis is not appropriate.

Table 1 continued.
 Idaho Army National Guard
 Orchard Inter-Center Strain Trial
 Summary of 1998 - 2001 Evaluation Data

Non-replicated Grass Display Plots

Accession No.	Common Name	Scientific Name	Percent Stand ^{1/}			
			(date of evaluation)			
			6/4/98	5/25/99	5/23/00	5/23/01
Nordan	Crested Wheatgrass	Agropyron desertorum	13	68	58	63
CD-II	Crested Wheatgrass	A cristatum X desertorum	33	83	43	43
Hycrest	Crested Wheatgrass	A cristatum X desertorum	13	53	35	35
Ephraim	Crested Wheatgrass	Agropyron cristatum	5	15	28	30
PI-275459	Siberian Wheatgrass	Agropyron fragile	20	65	25	28
Vavilov	Siberian Wheatgrass	Agropyron fragile	15	48	28	23
Whitmar	Beardless Wheatgrass	Pseudoroegneria spicata inermis	13	8	0	18
Douglas	Crested Wheatgrass	Agropyron cristatum	3	15	10	18
P-27	Siberian Wheatgrass	Agropyron fragile	28	45	25	18
Fairway	Crested Wheatgrass	Agropyron cristatum	23	58	18	15
Mankota	Russian Wildrye	Psathyrostachys juncea	25	38	0	10
Bozoisky	Russian Wildrye	Psathyrostachys juncea	23	20	15	5
Syn-A	Russian Wildrye	Psathyrostachys juncea	10	8	0	3
9043501	Salina Wildrye	Leymus salinus	0	0	0	0
Sherman	Big Bluegrass	Poa secunda	8	15	0	0
Tetracan	Russian Wildrye	Psathyrostachys juncea	10	10	3	0
SL-Hybrid	Hybrid Wheatgrass	Elymus X Pseudoroegneria	5	0	0	0

Non-replicated Forb and Shrub Display Plots

U13-97	Forage Kochia	Kochia prostrata	30	23	30	38
Immigrant	Forage Kochia	Kochia prostrata	25	13	13	13
9021471	Fringed sage	Artemisia frigida	5	0	0	0
Timp	Utah Sweetvetch	Hedysarum boreale	25	0	0	0
9016134	Saltbush	Atriplex falcata	5	0	0	0
ARCA	Silver sagebrush	Artemisia cana	85	0	0	0
Richfield sel.	Firecracker penstemon	Penstemon eatonii	0	0	0	0
9076417	Sharpleaf penstemon	Penstemon acuminatus	0	0	0	0
	Spiny Hopsage	Grayia spinosa	0	0	0	0

^{1/} Percent stand is equal to basal cover.

Table 1 continued.
 Idaho Army National Guard
 Orchard Inter-Center Strain Trial
 Summary of 1998 - 2001 Evaluation Data

Replicated Grass Plots

Accession No.	Common Name	Scientific Name	Plant Density (no. plants per ft ²)			
			6/4/98	5/25/99	5/23/00	5/23/01
9078408	Sandberg Bluegrass	<i>Poa secunda</i>	10.5	6.3	8.3	3.3
9076410	Sandberg Bluegrass	<i>Poa secunda</i>	10.8	6.0	5.3	2.0
Bannock	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	4.3	3.8	3.5	2.0
9076412	Sandberg Bluegrass	<i>Poa secunda</i>	6.3	4.0	3.0	1.8
Canbar	Sandberg bluegrass	<i>Poa secunda</i>	5.3	3.5	1.0	1.0
9076411	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	6.0	3.5	0.0	0.3
Trailhead	Basin Wildrye	<i>Leymus cinereus</i>	4.8	1.0	0.3	0.3
9076414	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	0.8	1.0	0.5	0.3
Secar	Snake River Wheatgrass	<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	2.3	1.3	0.0	0.3
Sand Hollow	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	0.3	1.0	0.5	0.3
Sodar	Streambank wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	6.5	2.3	0.0	0.0
Critana	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	3.8	1.0	0.5	0.0
Magnar	Basin Wildrye	<i>Leymus cinereus</i>	3.5	1.3	0.3	0.0
Nezpar	Indian Ricegrass	<i>Achnatherum hymenoides</i>	4.0	0.0	0.0	0.0
9076409	Indian Ricegrass	<i>Achnatherum hymenoides</i>	3.3	0.3	0.0	0.0
Schwendimar	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	3.3	0.8	0.5	0.0
9076413	Thurber's Needlegrass	<i>Achnatherum thurberiana</i>	0.8	0.0	0.0	0.0
Rimrock	Indian Ricegrass	<i>Achnatherum hymenoides</i>	1.0	0.0	0.0	0.0
9019219	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	0.0	0.0	0.0	0.0
9019218	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	0.0	0.0	0.0	0.0

Table 1 continued.
 Idaho Army National Guard
 Orchard Inter-Center Strain Trial
 Summary of 1998 - 2001 Evaluation Data

Non-replicated Grass Display Plots

Accession No.	Common Name	Scientific Name	Plant Density (no. plants per ft ²)			
			6/4/98	5/25/99	5/23/00	5/23/01
Ephraim	Crested Wheatgrass	Agropyron cristatum	5	2	4	3
Vavilov	Siberian Wheatgrass	Agropyron fragile	3	3	0	2
P-27	Siberian Wheatgrass	Agropyron fragile	7	7	2	2
Whitmar	Beardless Wheatgrass	Pseudoroegneria spicata inermis	0	0	0	1
Nordan	Crested Wheatgrass	Agropyron desertorum	2	3	0	1
CD-II	Crested Wheatgrass	A cristatum X desertorum	11	5	2	1
Fairway	Crested Wheatgrass	Agropyron cristatum	5	4	3	1
Hycrest	Crested Wheatgrass	A cristatum X desertorum	3	1	2	1
9043501	Salina Wildrye	Leymus salinus	0	0	0	0
Bozoisky	Russian Wildrye	Psathyrostachys juncea	7	3	0	0
PI-275459	Siberian Wheatgrass	Agropyron fragile	6	5	0	0
Sherman	Big Bluegrass	Poa secunda	4	1	0	0
Mankota	Russian Wildrye	Psathyrostachys juncea	8	1	0	0
Tetracan	Russian Wildrye	Psathyrostachys juncea	1	0	0	0
Douglas	Crested Wheatgrass	Agropyron cristatum	0	1	1	0
SL-Hybrid	Hybrid Wheatgrass	Elymus X Pseudoroegneria	2	0	0	0
Syn-A	Russian Wildrye	Psathyrostachys juncea	2	0	0	0

Non-replicated Forb and Shrub Display Plots

U13-97	Forage Kochia	Kochia prostrata	3	3	3	1
9021471	Fringed sage	Artemisia frigida	1	0	0	0
Timp	Utah Sweetvetch	Hedysarum boreale	3	0	0	0
Immigrant	Forage Kochia	Kochia prostrata	2	0	0	0
9016134	Saltbush	Atriplex falcata	0	0	0	0
ARCA	Silver sagebrush	Artemisia cana	5	0	0	0
Richfield sel.	Firecracker penstemon	Penstemon eatonii	0	0	0	0
9076417	Sharpleaf penstemon	Penstemon acuminatus	0	0	0	0
	Spiny Hopsage	Grayia spinosa	0	0	0	0

Table 1 continued.
 Idaho Army National Guard
 Orchard Inter-Center Strain Trial
 Summary of 1998 - 2001 Evaluation Data

Replicated Grass Plots

Accession No.	Common Name	Scientific Name	6/4/98	5/25/99	Vigor ^{2/} (date of evaluation)		
					9/15/99 ^{3/}	5/23/00	5/23/01
Sand Hollow	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	5.3	3.5	8.8	3.8	6.0
Trailhead	Basin Wildrye	<i>Leymus cinereus</i>	3.3	5.0	9.0	5.8	6.5
Bannock	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	1.0	3.0	4.5	3.5	6.8
Magnar	Basin Wildrye	<i>Leymus cinereus</i>	2.8	3.8	9.0	6.0	7.3
9076414	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	4.3	3.3	8.5	4.8	7.5
Secar	Snake River Wheatgrass	<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	4.0	4.3	7.8	6.3	7.5
9076410	Sandberg Bluegrass	<i>Poa secunda</i>	2.5	2.5	3.0	5.5	7.8
9078408	Sandberg Bluegrass	<i>Poa secunda</i>	1.8	1.5	1.8	1.3	8.0
9076411	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	2.0	3.5	8.5	7.0	8.0
Canbar	Sandberg bluegrass	<i>Poa secunda</i>	3.5	3.5	6.5	6.3	8.0
Critana	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	3.0	3.8	3.8	4.8	8.0
9019219	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	7.8	8.0	9.0	7.8	8.0
9076412	Sandberg Bluegrass	<i>Poa secunda</i>	3.5	3.0	7.0	6.3	8.3
9019218	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	8.0	5.3	9.0	9.0	8.3
Sodar	Streambank wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	2.5	2.8	3.8	6.3	8.5
Schwendimar	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	5.0	4.8	8.0	5.0	8.8
Nezpar	Indian Ricegrass	<i>Achnatherum hymenoides</i>	3.3	9.0	9.0	9.0	9.0
9076409	Indian Ricegrass	<i>Achnatherum hymenoides</i>	3.8	9.0	9.0	9.0	9.0
9076413	Thurber's Needlegrass	<i>Achnatherum thurberiana</i>	5.0	7.8	9.0	9.0	9.0
Rimrock	Indian Ricegrass	<i>Achnatherum hymenoides</i>	4.8	7.5	9.0	9.0	9.0

^{2/} Rated 1-9 with 1 best, 9 worst.

^{3/} Competitive ability against cheatgrass. Rated 1-9 with 1 best, 9 worst.

Table 1 continued.
Idaho Army National Guard
Orchard Inter-Center Strain Trial
Summary of 1998 - 2001 Evaluation Data

Non-replicated Grass Display Plots

Accession No.	Common Name	Scientific Name	6/4/98	5/25/99	Vigor ^{2/} (date of evaluation)		
					9/15/99 ^{3/}	5/23/00	5/23/01
Nordan	Crested Wheatgrass	Agropyron desertorum	4	2	1	2	3
PI-275459	Siberian Wheatgrass	Agropyron fragile	3	2	3	5	4
CD-II	Crested Wheatgrass	A cristatum X desertorum	2	1	1	2	4
Fairway	Crested Wheatgrass	Agropyron cristatum	3	2	2	5	4
Hycrest	Crested Wheatgrass	A cristatum X desertorum	4	3	2	3	4
Ephraim	Crested Wheatgrass	Agropyron cristatum	4	5	4	4	4
Vavilov	Siberian Wheatgrass	Agropyron fragile	3	1	2	5	5
P-27	Siberian Wheatgrass	Agropyron fragile	3	2	5	5	6
Whitmar	Beardless Wheatgrass	Pseudoroegneria spicata inermis	4	4	8	9	7
Bozoisky	Russian Wildrye	Psathyrostachys juncea	3	3	2	5	7
Mankota	Russian Wildrye	Psathyrostachys juncea	3	4	2	9	7
Douglas	Crested Wheatgrass	Agropyron cristatum	5	5	4	4	7
Syn-A	Russian Wildrye	Psathyrostachys juncea	4	5	5	9	7
9043501	Salina Wildrye	Leymus salinus	9	9	9	9	9
Sherman	Big Bluegrass	Poa secunda	4	2	8	9	9
Tetracan	Russian Wildrye	Psathyrostachys juncea	4	5	5	5	9
SL-Hybrid	Hybrid Wheatgrass	Elymus X Pseudoroegneria	3	9	9	9	9

Non-replicated Forb and Shrub Display Plots

U13-97	Forage Kochia	Kochia prostrata	3	3	9	2	2
Immigrant	Forage Kochia	Kochia prostrata	4	2	8	4	4
9021471	Fringed sage	Artemisia frigida	3	9	9	9	9
Timp	Utah Sweetvetch	Hedysarum boreale	3	9	9	9	9
9016134	Saltbush	Atriplex falcata	3	9	9	9	9
ARCA	Silver sagebrush	Artemisia cana	1	9	9	9	9
Richfield sel.	Firecracker penstemon	Penstemon eatonii	9	9	9	9	9
9076417	Sharpleaf penstemon	Penstemon acuminatus	9	9	9	9	9
	Spiny Hopsage	Grayia spinosa	9	9	9	9	9

^{2/} Rated 1-9 with 1 best, 9 worst

^{3/} Competitive ability against cheatgrass. Rated 1-9 with 1 best, 9 worst.

Table 2.
 Idaho Army National Guard
 Range 26 Site Inter-Center Strain Trial
 Summary of 1998 - 2001 Evaluation Data
Replicated Grass Plots (1998 Data)

Accession No.	Common Name	Scientific Name	Source	Percent PLS	Plant Height (cm) 6/5/98	Percent Stand ^{1/} 6/5/98	Plant Density (per ft ²) 6/5/98	Vigor ^{2/} 6/5/98
Sodar	Streambank wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Aberdeen	94.72	4.0	20.8 a	5.8	2.5
Schwendimar	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Pullman	61.99	3.8	19.3 a	5.0	3.8
9076409	Indian Ricegrass	<i>Achnatherum hymenoides</i>	IDARNG	70 *	5.8	19.0 a	6.5	2.5
9076411	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	IDARNG	50 *	3.0	19.0 a	10.5	4.0
9076410	Sandberg Bluegrass	<i>Poa secunda</i>	IDARNG	60 *	1.0	17.3 a	9.3	4.0
Critana	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Bridger	88.35	4.8	16.5 abc	6.0	3.5
Bannock	Thickspike Wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	Aberdeen	89.24	5.5	14.8 bcd	5.8	3.3
9076414	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	USFS	70 *	1.8	8.5 bcd	4.8	4.3
Magnar	Basin Wildrye	<i>Leymus cinereus</i>	Aberdeen	91.72	3.5	8.5 bcd	3.8	4.0
Canbar	Sandberg bluegrass	<i>Poa secunda</i>	Commercial	84.00	1.0	8.5 cd	9.8	4.8
Nezpar	Indian Ricegrass	<i>Achnatherum hymenoides</i>	Aberdeen	94.72	5.0	7.8 cd	1.0	3.8
Rimrock	Indian Ricegrass	<i>Achnatherum hymenoides</i>	Bridger	71.44	4.3	6.5 d	0.5	4.3
Sand Hollow	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	ARS	70 *	3.3	5.3 d	1.8	6.3
9076412	Sandberg Bluegrass	<i>Poa secunda</i>	USFS	60 *	1.5	4.0 d	1.3	6.8
9078408	Sandberg Bluegrass	<i>Poa secunda</i>	Bridger	60 *	1.0	3.5 d	4.0	5.0
Trailhead	Basin Wildrye	<i>Leymus cinereus</i>	Bridger	81.13	1.8	2.8 d	0.5	6.3
Secar	Snake River Wheatgrass	<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	Pullman	86.90	1.3	2.8 d	0.5	7.3
9076413	Thurbers Needlegrass	<i>Achnatherum thurberiana</i>	USFS	70 *	1.8	2.5 d	2.3	6.0
9019218	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	Bridger	70 *	1.0	0.8 d	0.0	8.3
9019219	Bottlebrush Squirreltail	<i>Elymus elymoides</i>	Bridger	70 *	0.8	0.0 d	0.3	8.3
Replicated Shrub Plots (1998 Data)					# Plants/Sample rows			
Wytana	Fourwing Saltbush	<i>Atriplex canescens</i>	Bridger	25.14	n/a	10.5	n/a	5.3
9076415	Winterfat	<i>Krascheninnikovia lanata</i>	IDARNG	50*		8.8		5.3
9067481	Winterfat	<i>Krascheninnikovia lanata</i>	Aberdeen	50*		7.8		2.8
Hatch	Winterfat	<i>Krascheninnikovia lanata</i>	Meeker	50*		7.0		4.3
9063535	Winterfat	<i>Krascheninnikovia lanata</i>	Bridger	50*		6.5		4.3
9067480	Fourwing Saltbush	<i>Atriplex canescens</i>	Aberdeen	30*		1.3		6.0
Rincon	Fourwing Saltbush	<i>Atriplex canescens</i>	Meeker	30*		0.3		8.0

* Purity and germination data was not available from source, estimated.

^{1/}Percent stand is equal to basal cover. 6/5/98 percent stand data was analyzed utilizing Duncan's Multiple Range Test; P=0.05, CV=57.75; means followed by the same letter are not significantly different.

^{2/} Rated 1-9 with 1 best, 9 worst.

Table 2 continued.
 Idaho Army National Guard
 Range 26 Site Inter-Center Strain Trial
 Summary of 1998 - 2001 Evaluation Data

Non-replicated Grass Display Plots (1998 Data)

Accession No.	Common Name	Scientific Name	Source	Percent PLS	Plant	Percent	Plant	Vigor ^{2/}
					Height (cm)	Stand ^{1/}	Density (per ft ²)	
					6/5/98	6/5/98	6/5/98	6/5/98
9043501	Salina Wildrye	<i>Leymus salinus</i>	Meeker	87.00	4	18	5	4
Whitmar	Beardless Wheatgrass	<i>Pseudoroegneria spicata inermis</i>	Pullman	86.12	3	5	4	4
Bozoisky	Russian Wildrye	<i>Psathyrostachys juncea</i>	Bridger	93.56	3	28	2	4
PI-275459	Siberian Wheatgrass	<i>Agropyron fragile</i>	Pullman	77.71	8	10	0	2
Sherman	Big Bluegrass	<i>Poa secunda</i>	Pullman	86.27	1	3	0	7
Mankota	Russian Wildrye	<i>Psathyrostachys juncea</i>	Bismark	92.01	5	20	8	3
Nordan	Crested Wheatgrass	<i>Agropyron desertorum</i>	Commercial	92.48	4	3	0	6
Tetracan	Russian Wildrye	<i>Psathyrostachys juncea</i>	ARS	80*	5	18	3	3
Douglas	Crested Wheatgrass	<i>Agropyron cristatum</i>	ARS	70*	2	15	3	4
SL-Hybrid	Hybrid Wheatgrass	<i>Elymus X Pseudoroegneria</i>	ARS	80*	4	20	0	4
Syn-A	Russian Wildrye	<i>Psathyrostachys juncea</i>	ARS	80*	4	15	5	5
Vavilov	Siberian Wheatgrass	<i>Agropyron fragile</i>	ARS	70*	6	3	3	3
CD-II	Crested Wheatgrass	<i>A cristatum X desertorum</i>	ARS	70*	3	18	2	3
Fairway	Crested Wheatgrass	<i>Agropyron cristatum</i>	Commercial	88.61	2	3	2	6
Hycrest	Crested Wheatgrass	<i>A cristatum X desertorum</i>	Aberdeen	90.00	5	23	11	2
Ephraim	Crested Wheatgrass	<i>Agropyron cristatum</i>	Aberdeen	87.00	3	5	1	6
P-27	Siberian Wheatgrass	<i>Agropyron fragile</i>	Aberdeen	89.20	4	8	2	3

Non-replicated Forb and Shrub Display Plots (1998 Data)

9021471	Fringed sage	<i>Artemisia frigida</i>	Meeker	73.00	0	0	0	9
Timp	Utah Sweetvetch	<i>Hedysarum boreale</i>	Meeker	95.00	2	18	0	2
Immigrant	Forage Kochia	<i>Kochia prostrata</i>	Commercial	50*	1	8	1	4
U13-97	Forage Kochia	<i>Kochia prostrata</i>	USFS	50*	1	8	0	4
9016134	Saltbush	<i>Atriplex falcata</i>	Bridger	30*	0	0	0	9
ARCA	Silver sagebrush	<i>Artemisia cana</i>	USFS	15*	2	13	18	1
Richfield sel.	Firecracker penstemon	<i>Penstemon eatonii</i>	Aberdeen	50.00	1	3	0	4
9076417	Sharpleaf penstemon	<i>Penstemon acuminatus</i>	IDARNG	50*	0	0	0	9
	Spiny Hopsage	<i>Grayia spinosa</i>	IDARNG	30*	0	0	0	9

* Purity and germination data was not available from source, estimated.

^{1/} Percent stand is also equal to basal cover.

^{2/} Rated 1-9 with 1 best, 9 worst.

Table 2 continued.
 Idaho Army National Guard
 Range 26 Site Inter-Center Strain Trial
 Summary of 1998 - 2001 Evaluation Data
Replicated Shrub Plots

Accession No.	Common Name	Scientific Name	Total No. plants (mean) (date of evaluation)			Plant Height (cm) (date of evaluation)			
			5/26/99	5/24/00	5/24/01	5/24/00	9/12/00	5/24/01	9/12/01
9067481	Winterfat	Krascheninnikovia lanata	12 (3.0)	35 (8.8)	35 (8.8)	16.0	32.8	20.0	22.5
9076415	Winterfat	Krascheninnikovia lanata	9 (2.3)	18 (4.5)	20 (5.0)	17.5	23.8	15.8	11.3
Hatch	Winterfat	Krascheninnikovia lanata	4 (1.0)	18 (4.5)	19 (4.8)	3.5	21.5	11.5	10.5
9063535	Winterfat	Krascheninnikovia lanata	3 (0.8)	4 (1.0)	4 (1.0)	5.0	12.8	7.8	4.3
Wytana	Fourwing Saltbush	Atriplex canescens	7 (1.8)	4 (1.0)	0 (0.0)	0.5	0.5	0.0	0.0
9067480	Fourwing Saltbush	Atriplex canescens	1 (0.3)	1 (0.3)	1 (0.3)	0.5	2.5	1.3	0.0
Rincon	Fourwing Saltbush	Atriplex canescens	2 (0.5)	0 (0.0)	0 (0.0)	0.0	0.0	0.0	0.0

Vigor ^{2/}

Accession No.	Common Name	Scientific Name	(date of evaluation)			
			5/24/00	9/12/00	5/24/01	9/12/01
9067481	Winterfat	Krascheninnikovia lanata	2.8	2.5	2.0	4.0
9076415	Winterfat	Krascheninnikovia lanata	2.3	4.3	2.8	5.8
Hatch	Winterfat	Krascheninnikovia lanata	5.3	5.0	4.5	6.8
9063535	Winterfat	Krascheninnikovia lanata	5.8	5.8	5.8	7.8
Wytana	Fourwing Saltbush	Atriplex canescens	8.8	8.0	9.0	9.0
9067480	Fourwing Saltbush	Atriplex canescens	8.5	8.0	8.3	9.0
Rincon	Fourwing Saltbush	Atriplex canescens	9.0	9.0	9.0	9.0

Replicated Grass Plots

Accession No.	Common Name	Scientific Name	Total No. plants (mean) (date of evaluation)		
			5/26/99	5/24/00	5/24/01
9078408	Sandberg Bluegrass	Poa secunda	0	125 (31.3)	0
9076411	Bottlebrush Squirreltail	Elymus elymoides	17 (4.3)	8 (2.0)	15 (3.8)
9076409	Indian Ricegrass	Achnatherum hymenoides	0	3 (0.8)	0
Nezpar	Indian Ricegrass	Achnatherum hymenoides	0	3 (0.8)	0
9076414	Bottlebrush Squirreltail	Elymus elymoides	0	2 (0.5)	2 (0.5)
Canbar	Sandberg Bluegrass	Poa secunda	0	0	2 (0.5)
9019218	Bottlebrush Squirreltail	Elymus elymoides	0	0	1 (0.3)
Critana	Thickspike Wheatgrass	Elymus lanceolatus ssp. lanceolatus	0	0	1 (0.3)

^{2/} Rated 1-9 with 1 best, 9 worst.

Table 2 continued.
 Idaho Army National Guard
 Range 26 Site Inter-Center Strain Trial
 Summary of 1998 - 2001 Evaluation Data

Non-replicated Display Plots

Accession No.	Common Name	Scientific Name	Total No. plants (date of evaluation)		
			5/26/99	5/24/00	5/24/01
Grasses					
Bozoisky	Russian Wildrye	Psathyrostachys juncea	26	40	61
Mankota	Russian Wildrye	Psathyrostachys juncea	19	40	48
Tetracan	Russian Wildrye	Psathyrostachys juncea	10	22	22
Syn-A	Russian Wildrye	Psathyrostachys juncea	14	18	24
PI-275459	Siberian Wheatgrass	Agropyron fragile	14	17	23
Vavilov	Siberian Wheatgrass	Agropyron fragile	12	16	15
P-27	Siberian Wheatgrass	Agropyron fragile	2	9	9
Nordan	Crested Wheatgrass	Agropyron desertorum	1	1	0
Shrubs					
Immigrant	Forage Kochia	Kochia prostrata	27	n/a	n/a
U13-97	Forage Kochia	Kochia prostrata	22	n/a	n/a

Non-replicated Forb and Shrub Display Plots

2000 Evaluation Data

			Percent cover	Plant Ht. (cm)		Plant Density (per ft ²)
				5/24	9/12	
Immigrant	Forage Kochia	Kochia prostrata	40	18	32	3
U13-97	Forage Kochia	Kochia prostrata	35	24	50	1

2001 Evaluation Data

			Percent cover	Plant Ht. (cm)		Plant Density (per ft ²)
				5/24	9/12	
Immigrant	Forage Kochia	Kochia prostrata	48	15	20	1
U13-97	Forage Kochia	Kochia prostrata	48	20	27	1

Table 3.
Seedbed Preparation Demonstration
Idaho Army National Guard
Orchard Site
Summary of Evaluations

**Bannock Thickspike Wheatgrass
0.5 - 0.75 inch seeding depth**

Evaluation date	Seedbed Condition					
	Firm		Medium		Soft	
	% Stand	Height	% Stand	Height	% Stand	Height
June 6, 1998	18	23 cm	25	33 cm	25	25 cm
May 25, 1999	13	20	0	0	0	0
May 23, 2000	0	0	0	0	5	26
May 23, 2001	0	0	0	0	2	25
Mean	7.75	11.5	6.25	8.25	8.0	19.0

**Bannock Thickspike Wheatgrass
> 1.0 inch seeding depth**

Evaluation date	Seedbed Condition					
	Firm		Medium		Soft	
	% Stand	Height	% Stand	Height	% Stand	Height
June 6, 1998	13	26 cm	3	33 cm	8	45 cm
May 25, 1999	3	15	10	20	10	18
May 23, 2000	0	0	0	0	5	27
May 23, 2001	0	0	0	0	5	25
Mean	4.0	10.25	3.25	13.25	7.0	28.75

**Bannock Thickspike Wheatgrass
Broadcast seeding**

Evaluation date	Seedbed Condition					
	Firm		Medium		Soft	
	% Stand	Height	% Stand	Height	% Stand	Height
June 6, 1998	20	40 cm	20	25 cm	18	33 cm
May 25, 1999	18	17	13	14	30	23
May 23, 2000	10	23	8	28	8	22
May 23, 2001	0	0	3	25	0	0
Mean	12.0	20.0	11.0	23	14.0	19.5

Table 3 continued.
 Seedbed Preparation Demonstration
 Idaho Army National Guard
 Orchard Site
 Summary of Evaluations

**Hycrest Crested Wheatgrass
 0.5 - 0.75 inch seeding depth**

Evaluation date	Seedbed Condition					
	Firm		Medium		Soft	
	% Stand	Height	% Stand	Height	% Stand	Height
June 6, 1998	25	53cm	25	38 cm	5	28 cm
May 25, 1999	60	38	50	31	40	21
May 23, 2000	25	33	18	28	50	36
May 23, 2001	20	30	15	30	43	30
Mean	32.5	38.5	27.0	31.75	34.5	28.75

**Hycrest Crested Wheatgrass
 > 1.0 inch seeding depth**

Evaluation date	Seedbed Condition					
	Firm		Medium		Soft	
	% Stand	Height	% Stand	Height	% Stand	Height
June 6, 1998	10	26 cm	13	33 cm	3	20 cm
May 25, 1999	35	29	45	33	33	26
May 23, 2000	25	39	23	32	15	31
May 23, 2001	25	30	20	30	18	30
Mean	23.75	31.0	25.25	32.0	17.25	26.75

**Hycrest Crested Wheatgrass
 Broadcast seeding**

Evaluation date	Seedbed Condition					
	Firm		Medium		Soft	
	% Stand	Height	% Stand	Height	% Stand	Height
June 6, 1998	5	42 cm	28	33 cm	13	35 cm
May 25, 1999	13	23	40	31	40	27
May 23, 2000	23	41	30	33	10	27
May 23, 2001	35	35	30	30	13	30
Mean	19.0	35.25	32.0	31.75	19.0	29.75

Table 4.
Orchard Weather Data Summary

2001 Water Year	Average Maximum Temperature	Average Minimum Temperature	Average Relative Humidity	Precipitation
Month/Year	°C	°C	%	Inches
Oct-00	16.75	1.96	69.41	2.48
Nov-00	4.28	-6.83	86.22	0.78
Dec-00	2.11	-5.69	80.77	0.71
Jan-01	1.79	-7.60	87.62	0.98
Feb-01	5.51	-5.17	82.29	0.35
Mar-01	13.02	-1.26	71.81	0.79
Apr-01	12.43	-1.77	73.29	0.94
May-01	23.96	4.54	42.89	1.02
Jun-01	25.31	5.95	41.33	0.16
Jul-01	29.24	10.57	43.59	0.39
Aug-01	32.67	11.48	31.71	0.00
Sep-01	26.03	5.49	44.42	0.24
Mean	16.09	Mean 0.97	Mean 62.95	Total 8.84

2000 Water Year	Average Maximum Temperature	Average Minimum Temperature	Average Relative Humidity	Precipitation
Month/Year	°C	°C	%	Inches
Oct-99	20.55	0.22	42.35	0.20
Nov-99	14.31	-0.49	62.37	0.91
Dec-99	2.43	-5.10	89.29	0.82
Jan-00	4.12	-4.46	87.94	1.51
Feb-00	9.57	-1.46	78.64	2.10
Mar-00	11.60	-2.66	70.96	1.66
Apr-00	18.71	2.06	65.34	0.97
May-00	21.38	21.38	60.00	0.64
Jun-00	29.32	14.05	31.63	0.13
Jul-00	33.31	18.34	25.59	0.01
Aug-00	32.96	12.34	31.89	0.32
Sep-00	24.68	6.55	52.41	0.74
Mean	18.58	Mean 5.06	Mean 58.20	Total 10.01

1999 Water Year	Average Maximum Temperature	Average Minimum Temperature	Average Relative Humidity	Precipitation
Month/Year	°C	°C	%	Inches
Oct-98	17.75	-0.85	60.51	0.11
Nov-98	10.40	-1.00	74.27	0.95
Dec-98	2.97	-7.53	79.01	1.59
Jan-99	5.66	-4.45	82.84	1.36
Feb-99	6.34	-4.19	77.87	1.47
Mar-99	11.56	-3.28	65.81	1.14
Apr-99	14.48	-0.87	62.63	0.60
May-99	19.74	2.71	57.45	0.96
Jun-99	26.03	8.41	49.75	0.73
Jul-99	32.45	10.75	30.55	0.01
Aug-99	32.30	12.07	38.12	0.10
Sep-99	25.99	4.70	33.98	0.07
Mean	17.14	Mean 1.37	Mean 59.40	Total 9.09

Table 4 continued.
Orchard Weather Data Summary

1998 Water Year	Average Maximum Temperature	Average Minimum Temperature	Average Relative Humidity	Precipitation
Month/Year	°C	°C	%	Inches
Oct-97	17.40	-0.61	56.17	0.51
Nov-97	11.26	-3.26	74.70	0.60
Dec-97	3.96	-8.26	82.47	0.53
Jan-98	7.44	-2.78	80.73	2.58
Feb-98	7.92	-2.44	76.51	1.81
Mar-98	11.44	-1.54	70.40	1.26
Apr-98	15.35	-0.03	68.13	0.57
May-98	18.12	5.48	74.17	3.56
Jun-98	23.76	6.84	65.96	1.40
Jul-98	34.80	14.42	45.10	0.53
Aug-98	34.21	12.29	35.89	0.04
Sep-98	27.95	9.84	56.50	0.83
Mean	17.80	Mean 2.49	Mean 65.56	Total 14.22

1997 Water Year	Average Maximum Temperature	Average Minimum Temperature	Average Relative Humidity	Precipitation
Month/Year	°C	°C	%	Inches
Oct-96	18.07	1.68	54.80	0.87
Nov-96	10.49	-2.68	76.98	1.34
Dec-96	4.79	-3.26	82.88	3.82
Jan-97	4.01	-6.24	82.34	2.30
Feb-97	7.54	-5.26	72.09	0.41
Mar-97	12.97	-3.23	60.67	0.38
Apr-97	14.58	-0.71	62.30	1.55
May-97	24.09	5.59	53.46	0.47
Jun-97	25.47	9.11	55.24	1.20
Jul-97	30.55	11.15	47.16	0.31
Aug-97	32.65	11.51	42.48	0.72
Sep-97	27.20	8.41	50.96	0.27
Mean	17.70	Mean 2.17	Mean 61.78	Total 13.64

Table 5.
National Guard Site 26 Weather Data Summary

2001 Water Year	Average Maximum Temperature	Average Minimum Temperature	Average Relative Humidity	Precipitation
Month/Year	°C	°C	%	Inches
Oct-00	17.77	5.40	64.80	1.97
Nov-00	5.27	-3.49	85.64	0.63
Dec-00	3.07	-3.33	92.32	0.35
Jan-01	1.84	-5.56	90.06	0.55
Feb-01	5.76	-2.53	81.69	0.16
Mar-01	14.50	1.99	66.47	0.87
Apr-01	15.90	2.83	61.22	1.89
May-01	26.96	11.22	34.33	0.35
Jun-01	28.27	13.16	35.00	0.15
Jul-01	31.81	17.98	38.01	0.79
Aug-01	35.11	18.60	27.30	0.00
Sep-01	28.92	12.12	37.58	0.12
Mean	17.93	Mean 5.70	Mean 59.54	Total 7.83

2000 Water Year	Average Maximum Temperature	Average Minimum Temperature	Average Relative Humidity	Precipitation
Month/Year	°C	°C	%	Inches
Oct-99	21.12	4.05	35.90	0.02
Nov-99	14.80	2.52	56.28	0.45
Dec-99	3.76	-3.56	88.43	0.74
Jan-00	5.68	-2.15	88.99	0.83
Feb-00	10.85	1.27	76.07	1.69
Mar-00	13.05	0.76	68.01	1.71
Apr-00	20.11	5.67	55.95	0.56
May-00	22.72	9.60	48.02	0.56
Jun-00	29.32	14.05	31.63	0.06
Jul-00	33.31	18.34	25.59	0.00
Aug-00	33.47	17.59	24.76	0.03
Sep-00	25.69	10.38	44.84	0.61
Mean	19.49	Mean 6.54	Mean 53.71	Total 7.26

1999 Water Year	Average Maximum Temperature	Average Minimum Temperature	Average Relative Humidity	Precipitation
Month/Year	°C	°C	%	Inches
Oct-98	18.59	3.67	50.57	0.27
Nov-98	11.76	1.71	70.88	0.50
Dec-98	4.37	-5.12	73.47	0.95
Jan-99	6.68	-1.74	79.53	0.44
Feb-99	8.05	-1.63	74.31	0.69
Mar-99	13.11	-0.08	58.25	0.37
Apr-99	16.16	2.66	51.72	0.50
May-99	21.16	7.70	42.93	0.90
Jun-99	26.74	13.25	41.39	0.51
Jul-99	32.19	16.51	23.83	0.12
Aug-99	32.14	16.40	32.60	0.19
Sep-99	26.75	9.53	27.59	0.07
Mean	18.14	Mean 5.24	Mean 52.26	Total 5.51

Table 5 continued.
National Guard Site 26 Weather Data Summary

1998 Water Year	Average Maximum Temperature	Average Minimum Temperature	Average Relative Humidity	Precipitation
Month/Year	°C	°C	%	Inches
Oct-97	17.35	5.45	61.32	0.25
Nov-97	11.86	0.24	68.97	0.25
Dec-97	4.58	-4.95	78.38	0.35
Jan-98	8.02	-0.76	79.04	0.87
Feb-98	9.23	-0.45	74.99	0.84
Mar-98	13.11	1.40	64.16	0.74
Apr-98	16.63	3.61	59.43	0.66
May-98	19.40	7.88	66.80	2.43
Jun-98	25.20	10.74	54.93	0.91
Jul-98	35.26	19.35	34.27	0.09
Aug-98	34.36	17.98	27.23	0.10
Sep-98	28.59	13.69	49.73	0.54
Mean	18.63	Mean 6.18	Mean 59.93	Total 8.03

Table 6.
Range 2 Precipitation Data Summary
Christmas Mountain

Month	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
January	-	0.94	0.18	1.07	0.87	1.02	1.08	1.95	1.54	0.72	0.97	-
February	-	0.58	1.18	1.09	0.86	0.56	0.70	0.10	1.31	1.11	1.86	-
March	-	0.53	0.23	2.64	0.21	1.39	1.04	0.20	0.94	0.62	1.93	-
April	-	1.05	0.79	1.16	1.12	0.82	1.44	1.52	0.69	0.49	0.95	-
May	-	1.82	0.00	0.46**	0.70	1.24	0.90	0.48	3.92	0.72	0.62	-
June	0.05	0.80	1.79	0.05***	0.15	1.09	0.13	0.91	1.90	0.49	0.24	-
July	0.22	0.00	0.03	0.47	0.20	2.08	0.15	0.48	0.08	0.08	0.00	-
August	0.16	0.00	0.00	0.29	0.00	0.02	0.00	0.41	0.02	0.04	0.32	-
September	0.04	0.16	0.05	0.00	0.13	0.16	0.20	0.37	0.67	0.01	0.35	-
October	0.29	0.84	0.77	0.74	0.64	0.55	0.65	0.40	0.00	0.11	1.68	-
November	0.56	1.48	1.08	0.10	1.18	1.83	1.05	0.52	0.00	0.61	0.53	-
December	0.93	0.18	0.27	0.45	1.34	1.72	3.14	0.51	0.00	0.60	0.43	-
TOTAL	2.25	8.38	6.37	8.52	7.40	12.48	10.48	7.85	11.07	4.39	9.88	-

UTM 568615/4776293

**5/1/93 – 5/20/93 only

***6/1/93 – 6/30/93 only

**FIELD PLANTING,
DEMONSTRATION AND DISTRICT
SEED INCREASE EVALUATION
SUMMARIES**

PLANT MATERIALS

2001

IDAHO EVALUATION SUMMARIES

FIELD, DSI and DEMONSTRATION PLANTINGS

PLANT MATERIALS PLANTINGS IDAHO DIVISION I

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 indicated 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.

ID99015 Merle Olsen Field Planting – Regar meadow brome/alfalfa. Materials ordered April 9, 1999. Site characteristics – Rubson silt loam soil, 5 percent slopes, south aspect, 1840 feet elevation, 24 inch precipitation zone, non-irrigated, T61N R1E Section 7. FY99 no evaluation. FY00 excellent mixed stand established. FY01 the Regar and alfalfa mixture performed well with good hay quality. This year’s crop had reduced yields due to drought conditions.

ID00008 SCD Field Planting – Sherman big bluegrass. Materials ordered February 23, 2000. FY00 not planted this spring due to dry conditions. Cooperator plans to plant half of fields as dormant fall seeding the fall of 2000 and the other half as early spring seeding in 2001. FY01 the planting failed due to drought conditions - **cancel**.

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 An 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.

FIELD OFFICE: COUER D’ALENE

ID87004 Farragut State Park Multiple Weed Control FY91 Durar sheep fescue is the dominant plant. Hard fescue is present in only one plot. The chemical treatments appear about the same with spotted knapweed in all plots. Tansy mustard has not invaded plots. FY93 From trip report, the most effective herbicide rate was 0.5 lbs/ac Picloram. Durar, Manchar, Rubens, Tegmar, Covar, Paiute and Drummond were competing the best with spotted knapweed. On nearby native site Idaho fescue was doing very well competing with spotted knapweed when sprayed with 0.5 Lbs/ac Picloram and then fertilized. **This trial was canceled - keep this report active with no evaluations.**

FIELD OFFICE: PLUMMER

None

FIELD OFFICE: SANDPOINT

ID96029 Lee Johnson wood fiber mulch, Niner sideoats grama, Alma blue grama, annual rye, Durar hard fescue, Durar hard fescue/clover, prairie junegrass, and alpine bluegrass field plantings - tree nursery ground cover trial. Site loam soil (low to mod. permeability/high erosion potential), 5-10% slopes on SE exposure. FY96 planted 5/31/96. 1. Wood mulch is doing excellent job of weed control and no rodent activity to date - mulch was about 10 inches deep when applied 2. Excellent stand of annual rye established, Durar hard fescue plants are very small and establishing beneath cover crop 3. Many young Durar hard fescue plants were establishing, but very few clover plants - soil may have been too loose when seeded and clover seed may be too deep 4. Excellent initial stand of sideoats and blue grama establishing - could not tell which species was doing the best 5. Very few prairie junegrass plants establishing - appears some germination is occurring this fall 6. A lot of alpine bluegrass seedlings - appears germination did not occur until fall. FY97 and FY98 no evaluations. FY99 Treatment 1: Control no cover and normal weed control - 0 percent desirable cover with 50-80 weeds. Treatment 2: Cedar bark mulch 6-8 inches thick - 100 percent desirable cover in rows with 5 percent weeds invading mulch and some evidence of rodents in mulch. Trees near cedar mulch are more chlorotic than other treatments. Treatment 3: Durar hard fescue and annual ryegrass - 50-70 percent desirable cover with up to 20 percent weeds. Fescue blends provide more biomass than other seedings and good cover - almost 100 percent cover if mowed. Treatment 4: Durar hard fescue and Berseem annual clover - 60-80 percent desirable cover and up to 15 percent weeds. Treatment 5: blue grama and sideoats grama - 20-50 percent desirable cover with 30-80 percent weeds. Clearly the worst treatment in trial. Treatment 6: Prairie junegrass - 60-80 percent desirable cover and 10-15 percent weeds. A good alternative since this is a low growing cover. Treatment 7: Alpine bluegrass - 50-80 percent cover with 5-10 percent weeds. Less biomass produced than fescue or prairie junegrass. The alpine bluegrass produced more of a thick sod with seedheads 6-8 inches tall. This would be a better choice for nurseries that are concerned with the shading effect of taller grasses on lower branches. It also covers the ground better once established, especially in shady areas. One potential problem is it's ability to spread, including into the tree rows. FY00 and FY01 no evaluations.

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

IDAHO DIVISION II

FIELD OFFICE: GRANGEVILLE

ID01009 Cooperator Unknown Riparian Forest Buffer Field Planting. Serviceberry - Kendrick accession, Serviceberry - Okanogan accession, and Blanchard blue elderberry. Plants ordered May 3, 2001. FY01 no evaluation.

ID02002 Teresa Selaske Forest Field Planting. Lind Douglas fir (50 plants) and Yakima Douglas fir (13 planting) ordered July 16, 2001. Planting scheduled for March-April 2002.

ID02003 Dan Raduckovich Forest Field Planting. Lind Douglas fir (50 plants) and Yakima Douglas fir (12 planting) ordered July 16, 2001. Planting scheduled for March-April 2002.

FIELD OFFICE: LEWISTON

ID82001 Galin Buchanon 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. **Next field evaluation will be FY04.**

ID86007 Hellsgate field planting - adaptation. FY92 Rush 50%, Oahe 70%, Luna 60%, Ephraim 20%, Magnar 30%, Secar 10%, Alkar 70% and P27 50% survival. FY93 in very heavy cheatgrass infested area Nordan 10% Rush 40%, Oahe 20%, Luna 24%, Rosana 30%, Magnar 15%, Secar 20% and P27 10% survival. Rush and Luna appear to be the best species. FY94 Rush int. wheatgrass is the most vigorous followed closely by Luna pubescent wheatgrass. Magnar plants are the largest. Rodents have utilized all Secar plants and a few plants of Ephraim, Nordan, P-27, Sherman, and Rosana. The accessions that have failed include Goldar, Paiute, Delar, Appar, Bandera, Nezpar and Tualatin. Cheatgrass continues to dominate site. FY95 50% survival of Rush and Rosana; 30% survival Oahe, Luna, Magnar;

20% survival Secar; 10% survival Ephraim, P27 and Sherman. Failed species include Tualatin, Nezpar, Bandera, Appar, Durar, Delar, Paiute, and T2950-Goldar. Intermediate types are doing the best. Rush and Rosana have spread the most. Alkar has extensive die-out. Cheatgrass continues to dominate site. FY96, and FY97 no evaluations. FY98 survival/comments: Oahe 50% erratic 10-12 feet spread in some areas to dead in others; Magnar 70% some seedlings and plants are very vigorous with few weeds between plants; Rush 75% spreading vegetatively 12-14 feet wide and uniform; Rosana 60% spreading vegetatively 20-30 feet wide and spotty with many weeds; Luna 70% spreading vegetatively up to 12 feet wide and a few bare areas; and Secar 10% widely scattered plants with good vigor. 1 to 3 plants of Nordan, Ephraim, and P-27 found. All other plots are dead. FY99 through FY01 no evaluations.

ID95018 Lewiston Veterans Home willow planting. Cuttings ordered 2/95. FY95 Aberdeen willows: White willow-good vigor/slight insect damage; Laurel willow good vigor/slight insect damage; Geyer willow fair vigor/moderate insect damage; Meeker willows: 825 booth willow poor vigor/leafed out only 20% of length, 826 booth willow poor vigor/leafed out only 30% of length, 835 yellow willow good vigor/moderate insect damage, 767 subalpine willow poor vigor/top growth died sprouting from base, 833 whiplash willow fair vigor, 834 yellow willow fair vigor/sprouting at base, 836 Scouler willow fair vigor/slight insect damage. 822, 827, 819, 820, 766, 837, 848 all died. FY96 100% survival for Laurel 3/3, 836 SASC 1/1, 834 SALU 1/1, 833 SALA 1/1, 835 SALU 1/1, SAAL White 1/1. FY97 no evaluations. FY98 100% survival Laurel, White, 836, 834, 833, Geyer, 835. Laurel has best color, height, and least insect damage. FY99 and FY00 no evaluation. FY01 Laurel willow has stripped bark and is sprouting from base. Whiplash willows are dead. White and Coyote willows are doing well and are spreading. Recommend this planting be **canceled**.

ID95028 Dau Bannock thickspike wheatgrass and Rush intermediate wheatgrass field planting. Seed ordered 4/3/95. FY95, FY96, FY97, FY98 and FY99 no evaluations. FY00 40 plants per foot squared of Rush intermediate wheatgrass. Bannock thickspike wheatgrass failed. FY01 40 seedheads per foot squared, 4.5 feet tall, 3000 pounds per acre, estimate 500 pounds per acre seed production and stand is weed free. **Next field evaluation will be FY04.**

ID96009 Dau Rush intermediate wheatgrass, Luna pubescent wheatgrass, and Bozoisky Russian wildrye field planting (3 individual plantings) for star thistle control. Seed ordered 12/8/95. FY96, FY97, FY98 and FY99 no evaluations. FY00 excellent stand with 40 reproductive stems per square foot. Excellent vigor, ability to spread, erosion control, and forage production producing 3000 pounds per acre. Producer is very pleased with performance and plans to establish additional plantings. FY01 no evaluation. **Next field evaluation will be FY04.**

ID98007A Mike Miller willow planting. Aberdeen willows (Laurel, White, Streamco, Coyote, Geyer) and Meeker willows (Coyote, Yellow 3 accessions, Scouler, Whiplash 2 accessions, Booth 3 accessions, Drummond 3 accessions, Geyer 2 accessions) and Pullman shrubs (Dogwood 3 accessions). Materials ordered 2/9/98. FY98 survival Meeker willows 832 10/10, 823 10/10, 820 9/10, 826 9/10, 826 9/10, 847 7/10, 834 7/10, 827 10/10, 835 6/10, 825 10/10, 828 7/10, 822 0/10, 829 5/10, 819 ?/10. Survival of Pullman dogwoods 740 3/5, 733 5/5, 739 5/5. FY99 no evaluation. FY00 80 percent survival of 820 Pacific willow (local standard). 20 percent survival of 827 Booth willow, 828 Drummond willow, 822 Geyer willow, 829 Drummond willow and 834 Yellow willow. 10 percent survival of 832 Geyer willow. 823 Coyote willow, 826 Booth willow, 847 Drummond willow, 825 Yellow willow, 819 Yellow willow, 739 dogwood, 733 dogwood, 740 dogwood, and 835 Yellow willow failed. Competition, insects and browse damage are factors affecting survival. FY01 survival 822 Geyer 10%, 828 Drummond failed, 825 Yellow 10%, 829 Drummond 10%, 820 Pacific 80% (all died back to base – sprouting about 3 feet high this years growth), 823 Sandbar failed, 832 Geyer 20%, 826 Booth 10%, 847 Drummond failed, and 827 Booth 50%. **Next field evaluation will be FY03.**

ID98007B Ed and Maxine Larson willow and dogwood planting. FY99 and FY00 no evaluations. FY01 Superior accessions are Laurel willow, which is now 15-18 feet tall with good density and being utilized for cuttings to plant on other areas of the property; Sandbar willow 9024823, which is 4-5 feet tall, spreading and competing well with other vegetation. Accessions that failed include 9024825 Booth willow, 9024826 Booth willow, 9024827 Booth willow, Streambank willow, Aberdeen Geyer willow, Aberdeen Coyote willow, and 9023740 redosier dogwood.

ID98007C Modie Park willow planting. FY99 100% survival – Booths826, Booths827, and Pacific820; 70% survival sandbar823 and Dummond829; 60% survival dogwood; 33% survival Booth825; 30% survival Geyer822 and Drummond828; 20% survival Geyer832; 14% survival Dummond847; 10% survival yellow835; 0% survival-failed yellow819 and yellow834. Site is heavily overgrown with blackberries, cattails, rush and quackgrass. West side of creek was mowed resulting in severe willow damage. Most promising willows were yellow 9024835, sandbar 9024823,

Drummond 9024829 and Booth 9024826/9024827. Geyer 9024832 has glaucous stems and undersides of leaves and may be Drummond. **Next field evaluation will be FY03.**

ID98007E Victor Thulon willow planting. Aberdeen willows (Laurel, White, Streamco, Coyote, Geyer) and Meeker willows (Coyote, Yellow 3 accessions, Scouler, Whiplash 2 accessions, Booth 3 accessions, Drummond 3 accessions, Geyer 2 accessions) and Pullman shrubs (Dogwood 3 accessions). Materials ordered 2/9/98. FY99 no evaluation. FY00 site is heavily infested with reed canarygrass. Meeker willows: 40% survival 827 Booth willow; 30 percent survival 835 Yellow willow and 834 Yellow willow; 20% survival 825 Booth willow; and 10 percent survival 832 Geyer willow and 822 Geyer willow. Aberdeen willows: 80 percent survival Laurel willow and White willow; 40 percent survival Streamco willow; and 30 percent survival Coyote willow. All other materials failed. FY01 Aberdeen willow survival Laurel 70% (best overall), White 70%, Streamco 30%, Coyote 30%. Meeker willow survival 835 Yellow 30%, 832 Geyer 10%, 825 Booth 10%, 827 Booth 40%, 822 Geyer 10%, and 834 Yellow 30%. **Next field evaluation will be FY03.**

ID98016 Fred Kaufman Hycrest crested wheatgrass, and Vavilov Siberian wheatgrass field planting. FY98 and FY99 no evaluations. FY00 excellent stands of Hycrest and Vavilov established. **Next field evaluation will be FY03.**

ID99008 Craig Mountain (IDFG) field planting. Species include white willow, Streamco willow, Coyote willow, Geyer willow 435, Geyer willow 448, Geyer willow 483, Geyer willow 491, Snowberry, Elderberry, Dogwood 733, and Dogwood 740. FY99 Area planted is heavily dominated by native sedges. Cuttings were planted 1.25 to 2 feet deep into good perennial moisture. Failure is probably due to severe competition. Streamco, Coyote, and White willows failed. 9067483 Geyer willow 80 percent survival with fair vigor. 9067448 Geyer willow 50 percent survival with poor vigor. 9067435 Geyer willow 100 percent survival with fair vigor. 9067491 Geyer willow 85 percent survival with poor vigor. 9023733 dogwood 5 percent survival with very poor vigor. 9023740 dogwood 5 percent survival with fair to poor vigor. FY00 no evaluation. FY01 willow survival – 483 Geyer 50%, Streamco failed, 448 Geyer 55%, Coyote failed, 435 Geyer 85%, and 491 Geyer 60%. **Next field evaluation will be FY03.**

ID01005 Greg Zenner field planting. Three acres each of Topar pubescent wheatgrass, Tegmar intermediate wheatgrass, Rush intermediate wheatgrass, Regar meadow brome, and Manchar smooth brome. Purpose – starthistle competition trial. Site characteristics: MLRA B9, Kettenback-Gwin silt loam soil with stony modifier, south aspect, 1200 feet elevation, 16-18 inch rainfall, T36N R4W NE1/4 Section 12. Seed shipped March 2001. FY01 not seeded.

FIELD OFFICE: MOSCOW

None

FIELD OFFICE: NEZPERCE

None

FIELD OFFICE: OROFINO

ID99010 Cooperator Unknown field planting. Species include Coyote willow, Geyer 435 willow, Geyer 448 willow, Geyer 483 willow, Geyer 491 willow, Snowberry, Elderberry, Dogwood 733, Dogwood 740, and Chokecherry. FY99 and FY00 and FY01 no evaluations.

IDAHO DIVISION III

FIELD OFFICE: CALDWELL

ID98021 Bill Baird Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, tall wheatgrass field planting - saline bottom. Seed ordered May 14, 1998. Planting scheduled for Nov. 1998. FY99 cooperater has not planted site due to droughty conditions and he wants to give seeding best opportunity possible when he plants. FY00 and FY01 no evaluations.

ID98022 Bill Baird Rush intermediate wheatgrass and orchardgrass field planting - irrigated pasture. Seed ordered May 14, 1998. Planting scheduled for mid May through mid June. FY98 irrigated pasture planted in mid May with poor stand establishing. Bill plans to replant in spring of 1999. FY99 good stand density establishing with 5 plants per foot squared and fair vigor. Plants reached 6-8 inch height this establishment year. Nitrogen, phosphorus, potassium,

and sulfur were applied. This is a very coarse-gravelly soil requiring irrigation every 4-5 days. FY00 and FY01 no evaluations.

ID99006 Jacy Gibbs-cooperator will complete evaluations for demo plots. Site characteristics: very warm dry summers, Cencove fine sandy loam soil, 0-2 percent slopes, about 2200 feet elevation, 8-10 inch precipitation, T3N R5W NE1/4 Section 10. Seed ordered February 24, 1999. Aberdeen accessions: Bannock thickspike wheatgrass, Sodar streambank wheatgrass, Goldar bluebunch wheatgrass, Appar blue flax, Magnar basin wildrye, Nezpar Indian ricegrass, Richfield Selection firecracker penstemon, Clearwater Selection alpine penstemon, Snake River Plain fourwing saltbush. Bridger accessions: Trailhead basin wildrye, Rimrock Indian ricegrass, M1 Nevada bluegrass, PI434231 plains bluegrass, 9005460 alpine bluegrass, 9078408 High Plains Sandberg bluegrass, Shoshone beardless wildrye, 9019219 bottlebrush squirreltail, Critana thickspike wheatgrass, Wytana fourwing saltbush. Meeker accessions: Summit Louisiana sagewort, Timp Utah sweetvetch, Bandera Rocky Mountain penstemon, 9040187-bottlebrush squirreltail, 9040189 bottlebrush squirreltail, 9043501 Salina wildrye, Maybell antelope bitterbrush. Pullman accessions Secar Snake River wheatgrass, Covar sheep fescue, Canbar Canby bluegrass, Sherman big bluegrass, Whitmar beardless wheatgrass, and Schwendimar thickspike wheatgrass. FY99 no evaluation. FY00 Nezpar has excellent seedling vigor, easy to transplant, remains green, and is an attractive landscape plant. Schwendimar is best thickspike wheatgrass, remains green longer, best regrowth, responds well after mowing, good dryland and limit irrigation. Goldar and Whitman stands are very poor due to cheatgrass competition. Basin wildrye, Sherman, Secar mix good weed competition. Basin wildrye, Sherman, Covar, Secar are all good landscape plants. Using Covar along one side of property for firebreak – it will be excellent. Penstemon species are very slow growing, remain green and will be good landscape plants. Appar can be a nuisance and is not very shade tolerant. Maybell is slow growing. Timp is a preferred species by rabbits resulting in difficulty establishing stand. Summary of best plants – Grasses: Secar Snake River wheatgrass, Magnar basin wildrye, Sherman big bluegrass, Nezpar Indian ricegrass, Covar sheep fescue, sand dropseed, Bannock thickspike wheatgrass, and Schwendimar thickspike wheatgrass. Forbs: western yarrow, Drummond phlox, white evening primrose, scarlet globemallow, silky lupine, Louisiana sagewort, Rocky Mountain iris, and Appar blue flax. Shrubs: native fourwing saltbush, native basin big sagebrush, Maybell bitterbrush, curlleaf mountain mahogany, Saskatoon serviceberry, Woods rose, almond, and Drummond willow. Trees: Idaho hybrid poplar, and Rocky Mountain juniper. FY01 no evaluation.

ID02001 CB River Springs Ranch WRP field planting. Vavilov Siberian wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Northern Cold Desert winterfat, and Snake River Plain fourwing saltbush. Seed ordered 3/26/01 for shipment in early March 2002. Site characteristics: Felthom fine sandy loam soil, 3-12 percent slopes, NE aspect, 2100 feet elevation, 11 inch rainfall, cheatgrass community to be sprayed 2-3 times (spring and fall 2001) prior to early spring (2002) interseeder planting.

FIELD OFFICE: EMMETT

ID02_____ Little Farms Rush intermediate wheatgrass, Vavilov Siberian wheatgrass, Covar sheep fescue, and Sodar streambank wheatgrass critical area planting. Seed ordered December 14, 1998 for delivery about August 1, 1999. FY02 seed transferred to Little Farms.

FIELD OFFICE: MARSING/GRANDVIEW

ID85043 Delamar Mine Multiple species Critical Area Treatment - Mine spoils evaluations through 1989. FY93 no evaluation. FY94 Plots were difficult to locate. The intermediate wheatgrasses and fescues were performing the best on the mine spoils. Areas with 12 inches or more topsoil over spoil material supported a good stand (nearly 100% cover) of intermediate wheatgrass. Areas with less topsoil, Durar hard fescue was doing better than other grasses. This fescue on deeper sites was very effective in filling in the interspaces between wheatgrasses. All shrubs planted were failures. Native shrubs moving into sites included western juniper, snowbrush ceanothus, bittercherry, and curlleaf mountain mahogany. These shrubs should be propagated locally and could include rocky mountain juniper in replacement of western juniper for on-site applications. The recommended seed mix includes: Luna pubescent wheatgrass 8 lbs/ac, Tegmar intermediate wheatgrass 8 lbs/ac, Covar sheep fescue or Durar hard fescue 2 lbs/ac, Appar blue flax 1 lbs/ac, Yellow sweetclover 1 lbs/ac = 20 lbs/acre total. It was also recommended that fertilizer and lime be applied based on specific soil tests. In addition, straw mulching at 1000-1500 lbs/ac, crimped with cat cleats should be applied to enhance site conditions to establish seeding. It was determined that these seeding trials have completed their usefulness and should be closed out. **This field trial is cancelled. Maintain this record, but no additional evaluations will be performed.**

FIELD OFFICE: MERIDIAN

ID99001 Brad Little Field Planting - Oust Herbicide Study 1) introduced species field plantings: CD-II (Hycrest II) crested wheatgrass, Hycrest crested wheatgrass, P27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, and Luna pubescent wheatgrass; 2) native species mix 1 - Goldar bluebunch wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass, and Wytana fourwing saltbush; native species mix 2 - Goldar bluebunch wheatgrass, Critana thickspike wheatgrass, Trailhead basin wildrye, Rimrock Indian ricegrass, and Wytana fourwing saltbush. Seed ordered September 24, 1998. Oust herbicide was applied at 3 rates (0.75, 1.0, and 1.25 ounces per acre) in the fall of 1997 to control cheatgrass, medusahead wildrye, and other annual weeds. Following one full growing season, the eight plantings will be seeded in late fall 1998. FY99 The Oust treatments controlled annual weeds very well with .75 oz per acre rate leaving most perennial grasses and forbs alive, at 1.25 oz per acre most grasses and forbs were eliminated. Planted in December 1998. The drill seeding looked very good when completed. All plantings are establishing poorly due to very cool spring temperatures, severe growing season drought (March through October), and very heavy grasshopper infestations. Plantings can be rowed in several areas, but grasshoppers have stripped all leaves so survival can not be determined. Some seed may not have germinated this year. FY00 this is second year of extremely dry conditions and heavy infestation of grasshoppers. It appears that no new germination occurred this year. Grasses established in 1999 came up with good vigor. Hot temperatures and no rain have resulted in plant health and vigor to be very poor. Grasshoppers have cleaned site of all growth. Overall the seedings are very poor. FY01 Study 1 (introduced species) – this was the third year of droughty conditions with spring precipitation less than 50 percent of normal. A few assorted locations had fairly good plant growth, but overall most stands are failures. Heavy cheatgrass and medusahead stands have reinvaded the site. The Oust herbicide treatment was a success; it does knock out the annuals and allows native perennials to express themselves. Sandberg bluegrass and bottlebrush squirreltail increased in size and vigor following the Oust applications. Seeded species would have had an excellent chance of establishing had spring rainfall been more cooperative and grasshopper infestation not occurred. Study 2 (native species) – same comments as above. This planting is **cancelled**.

ID00010 Rick Roe willow field planting. 25 cuttings each of 9067476 Coyote willow (50), 9067482 Booth willow, 9067544 Drummond willow, 9067477 Yellow willow, 9067475 Yellow willow, and 9067546 Peachleaf willow were ordered on March 1, 2000 for shipment April 10, 2000. FY00 cuttings were planted to good season-long moisture and growth is excellent. 80 percent survival and good vigor of all accessions. Coyote willow is 24 inches tall, Booth willow is 48 inches tall, Drummond willow is 60 inches tall, Yellow willow is 36 inches tall, and Peachleaf willow is 60 inches tall. FY01 all willows have 70% stand, are healthy, vigorous and competing well with weedy species. Height - 476 Coyote willow 3-8 feet tall, 546 Peachleaf willow 5-8 feet tall, 477 Yellow willow 5-8 feet tall, 482 Booth willow 4 feet tall, and 544 Drummond willow 10 feet tall.

ID02004 Brad Little Field Planting – BASF Plateau Herbicide Study – Seeding Trial.

Herbicide Treatment 1 – Burn + Herbicide (control – 2 ounce – 4 ounce rates). Herbicide Treatment 2 – Non-burn + Herbicide (control - 2 ounce – 4 ounce – 6 ounce – 8 ounce – 10 ounce – 12 ounce rates). Seeding Treatments – Alfalfa and Snake River Plains Germplasm fourwing saltbush will be mixed with each of the following rangeland forage grass species: Rush intermediate wheatgrass, Luna pubescent wheatgrass, Hycrest crested wheatgrass, CD-II crested wheatgrass, Vavilov Siberian wheatgrass, P27 Siberian wheatgrass, Bozoiisky Select Russian wildrye, Mankota Russian wildrye, and Covar sheep fescue. Each treatment (herbicide rate – seed mix) will cover 0.12 acres in 48x110 foot plots. Seed ordered September 18, 2001 for shipment by October 12, 2001. Herbicide treatments and seeding planned for November 2001 during dormant growth period. Site characteristics – MLRA B10, silt loam to sandy loam soil, 2-6 percent slopes, east southeast aspect, 2900-3000 feet elevation, 11-12 inch precipitation zone, non-irrigated, T5N R1N SW1/4 of SW1/4 of Section 5.

FIELD OFFICE: MOUNTAIN HOME

ID00017 Ted Hoffman-Idaho Department of Lands Species and Planting Method Demonstration for cheatgrass-medusahead wildrye control – rangeland rehabilitation. Four planting methods including conventional tillage with double disc drill, grain drill with sweeps, Idaho Fish and Game interseeder, and Idaho Department of Lands or BLM rangeland seeder will be demonstrated. Ten species – species mixes including Luna pubescent wheatgrass, Rush intermediate wheatgrass, Hycrest crested wheatgrass, Nordan crested wheatgrass, Vavilov Siberian wheatgrass, Bozoiisky Russian wildrye, Bozoiisky/Vavilov mix, Cereal Rye, Secar Snake River wheatgrass/Bannock thickspike wheatgrass/fourwing saltbush mix, and Secar Snake River wheatgrass/Bannock thickspike wheatgrass/Immigrant forage kochia mix will be cross planted over planting methods. Site characteristics include MLRA B11, Chilcott-Elijah silt loam soil, 0-12 percent slopes, south exposure, 3480 feet elevation, 10-12 inch rainfall zone, non-irrigated, T2S

R6E SE1/4 of SE1/4 of Section 16. FY01 planting completed November 2001. The conventional tillage section was not completed and was replaced with a no-till operation. Little to no emergence occurred in 2001 due to extreme drought conditions, the evaluation next year will determine if planting was a success or failure.

FIELD OFFICE: PAYETTE

None

FIELD OFFICE: SOUTH WEST IDAHO RC&D

None

FIELD OFFICE: WEISER

ID91029 Grafe Bannock and Critana thickspike wheatgrass field planting. Site is a sandy loam soil, non-irrigated, 12-14 inch ppt, 2500 feet elevation, and 4-8% slopes on west exposure. FY92 estimate 20% stand. FY93 survival is 90% for both species. The existing plants are healthy and holding their own with competition. Neither species is as vigorous as Oahe on same sites. FY94 survival is 95% for each species, good stands, and excellent vigor. This trial continues to improve, the stands are spreading and filling in open ground. Both species appear well adapted to site even considering the extended drought conditions. Total forage production is less than adjacent intermediate wheatgrass, but is more palatable. Plants are producing seed this year. The stands are starting to provide competition for annual weeds, grasses and cereal rye. I am now starting to see the value of these plants on some of our most droughty and limiting sites. FY95 Good stands for both Bannock and Critana (95% survival). Both species continue to improve over time. Cereal rye is not affecting growth. Neither thickspike wheatgrass is producing as well as Oahe intermediate wheatgrass. Both species would fit well with similar palatability grasses in mixture (suggest Goldar or Secar bluebunch wheatgrass). FY96 good stands of both with 6 plants/ft² of each and excellent vigor. Growth of both species is still very good and weed competition is light. Total production continues to be less than adjacent intermediate wheatgrass. FY97 good stands (5 plants per foot), survival, and vigor for both Bannock and Critana. Growth and vigor for both does not reflect the excellent moisture year we had and stands are maintaining or declining slightly. FY98 no evaluation. FY99 good stands of both species with 90 percent survival and good vigor. Producing between 500 and 1000 pounds per acre in an extremely dry April through November year. Bannock is slightly taller at 18 inches than Critana at 16 inches. Heavy grasshopper damage this year. Cheatgrass invasion is slight. FY00 no evaluation. FY01 stands of both Bannock and Critana were rated poor, with 1 plant per square foot, fair vigor and 200 pounds of production per acre. Two years of drought has heavily impacted this planting and cheatgrass is invading. **Next evaluation scheduled for FY03.**

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 wildrye, thickspike wheatgrass and intermediate wheatgrass accessions 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 wildrye accessions 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. **Next evaluation will be spring 2002.**

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

ID95038 Skow Rush intermediate wheatgrass field planting. Site is sandy loam soil, irrigated, 2320 feet elevation, and 2-4% slopes on north to northwest exposure. Seed ordered May 1995. FY95 seeding planned for spring of 1996. FY96 this seeding was not installed because site was inundated past recommended seeding dates. Planting location will be changed and seeded next year. FY97 planted early spring 1997. Excellent stand is establishing with 7-8 plants per foot squared and excellent vigor. Landowner sprayed in early summer for broadleaf weeds. This should turn out to be an excellent grazing trial. FY98 excellent stand and vigor. Estimate yield to be 5000 to 5500 pounds per acre or 3 to 3.5 AUMs per acre. FY99 good stand with 95 percent survival and excellent vigor. Production was 3500 to 4000 pounds per acre. Cattle preferred this seeding to tall fescue in adjacent field. Next evaluation will be FY2002. FY01 fair stand of Rush intermediate wheatgrass with fair vigor and about 500 pounds of production per acre following two years of extremely dry conditions. This field was grazed in conjunction with a tall fescue field and grazing preference was for Rush.

ID96024 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.

ID97023 Schwenkfelder Rush intermediate wheatgrass District Seed Increase. Site is silty clay loam soil, 14-16 inch ppt, irrigated, 2700 feet elevation, 0-2% slopes, and north exposure, T15N R2W SW1/4 NE1/4 Section 16. Seed ordered March 24, 1997. FY97 spring planted May 29, 1997 into excellent firm seedbed. By July 3, 1997 adequate rain had occurred for good germination so no irrigation was required. There were still a few seedlings emerging on this date. Cooperator plans to spray for broadleaf weeds and will fertilize this fall to prepare for seed production. FY98 excellent stand and vigor with plants averaging 60 to 72 inches in height on June 23 with seedheads up to 15 inches long. Harvested in mid August with 550 to 600 pounds per acre estimated yield. Baled forage yield was 7000 to 8000 pounds per acre. The hay is fed to range cattle early in the feeding season and utilize it readily. FY99 produced 300 lbs/ac seed this year. Producer is very happy with production and utilizes residue to feed beef cows. Hay yield was about 3 tons per acre. Producer fertilized with 43-lbs/ac nitrogen and 104-lbs/ac phosphorus in late October 1999. FY00 no evaluation. FY01 producer decided to graze this field this year due to drought and reduced seedhead production. Vigor was reduced because of drought.

ID98019 Royce Schwenkfelder Bannock thickspike wheatgrass District Seed Increase. Seed ordered March 16, 1998 for April delivery. FY98 because of spring rains, this seeding did not go in until mid June. Seedbed preparation was excellent, but only 20 percent of plants emerged due to soil crusting. Additional seed was obtained and this seeding will be replanted. FY99 producer plans to plant spring 2000. FY00 no evaluation. FY01 producer has not planted due to severe drought conditions the past two years.

ID00001 Henry Green Field Planting – Native mix Secar Snake River wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, winterfat, fourwing saltbush, Wyoming big sagebrush. Site is Baldock silt loam soil, 10-12 inch precipitation, 2180 feet elevation, 1-percent slope, SW exposure, T10 and 11N R4W Sections 3 and 34. Seed ordered (Bannock and Magnar) on 10-6-99. FY00 seeded October 27, 1999 into very dry soft seedbed. It rained .2 inches the night of seeding and weather was been mild until early December. Winterfat still had fluff on seed so it was broadcast ahead of drill. Half of sagebrush and all of fourwing saltbush seed were mixed with grass and drilled – the other half of sagebrush will be broadcast later this winter onto snow. FY00 unable to get good evaluation this year due to droughty conditions. FY01 this is the second year of extreme drought conditions that are severely impacting plant development. Competition from annual weeds is heavy. Not enough plants to give a good evaluation.

IDAHO DIVISION IV

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

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.

ID96028 East Cassia SCD Hycrest crested wheatgrass, Sodar streambank wheatgrass, Bannock thickspike wheatgrass, and Appar blue flax field planting and Hycrest II (CD-II) crested wheatgrass, Sodar, Bannock, and Appar field planting. FY96 planting planned for fall of 1996. FY97 no evaluation. FY98 fair stand of all species except Appar, which failed. FY99 poor stands of Hycrest, CDII, and Flax. Bannock and Sodar failed. Crested wheatgrass can be rowed in very heavy stands of cheatgrass. FY00 fair stand of Hycrest and CD-II, poor stand of Bannock, and Sodar and Appar failed. Both Hycrest and CD-II are thickening up and starting to crowd out cheatgrass. Some Bannock is present, but Sodar and Appar were not observed. FY01 no evaluation.

ID96045 Bill and Rod Jones Saline Soil Demonstration. Greasewood plowed out in the spring 1995, summer fallowed, deep ripped at about 18 inches in fall, disked and packed prior to seeding. Site 1: Field 11 soil pH 8-8.5 (16 mmhos), 10-12 inch ppt. Rush intermediate wheatgrass planted 11/24/95. Site 2: Fields 9 and 10 soil pH 8-8.5 (14 mmhos), 10-12 inch ppt. Bozoisky Russian wildrye, Luna pubescent wheatgrass, Hycrest crested wheatgrass, Rush intermediate wheatgrass and Travois alfalfa seeded 11/26/95. FY97 (May 5/28/97) - the mix is looking much better than the Rush only planting. Bozoisky is establishing the best with Hycrest and Rush about equal in stand. Travois failed due to heavy rabbit use the establishment year. Site 1: (July 7, 1997) very good growth and vigor for Rush since earlier observation with 1300 lbs/ac dry matter clipped. Site 2: (July 11, 1997) clipped 1220 lbs/ac dry matter with Hycrest accounting for 40%, Rush and Luna 30%, Bozoisky 10%, alfalfa <1% and weeds 20%. Site has received excellent rain this year. FY98 Site 2: excellent stand of Hycrest and good stand of Bozoisky, Luna, and Rush. FY99 Site 1 Good to excellent stand and vigor with Bozoisky 60% of stand, Hycrest 35% of stand, Rush 3% of stand, Luna 1% of stand, and no alfalfa. Producing about 1400 pounds per acre. Site 2 fair stand and vigor. Producing about 500 pounds per acre. FY00 site was grazed heavily this spring and no rain during summer resulted in little regrowth. Bozoisky and Hycrest are predominant with Bozoisky 10 percent of stand and Hycrest 40 percent of stand. Very little Rush and no Luna or Trevois were observed. FY01 due to severe drought conditions, this planting is suffering. Only a few Rush plants were identified in deeper soil locations. This planting is now a failure. The mixture planting inspection indicated that only Bozoisky is surviving with 30-40 inch height in deeper soils and areas that received additional runoff and 20 inch height throughout field. Dead plants are evident throughout field. Site was not grazed this year.

Cancel

ID97004 R. Manning Field plantings/Pivot Corners (four plantings) 1. Goldar, Bannock, P27 and Magnar; 2. Secar, Schwendimar, Vavilov and Trailhead; 3. Hycrest; 4. CD-II (Hycrest II). Sites are silt loam soil, non-irrigated, 11-inch ppt, 4500 feet elevation, 2% slopes on west exposure. Seed ordered 10/17/96. FY97 Plantings 1 and 2 nothing visible; Planting 3 Hycrest - can row grass (2+ plants/ft²), no seedhead production this year; Planting 4 CD-II - can row grass (2+ Plants/ft²), no seedhead production this year. FY98 Planting 3 Hycrest poor spotty stand (2 plants per foot²) with quackgrass and Canada thistle competition. Planting 4 Hycrest II fair stand (4 plants per foot²) with many weeds present. FY99 plantings 1 and 2 were plowed out due to failure. Planting 3 has good stand and vigor with 1400 pounds per acre production. Planting 4 was grazed too hard to evaluate. FY00 Plantings were grazed too heavily to evaluate stands. FY01 land sold – planting **canceled**.

ID97005 Hawker Field planting for medusahead wildrye control. Sherman big bluegrass, Covar sheep fescue and Garnet (905308) mountain brome. Site is very stony loam soil, non-irrigated, 14 inch ppt, 5800 feet elevation, 4% slope on south exposure. Seed ordered 10/17/96. FY97 new seeding and difficult to determine establishment. FY98 good stand of Sherman and Covar establishing and fair stand of mountain brome establishing. FY99 due to severe grasshopper population, it is impossible to determine stand composition. FY00 due to drought planted species were not found – evaluate in spring 2001. FY01 site was heavily grazed early this year and no regrowth occurred.

ID97006 Gary Jones Field planting of Garrison creeping foxtail. Site is silt loam soil, irrigated, 5000 feet elevation, 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 cooperators were satisfied with yield given the droughty conditions.

ID98005 Gary Steed Aberdeen willows - Laurel, Geyer, Streamco, White, and Coyote. Materials ordered 2/9/98. FY98 survival/height – Streamco 95%/1 foot; Geyer 100%/4 feet; Laurel 60%/2 feet; White 90%/4 feet; Coyote 85%/1.5 feet. FY99 management of this project is poor. Cattle are grazing planting area and there is a severe weed problem. The willows are very durable and most of them are still alive. FY00 Laurel, White, Coyote, and Streamco willow have best survival and plant vigor. Plants inside fence are not grazed, but those on south end are grazed heavily. FY01 White willows 50% survival, good vigor and 36-inch height. Coyote willow 60% survival, excellent vigor and 60-inch height. White willows 30% survival, excellent vigor and 48-inch height. Geyer willow 10% survival good vigor and 36 inch height. This farm has been sold – planting **canceled**.

ID00002 Clark Ward Field Planting (Critical Area Treatment) – Vavilov Siberian wheatgrass, Ephraim crested wheatgrass, and Tegmar intermediate wheatgrass. Site is a silt loam soil, 2-4 percent slope, NE exposure, 4680 feet elevation, 8-10 inch precipitation, non-irrigated, T1S R24 & 25E Sections 25 and 30. Seed ordered 10-6-99. Planting will be broadcast and raked about Nov. 1, 1999. FY00 site could not be accessed. FY01 this planting was part of a 319-stream restoration project. It has been very successful with native shrub recovery excellent making evaluation of planted materials very difficult. Planting should be considered a success, but **canceled** due to difficulty in evaluation of materials.

ID00009A Warren Yadon willow field planting. 9067561 Lemmon willow (12), 9067548 Drummond willow (12), 9067436 Yellow willow (12), 9067375 Peachleaf willow (15), and 9067376 Peachleaf willow (14) were ordered on March 1, 2000 for shipment April 10, 2000. FY00 willow evaluations will be performed next year. FY01 this planting is overgrown with woods rose, stinging nettle and weeds. Cuttings are alive, but very difficult to evaluate this late in the year. Recommend evaluating earlier next year.

ID00009B Fred Bullers willow field planting. 9067561 Lemmon willow (28), 9067548 Drummond willow (24), 9067436 Yellow willow (13), 9067375 Peachleaf willow (27), and 9067376 Peachleaf willow (40) were ordered on March 1, 2000 for shipment April 10, 2000. FY00 willow evaluations will be performed next year. FY01 this planting failed – **cancel**.

ID00009C Paul Frelier willow field planting. 9067561 Lemmon willow (13), 9067548 Drummond willow (12), and 9067375 Peachleaf willow (13) were ordered on March 1, 2000 for shipment April 10, 2000. FY00 willow evaluations will be performed next year. FY01 this planting is overgrown with native vegetation. Cuttings are alive, but very difficult to evaluate this late in the year. Recommend evaluating earlier next year.

FIELD OFFICE: GOODING/FAIRFIELD

ID94022 Erdman Farms Rush intermediate wheatgrass DSI. Seed ordered 4/4/94. FY94 seeded on May 25, 1994, excellent initial establishment with plants going dormant in early summer due to no rain (record low rainfall) and greening up after being dormant for over 90 days with fall rains. Drilled two rows together (6" spacing) with 24 inches between double rows. Some mortality of seedlings due to drought. Most plants made 5-7 leaf stage before dormancy in fall. Appears to be a good stand and cooperators rated drought tolerance the establishment year as excellent. FY95 cut for seed 9/15/95 with 140 lbs/ac clean seed production. Rush stayed green longer into summer than Luna and cooperators had to wait two weeks longer than Luna to harvest seed. Rush had green basal leaves despite very dry summer and fall in November. FY96 no seed harvested, drought tolerance of established Rush is exceptional. FY97 no evaluations. FY98 83 lbs/ac clean seed. FY99 strong winds just prior to harvest shattered seed and stand was not combined. FY00 Judy Erdman burned stand in April 2000 to reduce litter. Stand recovered well and produced seed despite dry conditions, but not enough seed for Judy to justify harvesting costs so seed was not harvested in year 2000. Rush plants remain vigorous, and light rhizomatous spreading out of original twin-rows is occurring. Very dry summer on the prairie. Stand looks very good considering it was burned in spring with no moisture thereafter to speak of until Labor Day weekend. FY01 no evaluation.

ID97011 Malad Gorge State Park Dormant field plantings a) Secar, Bannock, Nezpar, Magnar; b) Secar, Bannock, Rimrock, Trailhead; and c) bottlebrush squirreltail (9040187 and 9040189 accessions for plots). Seed ordered 1/31/97. Site is very fine sandy loam, 0-1% slopes, 3225 feet elevation, 10-inch rainfall, non-irrigated, T6S R13E NE1/4 Section 35. Sites to be planted in March 1997. FY97 no evaluations. FY98 two five-acre fields were planted in the spring of 1997 into good firm weed free seedbeds. Good spring rains in 1997 gave seedlings a good establishment year. In July 1998 both stands are fully established with large seed producing plants. Both stands are dominated by Bannock thickspike wheatgrass, with Secar Snake River wheatgrass, both basin wildryes, and both Indian ricegrass accessions present in lesser amounts. Stands were so successful; cooperators harvested seed for future planting with 1000 pounds of cleaned seed combined. This is approximately 100 lbs/ac of seed in a 10-inch rainfall zone. Bottlebrush squirreltail plots were not planted in 1998. FY99 excellent stands for both plantings. Secar and thickspike wheatgrass dominate stands, with basin wildrye and Indian ricegrass present as minor components. FY00 The two 5-acre dryland plots of grass remain strong with good plant density and seed production despite a very dry year. Secar and Bannock dominate both the north and south fields, with only occasional ricegrass plants. The main difference between the two fields may be the amounts of basin wildrye persisting and/or increasing. Trailhead in the south field is readily apparent throughout the stand, but plants are not robust at this time presumably due to competition from Secar and Bannock. Comparatively, Magnar in the north field is present but much less apparent. Fields were not harvested for seed. Weeds, including cheatgrass, are controlled and not a factor in these fields. The State Park plans to graze these fields this November for a short period to reduce litter and plant residues. FY01 no evaluation.

ID98018 Bill Simon Farms Rush intermediate wheatgrass District Seed Increase. Seed ordered March 16, 1998 for mid April delivery. FY98 rush seeded in April 1998 into twin rows on 30-inch centers. The 55 acre field was formerly in alfalfa (1996 and prior) and fallowed in 1997. The 85-acre field was formerly in small grain. Excellent stands were established by the fall of 1998 with plants fully bunched and vigorous. Stands were sprayed with formula 40 2,4-D in late June or early July. Producer did not fertilize stands in the fall. FY99 approximately 25 percent of production was lost to shatter due to strong winds prior to harvest. The 55-acre field produced approximately 180 lbs/acre. The 85-acre field produced approximately 110 lbs/acre. On droughtier hilltops and ridges producer noted that seed production was lacking and suggested that wider row spacing would be desirable. FY00 Rush stands remain strong and Bill Simon feels it is the best grass on the Prairie. The dry year took its toll on seed production, however. Harvested the third week of August 2000, the 85-acre field produced only 81 pounds/acre clean seed, and the 55-acre field produced 91 pounds/acre clean seed. Weeds in the 85-acre field are not a problem, since prior to seeding to Rush the field was in 2 years of wheat, and prior to that 5 years of Regar meadow brome, providing a clean field. The 55-acre field, however, was in alfalfa prior to seeding to Rush, and this field has more weeds. FY01 no evaluation.

ID98020 Bill Simon Bannock thickspike wheatgrass District Seed Increase. Seed ordered April 10, 1998 for mid April delivery. FY98 Bannock seeded on 12-inch centers. Evaluation in November 1998 indicated a slow start with weak plants at the end of the first full growing season. Weeds do not appear to be a problem, but soils are somewhat gravelly and it appears to be a difficult site to establish a stand. Field was fertilized with about 20 units of nitrogen in the fall. FY99 plants remain narrow and spindly, but fertilizer did contribute to improved plant health. Harvest of approximately 80 lbs/acre was completed early while plants were still green, but seed was mature and beginning to shatter. FY00 this is the first-to-ripen grass in Bill's portfolio, interfering with his alfalfa hay harvest on the Prairie. This year the Bannock was harvested the first week of August, and produced 110 pounds/acre clean seed, which is higher than last year's yield despite the dry year. The field was fertilized with 40 units of ammonium sulfate about May 1, 2000, and later sprayed with Formula 40 2,4-D. Cheatgrass is increasing in the field and will need to be controlled in 2001. FY01 no evaluation.

ID99007 Spring Cove Ranch – Butler Field Planting Laurel willow. Island-constructed wetland, silt loam soil, 0-2 percent slopes, 3100 feet elevation, T5S R12E SW1/4 Section 21. FY99 20 Laurel willows were at water edge on islands. Tree tubes (1.5 feet tall) were utilized to protect cutting from muskrats. All cutting are flourishing with about 5 to 6 feet of growth the first growing season. FY00 Laurel willows are thriving on the islands, protected by their tree tubes. Plants are vigorous and are now beginning to obtain fuller, multi-branched shape. FY01 no evaluation.

ID00005 Camas SCD (Koonce) formerly ID86010 Koonce multiple species demo plots. FY99 field evaluation determined these plots to be contaminated and planting was destroyed, site cleaned-up and fallowed during 1999, and was replanted in the spring of 2000. Plots replanted May 1, 2000. Plots will be irrigated the first growing season. FY00 plots were irrigated until mid June, then discontinued. Most of the wheatgrasses sprouted in the central and northern portions of the plot, but remained small at evaluation time due to dry season. Plot remains relatively weed-free except

the southernmost 15 feet of the plot (sheep fescue area) which is a solid stand of globe mallow. The fescue is sprouted underneath the large mallow leaves. This is a particularly difficult weed to control once established. Special attention needs to be directed here in spring 2001. FY01 the plots have been subjected to two seasons of unfavorable plant growth (dry springs) and one of the lowest winter snowpacks recorded on the Camas Prairie. Still, all varieties exhibit some level of success except for the following varieties which could not be found for observation: Durar hard fescue, Nezpar Indian ricegrass, 9043501 Salina wildrye, and Thurber's needlegrass. These varieties did not establish at all or remain yet as dormant seed due to drought. Some of the absent species may have germinated but died unnoticed due to drought. Weed competition most likely is not a factor of establishment difficulties in the plot. Possible exceptions may be in the Covar sheep fescue area that had significant amounts of common mallow in 2000 but is now under control due to spot spraying. Scouringrush is invading in the Bighorn sheep fescue and Magnar basin wildrye areas and may be a factor there. The entire demo plot was spot-sprayed in 2001 twice (last of June and first of August) with 2,4-D/Banvel. At the time of this evaluation the plot did not contain weed problems significant to grass establishment. The wheatgrasses are performing the best. The highest performing wheatgrasses include Rush and Reliant intermediate wheatgrasses, Maska and Luna pubescent wheatgrasses, CDII and Nordan crested wheatgrasses, Bannock thickspike wheatgrass, and Pryor slender wheatgrass. Weak wheatgrass performance was observed with Arriba western, Whitmar beardless wildrye, San Luis slender wheatgrass, Critana thickspike wheatgrass, Ephraim crested wheatgrass, Douglas crested wheatgrass, and P27 Siberian wheatgrass.

Bozoisky and Mankota Russian wildrye performed moderately, but the other wildryes either did poorly (Volga Mammoth and Magnar) or did not establish (Salina and Trailhead). Manchar and Liso smooth bromes have done well considering the drought with moderate performances, but Garnet and Bromar mountain bromes and Regar meadow brome did not fare so well and have overall weak ratings. The fescues, needlegrasses, orchardgrasses, ricegrasses, timothy, and foxtail are currently performing weakly or did not establish. Sherman big bluegrass had low establishment density but the existing plants have good vigor with many seedheads produced.

ID00006 Bill Simon Bannock thickspike wheatgrass District Seed Increase. Seed ordered February 10, 2000 for mid April delivery. FY00 This new Bannock seeding in spring 2000 was installed adjacent and south of existing Bannock field under file ID98020. Bannock was drilled at 3 pounds per acre PLS on 24-inch centers. The field was helicopter sprayed with 2,4-D the third week of June. Where helicopter missed, Russian thistle prevailed this year but should diminish next year. At evaluation time on November 1, 2000, the stand was well on its way to establishment considering the dry year. FY01 no evaluation.

ID01002 Cooperator unknown willow field planting. 25 cuttings each of 9067436 Yellow willow, 9067452 Yellow willow, 9067475 Yellow willow, 9067477 Yellow willow, 9067493 Yellow willow, 9067375 Peachleaf willow, 9067376 Peachleaf willow, 9067541 Peachleaf willow, 9067546 Peachleaf willow, 9067549 Peachleaf willow, and 9067560 Peachleaf willow. FY01 no evaluation.

ID01007 Spring Cove Ranch – Butler demonstration plantings of Magnar basin wildrye, Snake River Plain fourwing saltbush, and Northern Cold Desert winterfat. Seed ordered March 16, 2001. Site characteristics: Planting 1. Vertisol soil, 11-inch rainfall, irrigated, 3300 feet elevation, south of Pioneer Reservoir. Planting 2. Sodic soil, 12-inch rainfall, irrigated, 3500 feet elevation, near Clover Creek – Hill City Road – southern base of Bennett Mountain foothills. FY01 no evaluation.

ID01011 Bill Simon District Seed Increase High Plains Sandberg bluegrass test plots. Seed ordered in September 2001.

FIELD OFFICE: JEROME

ID99012 Tom Davis Critical Area Planting on pond embankment/dike. Hycrest crested wheatgrass and Vavilov Siberian wheatgrass seed ordered March 30, 1999. Planting planned for early April 1999. FY99 spring planting failed due to lack of rainfall. Cooperator planted (broadcast and harrowed) in November 1999 under dry conditions. FY00 good stand in areas where sprinkler semi-irrigates - poor to fair stand establishing in dry areas due to extremely droughty conditions. 2 plants per square foot, good vigor, 12-inch height. Expect stand to improve with better rainfall this fall-winter. FY01 good stand with 3 plants per foot square, and good vigor.

ID99013 Steve Hagler Critical Area Planting on pond embankment/dike. Hycrest crested wheatgrass and Vavilov Siberian wheatgrass seed ordered March 30, 1999 with delivery about Sept 1, 1999. Planting planned for late October 1999. FY99 project is still in construction stage and planting is not completed. FY01 planting not completed – **cancel**.

ID99014 Tom Davis irrigation pivot corner field planting. Vavilov Siberian wheatgrass ordered March 30, 1999 with delivery about September 1, 1999. Planting planned for late October 1999. FY00 planted (broadcast and harrowed) in November under dry conditions. Good stand in areas where sprinkler semi-irrigates - poor to fair stand establishing in dry areas due to extremely droughty conditions. 2 plants per square foot, good vigor, 12-inch height. Expect stand to improve with better rainfall this fall-winter. FY01 good stand with 3 plants per foot squared and good vigor

FIELD OFFICE: RUPERT

None

FIELD OFFICE: SHOSHONE/HAILEY

ID95010 Brossy Bozoisky Russian wildrye field planting Seed ordered 2/95. FY96 – FY98 not planted due to drought conditions. FY99 planting planned fall 1999 on wildfire burn. FY00 and FY01 no evaluations. **Cancel**

ID95011 Brossy Nezpar, 9035287, 9052861, 478833 Indian ricegrass field planting (plots). Seed ordered 2/95. FY96 – FY98 not planted due to drought conditions. FY99 plots planned for fall 1999 on wildfire burn. FY00 and FY01 no evaluations. **Cancel**

ID95012 Brossy Secar, Bannock, Immigrant, Meeker squirreltail accessions (2), Appar and Firecracker field planting mix. Seed ordered 2/95. FY96 – FY98 not planted due to drought conditions. FY99 plots planned for fall 1999 on wildfire burn. FY00 and FY01 no evaluations. **Cancel**

ID01003 Cooperator unknown willow field planting. 10 cuttings each of 9067548 Drummond willow, 9067435 Geyer willow, 9067491 Geyer willow, 9067437 Booth willow, 9067469 Booth willow, and 9067478 Booth willow. FY01 no evaluation.

FIELD OFFICE: TWIN FALLS

ID95045 CSI - Jim Wilson Blanchard blue elderberry demo planting. Plants ordered August 1995. FY96 Plants arrived in excellent condition. 7 plants planted at CSI Nursery and will be transplanted next spring. FY96 71% survival with poor vigor - plants died back in July when transplanted. The tallest plant is now about 15 inches with others ranging from 6-12 inches. FY97 71% survival (5 of 7) with fair vigor, 3-7 feet tall, and a lot of reed canarygrass competition. FY98 4 of 7 survived with fair to good vigor and 3 to 8 feet heights. FY99 42 percent survival with good vigor, 7-9 feet tall and 6 feet crown width. FY00 28 percent survival (2/7), fair vigor, 84-96 inch height, 7-8 feet crown width, 1.1 – 1.75 inch base, fruiting, rodent damage evident (muskrats or deer). FY01 cooperator is concerned about weeds and annually plants are mowed – this management is not conducive to elderberry growth or evaluation - **cancel**.

ID97008 CSI Sodar streambank wheatgrass, Rosana western wheatgrass, and Garrison creeping foxtail field planting on birms between constructed wetlands. Seed ordered 11/20/96. FY97 planting planned for fall 1997. FY98 excellent stand establishing with 30 plants per foot squared and excellent vigor. Sodar is planted on streambank, Rosana is planted on berms between cells, and Garrison is planted near shallow water. FY99 poor stand of Sodar, Rosana, and Garrison with 40% survival, good vigor, and fair ability to spread due to severe mowing and competition from other species. FY00 fair stands for each, 20 plants per square foot, 40 percent survival, good vigor, Sodar 24-48 inch height, Rosana 14 inch height, Garrison 12-60 inch height, heavy competition from other species in each plot. FY01 this site is completely sodded with a mix of species – planting **canceled**.

ID00007 Twin Falls SWCD/Twin Falls Highway District Drought tolerant landscape-weed control demonstration plantings. Seed ordered March 1, 2000 for late March delivery. Planting 1: Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, and Ladak alfalfa. Planting 2: Hycrest crested wheatgrass, Bozoisky Russian wildrye, and Ladak alfalfa. Planting 3: Secar Snake River wheatgrass, Critana thickspike wheatgrass, Trailhead basin wildrye, Rimrock Indian ricegrass, and Wytana fourwing saltbush. Planting 4: Secar Snake River wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass, and Snake River Plain fourwing saltbush. Site characteristics: MLRA B11A, Portneuf silt loam soil, 0-2 percent slopes, north exposure, 3800 feet elevation, 10-12 inch precipitation, irrigated for establishment only, T11S R18E SW1/4 of SW1/4 of Section 13. FY00 due to very dry spring the planting was delayed until better planting conditions occur. FY01 site was planted in mid to late April and sprinkler irrigated in May to assist with plant establishment. Site was also mowed several times during growing season

for weed control. Because of mowing, species identification was not possible – initial stand establishment for all plantings is fair with good plant vigor.

IDAHO DIVISION V

FIELD OFFICE: AMERICAN FALLS/ABERDEEN

ID95030 Roger Whitnah field planting - species: Cave-In-Rock switchgrass, Dakota switchgrass, Blackwell switchgrass, Forestburg switchgrass, and Kanlow switchgrass. Field Planting seed ordered 4/10/95. Planted 6/23/95 on two sites. Site characteristics: soils are fine sandy loam, irrigated, 4400 feet elevation, and 2-4% slopes. Seedings: 1) Pivot Corner, 106 lbs nitrogen applied. 2) Near Windbreak-broadcast. FY95 evaluation 1) Pivot Corner - loamy sand soil, irrigated, 4400 feet elevation, 2-4% slopes, SW exposure. Blackwell 95%, Forestburg and Dakota 80%, Cave-In-Rock 75% and Kanlow 65% survival. Blackwell is receiving additional moisture from pivot end gun. Kanlow plot was severely eroded by wind during early establishment period. Blackwell, Kanlow and Cave-In-Rock best weed competitors. All varieties appear adapted during initial establishment year. FY95 evaluation 2) Near Windbreak - silt loam soil, irrigated, 4400 feet elevation, 4-8% slopes, and east exposure. Blackwell and Dakota 90%, Cave-In-Rock and Forestburg 80% survival. Plots are irrigated when windbreak is irrigated. All varieties appear adapted during initial establishment year. FY96 evaluation 1) Pivot Corner: Dakota and Blackwell have best percent stand/clipped production (90%/1610 lbs) and (90%/1840 lbs), followed by Forestburg (60%/900 lbs), Cave-In-Rock (50%/565 lbs) and Kanlow (30%/310 lbs); evaluation 2) Windbreak Dakota has best percent stand/clipped production (100%/2110 lbs) followed by Blackwell (75%/1065 lbs), Cave-In-Rock (75%/1095 lbs), and Forestburg (70%/945 lbs). FY97 evaluation 1) Pivot Corner: Blackwell had the best production with 1121 lbs/ac followed by Dakota with 850 lbs/ac, Cave-In-Rock with 751 lbs/ac, and Forestburg with 746 lbs/ac. Dakota and Cave-In-Rock are intermixed with alfalfa and alfalfa is dominating. Forestburg and Kanlow have filled in some the past year. Blackwell is very similar to last year. 2) Windbreak: Blackwell with 1367 lbs/ac and Dakota with 1532 lbs/ac have the best stands, followed by Cave-In-Rock with 973 lbs/ac and Forestburg with 200 lbs/ac. Kanlow stand is very poor. Dakota had more panicles with seed and was more mature than Blackwell in mid-August. FY98, FY99, FY00 and FY01 no evaluations. **Cancel**

ID95034 Idaho Power Company critical area planting - species: Sodar streambank wheatgrass, Bannock thickspike wheatgrass, Critana thickspike wheatgrass, and Volga mammoth wildrye. Critical area planting seed ordered 4/21/95. Site is very sandy, prone to blowing, non-irrigated, 12" ppt, 4300 feet elevation, and 20 +% slopes on south exposure. Site was planted to spring grain in May 1995. Grain was sprayed in July so it would not go to seed. Grasses were planted in late October 1995 as dormant seeding. FY96 Some seedling establishing in spring, but additional seed may accelerate stabilization. October 1996 ordered additional Sodar, Bannock, Volga, and added Nezpar Indian ricegrass, Hycrest crested wheatgrass, and Wytana fourwing saltbush for seeding dormant Fall/Winter 1996. FY97, FY98, FY99, FY00 and FY01 no evaluations. **Cancel**

ID95040 Neil Poulson Bannock thickspike wheatgrass District Seed Increase. Seed ordered 7/3/95. FY96 no report. Additional seed provided 7/97. FY97, FY98, FY99, FY00 and FY01 no evaluations. **Cancel**

FIELD OFFICE: BLACKFOOT

Hakari brome appears to be a good plant for irrigated pastures on the Snake River Plain in Southeast Idaho. In plots at Pocatello, Hakari established easily and was ready for grazing within 75 days after spring planting. The oldest plots are three years old. It does not have a problem with winterkill. The grass greens up early and is ready for grazing between April 15 and May 1. It also stays green late into the fall. Hakari is advertised as having good nutritional value even after going to seed which gives a grass farmer a lot of options in developing an even flow of forage through the growing season. I have done no tests on this, but have let plots go to seed and then returned to cutting them at regular intervals. From the test plots I can recommend Hakari Brome as a good plant for short-term pastures. It may also be good for permanent pastures, but has not been tested long enough to make that recommendation.

Quick Establishing Grasses for Biennial Pastures

I am currently looking for a grass pasture that can be grown in a quick rotation between other crops. It could be planted in the fall to provide pasture for the next spring followed by a planting of Sudan x Sorghum. It could also be planted in the fall and provide feed the next spring and summer or it could be planted in the spring to provide summer pasture. With this in mind, a field planting of plots under irrigation was completed at Pocatello.

FY00 in mid April, plots were planted to Aroostock cereal rye, Bartissimo Italian ryegrass, and BG23 perennial ryegrass. Bartissimo and BG23 were used because of their winter hardiness and because we have a problem with

ryegrasses having difficulty greening up in the spring. We want plants that provide spring feed as well as summer forage. All the plants established quickly and were ready for grazing in less than 75 days. Aroostock rye is definitely the most vigorous. However, Aroostock wants to go to seed. It had to be cut every two weeks to keep it from going to seed. This could be a big problem in pastures. All three varieties produced good quantities of forage throughout the summer and fall. They will be evaluated next spring for forage production from green up to mid June. Three plots were also planted in early October to evaluate establishment and forage production in the spring. A special thanks is due to Barebrug for supplying the seed for these trials.

Sudan – Sorghum for Winter Feed

FY00 10 farmers planted sudan – sorghum varieties under various conditions. These fields were grazed in November and December. Some fields will not be used until February and March. Last winter the nutrition of the cows diet on fields of Granger sudan x sorghum were evaluated from fecal samples.

Granger Sudan x Sorghum

Date	Crude Protein	TDN	Dry matter eaten per day
Jan. 27	8.4%	64.6%	30 lbs.
Feb. 17	9%	63%	27 lbs.
Mar. 15	7.6%	58%	23 lbs.

Dry cows start out gaining weight on this feed. As there is less choice on what is available to eat, they just hold their weight. It is probably better to feed a partial feed of hay and let the cows pick on the last third of the time on a field. The best production was from a field of Granger planted in mid May. It was in a field following potatoes and heavily fertilized. This field produced more than 400 cow days per acre. Two farmers planted Granger on old hay fields. They sprayed the hay with Roundup and cut it five days later. After baling the first crop of hay, they disked the field twice and then broadcast seed and fertilizer. These fields did not produce nearly as much forage, but also had one crop of hay. Of the varieties planted, Granger appears to be the best for southeast Idaho. It needs a lot of nitrogen fertilizer and possible some phosphate. It does not like an oversupply of water. This is really catching on and is reducing the hay feeding time.

FIELD OFFICE: MALAD

ID98024 Bill Hubbard Rush intermediate wheatgrass District Seed Increase. Seed ordered and shipped in April 1998. FY99, FY00 and FY01 no evaluations. **Cancel**

ID99017 Bill Hubbard Bannock thickspike wheatgrass District Seed Increase. Seed ordered April 28, 1999. FY99, FY00 and FY01 no evaluations. **Cancel**

FIELD OFFICE: MONTPELIER

None

FIELD OFFICE: POCATELLO

None

FIELD OFFICE: PRESTON

ID93015 SWCD Multiple species demo plots. Site is located behind the Preston FO. Species provided in Aug 93. FY93 50 varieties were planted. FY94 Excellent stand of Luna, Bannock (9021076), Hycrest, Greenar, 281863 int. wheatgrass, Rush, Reliant, P27, Sodar, Hycrest, Ephraim, Tegmar, Eski, Appar, Delar, Paiute, Covar, Durar, Manska pub. wheatgrass, Latar, Garrison, Regar, Manchar. Good stand of Critana, Whitmar, Newhy, Topar, Sherman, Jose, Lutana, Magnar, Trailhead, Prairieland, Mankota, Bozoisky, Alkar, Rosana, Cascade, Kalo, Retain. Fair stand of Secar, Goldar, Nezpar, 478833 Indian ricegrass, Amur, Paloma, Johnstone fescue. Poor stand of Blackwell switchgrass. No stand of Cedar, Osage Indiangrass, Roundtree big bluestem, Bandera, Rincon, Wytana, Homestead Arnold hawthorn. FY95 detailed report available. Excellent stand of Luna, Bannock (T21076), Hycrest, Greenar, 281863 intermediate wheatgrass, Rush, Reliant, P27, Sodar, Hycrest, Ephraim, Tegmar, Eski, Delar, Paiute, Covar, Durar, Manska, Retain, Garrison, Regar, and Manchar. Good stands of Critana, Whitmar, Newhy, Topar, Sherman, Jose, Lutana, Magnar, Trailhead, Prairieland, Mankota, Bozoisky, Alkar, Rosana, Cascade, Kalo, and Retain. Fair stands of Secar, Goldar, Nezpar, 478833 Indian ricegrass, Amur, Paloma, and Johnstone fescue. Poor stand of Blackwell. Failure with Cedar,

Osage, Roundtree, Bandera, Rincon, Wytana and Homestead. FY96 detailed report available. FY97 and FY98 no evaluations. FY99 excellent stands of Luna, Greenar, Rush, Reliant, Hycrest, Amur, Manska, Alkar, Covar, Jose, Sherman, Tegmar, Manchar, Retain, and Latar. Good stands of Critana, 281863 intermediate wheatgrass, P27, Sodar, Ephraim, Newhy, Prairieland, Durar, Paiute, Delar, Topar, Garrison, and Johnstone. Fair stands of Bannock, Secar, Rosana, Bozoisky, Mankota, Trailhead, Magnar, Regar, and Roundtree. Poor to very poor stands of Goldar and Whitmar. Failed stands of Nezpar, PI478833, Paloma, Appar, Eski, Cedar, Lutana, Blackwell, Kalo, Cascade, Bandera, Osage, Arnold hawthorn, Wytana, and Rincon. FY00 and FY01 no evaluations - **cancel**.

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

FIELD OFFICE: SODA SPRINGS

None

IDAHO DIVISION VI

FIELD OFFICE: ARCO/CHALLIS

ID80100 IDL Bradbury Flat Multiple Adaptation Evaluation every 3 years. Planted March 25, 1980. FY92 evaluation 7/7/92. FY95 evaluation 11/14/95. All evaluations available on request. FY99 Evaluations September 1999. Good to excellent stands include 7654 crested wheatgrass, P27 Siberian wheatgrass, Sodar streambank wheatgrass, AB447 crested wheatgrass, and Secar Snake River wheatgrass. Fairs to poor stands include Goldar bluebunch wheatgrass and Ladak alfalfa. Failures include: Nezpar Indian ricegrass, Luna pubescent wheatgrass, Magnar basin wildrye, Topar pubescent wheatgrass, Appar blue flax, Firecracker penstemon, Bandera Rocky Mountain penstemon, Cedar Palmer penstemon, Alpine penstemon, AB555 blueleaf aster, black-eyed susan, AB9223 fourwing saltbush, AB9421 fourwing saltbush, Delar small burnet, PI314929 forage kochia and sulpherflower buckwheat. AB585 and AB764 winterfat could not determine stand due to presence of native winterfat. **Next evaluation FY03.**

ID80101 IDL Bradbury Flat Multiple Adaptation Evaluation every 3 years. Planted November 7, 1981. FY92 evaluation 7/7/92. FY95 evaluation 11/14/95. All evaluations available on request. FY99 Evaluations September 1999. Good to excellent stands include B1574 crested wheatgrass, P27 Siberian wheatgrass, AB447 crested wheatgrass, Secar Snake River wheatgrass, AB585 winterfat, AB764 winterfat, Bozoisky Russian wildrye and Vinall Russian wildrye. Fair to poor stands include Sodar streambank wheatgrass and Immigrant forage kochia. Failures include Nezpar Indian ricegrass, Luna pubescent wheatgrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Topar pubescent wheatgrass, Bandera Rocky Mountain penstemon, Cedar Palmer penstemon, Alpine penstemon, black-eyed susan, Delar small burnet, green needlegrass, Blair smooth brome, and PI109072 orchardgrass. Appar blue flax and firecracker penstemon were found outside of seeded plots. AB922 fourwing saltbush and AB942 fourwing saltbush plants were present with low vigor. **Next evaluation FY03.**

ID82101 BLM Hole In Rock Multiple Adaptation Evaluation every 3 years. Planted late October 1982. FY92 evaluation 7/7/92. FY95 evaluation 9/95. All evaluations available on request. FY99 plots were not accessible in September 1999. **Next evaluation FY03.**

ID82102 BLM Centennial Multiple Adaptation Evaluation every 3 years. Planted late October 1982. FY92 evaluation 6/26/92. FY95 evaluation 6/20/95. All evaluations available on request. FY99 not evaluated. **Next evaluation FY03.**

ID82103 BLM Spud Alluvial Multiple Adaptation Evaluation every 3 years. Planted late October 1982. FY92 evaluation 6/25/92. FY95 evaluation 11/14/95. All evaluations available on request. FY99 evaluations September 1999. Good to excellent stands include Whitmar beardless wheatgrass, P27 Siberian wheatgrass, Secar Snake River wheatgrass, Sodar streambank wheatgrass, Immigrant forage kochia, Vinall Russian wildrye, and Bozoisky Russian wildrye. Fair to poor stands include Synthetic alfalfa, PI109012 crested wheatgrass, Topar pubescent wheatgrass and Goldar bluebunch wheatgrass. Failures include Newhy hybrid wheatgrass, scarlet globemallow, Cedar Palmer

penstemon, Appar blue flax, PI109072 orchardgrass, Barton western wheatgrass, Nezpar Indian ricegrass, Magnar basin wildrye, and yellow sweetclover. Kochia is spreading outside of seeded plots and is only plant that is actively growing at evaluation date. Whitmar and Bozoisky affected by excessive litter. **Next evaluation FY03.**

ID82104 BLM Jeff's Flat Multiple Adaptation Evaluation every 3 years. Planted late October 1982. FY92 evaluation 6/26/92. FY95 no evaluation. FY99 evaluations September 1999. Good to excellent stands include Manchar smooth brome and Covar sheep fescue. Fair to poor stands include Synthetic alfalfa, Lutana cicer milkvetch, Durar hard fescue, PI1099012 crested wheatgrass, P27 Siberian wheatgrass, Greenar intermediate wheatgrass, Magnar basin wildrye, and Bozoisky Russian wildrye. Failures include Newhy hybrid wheatgrass, Hycrest crested wheatgrass, Delar small burnet, Baylor smooth brome, Bandera Rocky mountain penstemon, Cedar Palmer penstemon, Appar blue flax, Pi109072 orchardgrass, Sherman big bluegrass, Vinall Russian wildrye, and yellow sweetclover. Rodent damage evident in plots. **Next evaluation FY03.**

ID82105 BLM Round Valley Multiple Adaptation Evaluation every 3 years. Planted late October 1982. FY92 evaluation 6/25/92. FY95 evaluation 11/13/95. All evaluations available on request. FY99 evaluations September 1999. Good to excellent stands include P27 Siberian wheatgrass, Nordan crested wheatgrass, Vinall Russian wildrye and Bozoisky Russian wildrye. Fair to poor stands include Newhy hybrid wheatgrass, thickspike wheatgrass x crested, Nezpar Indian ricegrass, Secar Snake River wheatgrass, Immigrant forage kochia, and PI109012 crested wheatgrass. Failures include Synthetic alfalfa, scarlet globemallow, Bandera Rocky Mountain penstemon, Cedar palmer penstemon, Appar blue flax, PI109072 orchardgrass, Goldar bluebunch wheatgrass, Barton western wheatgrass, Topar pubescent wheatgrass, Whitmar beardless wheatgrass, Magnar basin wildrye, and yellow sweetclover. **Next evaluation FY03.**

ID82106 BLM Gooseberry Multiple Adaptation Evaluation every 3 years. FY92 evaluation 7/7/92. FY95 site has deteriorated to point evaluations would provide little future value. Some scattered plant materials still remain. **Cancel future evaluations, but maintain file for reference purposes.**

ID83100 FS Nip & Tuck Multiple Adaptation Evaluation every 3 years. FY92 evaluation 7/6/92. FY95 site has deteriorated to point future evaluations would provide little future value. Plants of Luna, Topar, Nezpar, Regar, Covar, Durar and Garrison still evident. Covar/Durar and then Regar doing best. Mountain big sagebrush and Idaho fescue are dominating site. **Cancel future evaluations, but maintain file for reference purposes.**

ID01001 Cooperator unknown cottonwood field planting. 9067408 Narrowleaf cottonwood, 9067443 Narrowleaf cottonwood, 9067484 Narrowleaf cottonwood, 9067502 Narrowleaf cottonwood, 9067537 Black cottonwood, 9067538 Black cottonwood, 9067562 Black cottonwood, 9067563 Black cottonwood, 9067568 Black cottonwood, 9067569 Black cottonwood, Robust poplar, Carolina poplar, and Siouxsland poplar. FY01 no evaluation.

FIELD OFFICE: DRIGGS

ID91006 Fair Grounds Multiple Species Demo Plots. FY92 planted spring 1992 excellent survival on all species except trefoil, mountain brome and cicer milkvetch which will have to be replanted. FY93 Remont, Bromar, Lutana planted spring of 1993. Remont is not tolerant of frequent irrigation. Bozoisky exhibits poor seedling vigor, Goldar has poor plant vigor, Canbar not recommended for pure stands, Magnar not adapted to shallow soils, Newhy lacks seedling vigor, Manchar exhibits poor summer regrowth, Whitmar is not tolerant of excessive moisture, Garrison adapted to wet soils. Magnar, Bromar, Rush, and Lutana are all doing poorly. Ordered Rush, P27, Magnar, Canbar, and Bozoisky on 3/17/94 to be included in plots. FY94 all plots good to excellent stand except Lutana, Remont and Delar. These plots are all irrigated so evaluations for drought, flood, salt and acid tolerance not possible. This planting does provide excellent trials for irrigated varieties in high mountain valleys. FY95 best performers are Hycrest, Critana, Alkar, Tegmar, Luna, Greenar, Topar, Rush, Regar, Manchar, Latar, Paiute, Sodar, Newhy, Durar, Sherman, Canby and Delar. Complete evaluations are available on request. FY96 not evaluated. FY97 Durar and Delar good to excellent stands with high vigor; Regar, Amur, Manchar, Latar, Paiute good stands with excellent vigor; Rush fair stand with fair vigor; Sodar, Goldar, Cascade, Appar poor stands with fair vigor; Hycrest, Critana, Alkar, Tegmar, Luna, Greenar, Topar, Lutana, Garrison, Whitmar, Secar, P27, Bromar, Magnar, Bozoisky, Canbar, Sherman, Kalo, very poor to failed stands. All plots are subject to turfgrass encroachment. February 9, 1998 ordered Hycrest, CD-II (Hycrest II), Sherman, Newhy, Critana, Bannock, Garrison, and Bozoisky for plots. FY98 species with good to excellent stands include Amur, Rush, Manchar, Latar, Durar, Cascade, and Delar. Species with poor to fair stands include Alkar, Luna, Topar, P27, Bromar, Paiute, Magnar, Appar, and Bozoisky. Failed stands include Hycrest, Critana, Tegmar, Greenar, Secar,

Whitmar, Garrison, Lutana, Regar, Sodar, Newhy, Kalo, Sherman, Canbar, and Goldar. FY99, FY00 and FY01 no evaluations.

ID99018 SCD field planting – leafy spurge competition study. Species include Rush intermediate wheatgrass, Luna pubescent wheatgrass, Regar meadow brome, Bromar mountain brome, Durar hard fescue, Bozoisky Russian wildrye, and Climax timothy. Seed ordered April 28, 1999 for shipment about May 17, 1999. FY99 Roundup was applied on June 10th to leafy spurge plots with up to 200 stems per 9.6 square foot hoop. Grass was drilled into plots on July 1, 1999 using a Brillion drill. Evaluation of germination and establishment will be performed in the spring of 2000. Replicated plots will be installed in May of 2000. FY00 and FY01 no evaluation.

FIELD OFFICE: IDAHO FALLS

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

ID95007 Winterfeld Rush intermediate wheatgrass District Seed Increase. Seed ordered 2/95. FY95 excellent stand establishing. FY96 700 lbs seed production, 1.5 tons per acre straw. FY97 400 lbs/acre clean seed production, plant height 50 inches, fertilized May 10 with 50 lbs/ac N. FY98 400 pounds per acre seed production. FY99 excellent stand in unfavorable moisture year with 435 pounds of bulk seed production per acre. FY00 excellent stand and vigor. Rush is an excellent forage grass for cattle. Seed production unknown at evaluation date. FY01 field plowed out – **cancel**.

ID95046 Winterfeld Alpine 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.

ID96003 Winterfeld Douglas crested wheatgrass District Seed Increase. Seed will be purchased through the Utah Crop Improvement Association. FY96 fair stand establishing during extremely dry conditions (no rain following planting). FY97 fair stand with good vigor and no seed production. Stand is improving. FY98 good stand established with 300 pounds per acre seed production. Elk and grouse are using stand. FY99 excellent stand in unfavorable moisture year with 400 pounds of cleaned seed production per acre. FY00 excellent stand and vigor. Seed production was excellent this year, but amount was unknown at evaluation date. Douglas is well suited for the Swan Valley area and is an excellent grazing species for cattle. FY01 excellent stand and vigor with 260 pounds per acre production. Douglas is tolerating drought very well.

ID99016 Winterfeld Goldar bluebunch wheatgrass District Seed Increase. Seed ordered April 15, 1999. Site characteristics – Tetonia silt loam soil, 1- percent slopes, north aspect, 5400 feet elevation, 18 inch precipitation zone, non-irrigated, T2N R43E NW1/4 Section 26. FY99 planted spring 1999 with good stand establishing. FY00 excellent stand and vigor. Seed production unknown at evaluation date. Good regrowth in spite of very droughty conditions. FY01 excellent stand and vigor. 150 pounds per acre cleaned seed production (some problem with silver top). 900 pounds of straw per acre.

ID99020 Winterfeld Nezpar Indian ricegrass District Seed Increase. Seed ordered August 20, 1999. Site characteristics – Hobarker gravelly loam soil, 2 percent slope, north aspect, 5315 feet elevation, 18 inch precipitation, non-irrigated, 25 acres, T1N R44E SE1/4 Section 17. FY99 planted late October 1999. FY00 fair stand with fair vigor. No seed was produced this year due to extended drought and slow plant establishment. FY01 failed due to drought – **cancel**.

ID01006 Winterfeld Ephraim crested wheatgrass District Seed Increase. Seed ordered March 13, 2001. Site characteristics - Tetonia silt loam soil, 2 percent slopes, south aspect, 5600 feet elevation, 18 inch precipitation, non-irrigated, T2N R43E SE1/4 Section 8. FY01 plan to plant spring 2002 due to drought this year.

ID01008 Winterfeld Lodorm green needlegrass. Seed purchased through North Dakota and shipped April 4, 2001 for seed increase. FY01 failed due to drought – **cancel**.

ID01012 Winterfeld Regar meadow brome – Foundation. FY01 good stand establishing with fair vigor due to drought conditions.

ID01013 Winterfeld Sodar streambank wheatgrass – Foundation. FY01 excellent stand establishing with excellent vigor under severe drought conditions.

FIELD OFFICE: REXBURG

ID89015 Wagoner Luna pubescent wheatgrass, P-27 Siberian wheatgrass, Sodar streambank wheatgrass, Greenar intermediate wheatgrass, Delar small burnet, Trevois alfalfa field planting on rangeland. Site is gravelly loam soil with a pan at 5-6 inches, non-irrigated, 12-inch ppt, 6300 feet elevation, and 3% slopes on NE exposure. FY89 ripped rangeland in spring and seeded mix in fall of 1990. FY91 excellent stand establishing with production about 1400 lbs/ac. FY92 clipping data: No Treatment - 318 lbs/ac., chisel only treatment (native species) - 495 lbs/ac., chisel/disc/seed treatment - 1110 lbs/ac. Clipped 7/9/92. FY93 Clipped plots resulted in production of 1200-2000 lbs/ac. FY94 production of about 800 lbs/ac in extremely droughty year. Non treated rangeland producing about 100 lbs/ac this year. FY95 excellent stand Luna and Greenar, Good stand P-27, Sodar and Travois and Poor stand of Delar. Stand produced 1400+ lbs/acre this year. High antelope use of stand was noted. Stand was grazed 3 weeks in spring and 4 weeks in fall with good management. FY96 excellent stand of Trevois, and good stand 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. **Next evaluation will be FY02.**

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. **Next evaluation will be FY02.**

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. **Next evaluation will be FY02.**

ID91033 Madison SCD Multiple species demo plots. Located behind Rexburg FO. FY91 planted in spring. FY92 planting establishing well. Shrubs under fiber mulch are out performing those that are not. FY93 plants were doing well but had to be moved because of enlargement of parking lot. Will know survival in 94. FY94 Grass plots were removed because of parking lot enlargement. Austrees are 4 years old and about 20 feet tall and 2 year old poplars are 10-12 feet tall. FY95 Arctic willows failed transplant, all others are doing very well. Austrees are 25 to 30 feet tall (five years Old). Grass will be planted in spring of 1996. FY96 Austrees 30+ feet tall, Poplars 20+ feet tall and Larch is eight feet tall (4 years old). FY97 lost one poplar to disease all others doing well. **Next evaluation will be FY02.**

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. **Next evaluation will be FY02.**

ID93001 Clark SCD Multiple species demo plots. Site is located near Clark County Senior Center. FY93 trees were planted and ground prepared by chiseling to plant grass in the spring of 94. FY94 trees and shrubs planted with fabric material have a 98-100% survival. Grass plots were not installed due to drought conditions. FY95 all trees have survived and doing great. Poplars are 6-8 feet tall second year. Grass plots were planted in spring of 1995 and are establishing well. FY96 poplars 10-15 feet tall, juniper 4-5 feet tall, grass plots are establishing well. FY97 excellent growth for both trees and shrubs. FY99 grass plots are well established. A 1600 feet windbreak with drip system has been added to area (species include row 1: poplars, row 2 mixed shrubs of Siberian peashrub, chokecherry, and Nanking cherry, and row 3 Rocky Mountain juniper. Survival the first year was 98 percent. **Next evaluation will be FY02.**

ID94017 Lerwill Multiple willows adaptation demo. Colorado accessions. Cuttings ordered 3/94. Cuttings shipped 4/94. FY94 no evaluation. Some cuttings of each species have survived. The PMC accessions have much better growth than native species. Some loss due to spraying herbicide to control thistles. FY96 willows that survived are doing well. FY97 40 percent survival with surviving willows growing well. They survived spring flooding. FY98 vigor is good with plants now 8 to 10 feet tall and 10 feet crown width. **Next evaluation will be FY02.**

ID98009 Lerwill Aberdeen PMC - Laurel willow field planting. Materials ordered 2/9/98. FY98, FY99, FY00 and FY01 no evaluations.

ID00011 Richard Beesley Poplar field planting of accessions (15-29; 50-197; OP-367; 184-411; 52-225). Materials shipped from Oregon to Aberdeen PMC April 1998 and transferred to Rexburg same date. FY98 Poplar accessions planted in April were subjected to several hard frosts, and very hot dry summer. Survival was poor at 30 percent. 100 cuttings each of OP367 Hybrid poplar and 52-225 Hybrid poplar were ordered March 1, 2000 from Aberdeen for shipment on about March 7, 2000. FY00 and FY01 no evaluation.

FIELD OFFICE: RIGBY/TERRETON

ID96019a Mud Lake Willows and cottonwood demo planting Laurel, Coyote, White, Robusta poplar, Siouxland poplar, and Carolina poplar. Cuttings ordered 2/20/96. Planted May 8, 1996 using fabric mulch material and drip irrigation. FY96 Water application, started July 5th with willows receiving 7 gallons/week and poplars receiving 12 gallons/week. Flood irrigation by Park officials resulted in over-irrigation and drip system was cut back. 100% survival of all species except coyote which had 70% survival. Good vigor for all species except Carolina poplar which had fair vigor. Growth: Carolina 3.2 feet; Siouxland 5.7 feet; Robust 5.5 feet; Laurel 2.7 feet; White 3.7 feet; Coyote 4.0 feet. FY97 Irrigation: 3 gallons/tree from May through September. Survival/Vigor/Height: Carolina poplar 75%/good/10.5 feet; Siouxland poplar 100%/excellent/14 feet; Robust poplar 100%/fair/7 feet; Laurel willow 100%/excellent/7.5 feet; White willow 100%/excellent/9 feet; Coyote willow 67%/fair/ 4.5 feet. FY98 Survival/ Vigor/Height: Carolina poplar 75%/good/15 feet; Siouxland poplar 100%/excellent/ 20 feet; Robust poplar 100%/fair/12 feet; Laurel willow 100%/excellent/10.5 feet; White willow 100%/good/14 feet; Coyote willow 70%/good/6.5 feet. FY99 Carolina poplar 75% survival with good vigor and 21.2 feet height. Siouxland poplar 100% survival with excellent vigor and 26.4 feet height. Robust poplar 100% survival with poor vigor (yellow leaves) and 16.6 feet height – seedlings are vigorous with good color and suspect Aberdeen stock may have disease. Laurel willow 100% survival with good vigor and 12.4 feet height. White willow 100% survival with good vigor and 18.5 feet height. Coyote willow 70% survival with fair vigor and 6.9 feet height. FY00 Flood irrigated every two weeks with drip irrigation 6-10 gal/week. Carolina poplar 75 percent survival with excellent vigor and 320 inch height. Siouxland poplar 100 percent survival with excellent vigor and 354 inch height. Robust poplar 100 percent survival with poor vigor (disease) and 216 inch height. Laurel willow 100 percent survival with excellent vigor and 180 inch height. White willow 100 percent survival with fair vigor and 240 inch height. Coyote willow 66 percent survival with fair vigor and 90 inch height. FY01 6-year-old planting was

flood irrigated every two week this year. Carolina poplar (10-15 feet spacing recommended) - 75% survival, excellent vigor, 36 feet height, 16 feet crown width, and 5.5 inch DBH. Siouxland poplar (10-15 feet spacing recommended) – 100% survival, excellent vigor, 38 feet height, 15 feet crown width, and 5 inch DBH. Robust poplar (10-15 feet spacing recommended) – 100% survival, poor vigor, 25 feet height, 9 feet crown width, and 3.5 inch DBH. Laurel willow (8-10 feet spacing recommended) – 100% survival, good vigor, 17 feet height, 12.5 feet crown width, and 2 inch DBH. White willow (10-12 feet spacing recommended) – 100% survival, fair vigor, 20 feet height, 12 feet crown width, and 2 inch DBH. Coyote willow (3-5 feet spacing recommended) – 70% survival, fair vigor, 8 feet height, and 3 feet crown width.

ID96019b Rigby Cottonwood demo planting - Carolina, Siouxland, Robusta. Planted April 29th using fabric mulch and drip irrigation. FY96 Water application 10-14 gallons per week. Growth Carolina 2.0 feet; Siouxland 3.2 feet; Robust 4.0 feet. FY97 100% survival for all poplars. Good vigor for Carolina and Siouxland / poor vigor for Robust. Height 8-9 feet Carolina and Siouxland / 3 feet Robust. FY98 Survival/Vigor/Height: Carolina poplar 100%/good/15 feet; Siouxland poplar 100%/ excellent/18 feet; and Robust poplar 100%/poor/5.5 feet. FY99 Carolina poplar 100% survival with fair vigor and 21 feet height. Siouxland poplar 100% survival with fair vigor and 21 feet height. Robust poplar 100% survival with very poor vigor and 7 feet height. Note – Robust poplars from Lawyers Nursery are thriving, so suspect Aberdeen cuttings may be carrying a disease. FY00 Drip irrigated (14 gal/week) – Carolina poplar 100 percent survival with fair vigor and 240 inch height; Siouxland poplar 100 percent survival with fair vigor and 252 inch height; Robust poplar 100 percent survival with poor vigor and 84 inch height. FY01 6-year-old planting is irrigated with drip irrigation system at 7 gallons per week. Carolina poplar – 100% survival, poor vigor 22 feet height, 7 feet crown width, and 2.5 inch DBH. Siouxland poplar – 100% survival, poor vigor, 24 feet height, 6 feet crown width, and 3 inch DBH. Robust poplar – 100% survival, very poor vigor, 7 feet height, 4 feet crown width, and 1 inch DBH. Drought stress is evident and drip irrigation system is probably not fully functioning with plugged emitters, need for additional emitters, and need for longer watering sets.

ID97019a Hager Willow field planting. 5 cuttings of Aberdeen willows - Laurel, Streamco, and White; 5 cuttings of Meeker willow - Scouler. Cuttings ordered 2-11-97. FY97 windbreak planted mid April 1997 with fabric mulch and drip irrigation (averaged 8-10 gallons/plant/week. Survival/Vigor/Height: Laurel 100%/excellent/2.5 feet; Streamco 100%/excellent/4 feet; White 100%/excellent/ 6 feet; Scouler 75%/good/4.5 feet - Scouler affected by fungus on leaves. FY98 Survival/Vigor/Height: Laurel 100%/good/5.5 feet; Streamco 100%/fair/5 feet; White 100%/good/8 feet; and Scouler 75%/fair/5 feet. FY99 Laurel willow 100% survival with fair vigor and 6.3 feet height. Streamco willow 100% survival with good vigor and 6.7 feet height – note looks like spider plant and would not recommend for windbreaks, but would probably make an excellent streambank erosion control species. White willow 100% survival with good vigor and 5 feet height. Scouler willow 75% survival with good vigor and 13.5 feet height. FY00 Laurel willow 100 percent survival with good vigor and 96 inch height; Streamco willow 100 percent survival with good vigor and 60 inch height; White willow 100 percent survival with fair vigor and 192 inch height; Scouler willow 75 percent survival with fair vigor and 84 inch height. FY01 five-year-old planting is drip irrigated. Laurel willow – 100% survival good vigor, 9.5 feet height, 8 feet crown width, and out performing others in this test with healthy vigorous growth and increased density. Streamco willow – 100% survival, good vigor, 5.5 feet height, and 10 feet crown width. White willow – 100% survival, fair vigor, 16 feet height, and 9 feet crown width. Scouler willow - 75% survival, poor vigor, 7 feet height, 6 feet crown width, and damage by borers.

ID97019b Camas Creek site 1 Willow field planting. Cuttings of Aberdeen PMC willows - White, Laurel, Streamco, Geyer, Coyote and Meeker PMC willows Scouler, Pacific, Booth (827), Drummond (828), Greyleaf, Wolf and Geyer (832). Planted April 10, 1997 for streambank protection (no irrigation). On May 21, 1997 Laurel and White were submerged and all others were partially submerged. FY97 Survival/Vigor/Height: White 100%/excellent/3 feet; Laurel 100%/excellent/ 1.5 feet; Streamco 100%/excellent/2.5 feet; Geyer 100%/ excellent/2 feet; Coyote 60%/excellent/2 feet; Scouler 100% excellent/2 feet; Pacific 100%/excellent/3 feet; Booth (827) 100%/good/1.5 feet; Drummond (828) 100%/good/1.5 feet; Greyleaf 80%/fair/2 feet; Wolf 80%/fair/0.5 feet; Geyer (832) 100%/exc./2 feet. FY98 Survival/Vigor/Height: White 100%/good/4 feet; Laurel 100%/fair/2 feet; Streamco 100%/good/3 feet; Geyer 100%/fair/2.5 feet; Coyote 67%/excellent/5-5 feet; Scouler 80%/fair/2 feet; Pacific 100%/good/3 feet; Booth (827) 100%/poor/ 2 feet; Drummond (828) 80%/fair/2.5 feet; Greyleaf 80%/poor/2 feet; Wolf 80%/ poor/1 foot; and Geyer (832) 80%/fair/2.5 feet. FY99 White willow 100% survival with good vigor and 6 feet height. Laurel willow 100% survival with fair vigor and 3 feet height. Streamco willow 100% survival with good vigor and 4 feet height. Geyer willow 100% survival with good vigor and 5 feet height. Coyote willow 100% survival with good vigor and 5 feet height. Scouler willow 60% survival with fair vigor and 4 feet height. Pacific willow 100% survival with good vigor and 7 feet height. Booth (827) willow 100% survival with fair vigor and 3 feet height. Drummond (828) willow 20%

survival with poor vigor and 2 feet height. Greyleaf willow 80% survival with poor vigor and 1 foot height. Wolf willow 20% survival with poor vigor and 1.5 feet height. Geyer (832) willow 80% survival with fair vigor and 3.5 feet height. FY00 Elk heavily utilize site in winter. Overall the Streamco, White, Pacific, Coyote willows are performing the best under browsed conditions. Streamco is probably the best streambank stabilization willow being tested and is spreading with noticeable root growth. Aberdeen willows - White willow 100 percent survival with excellent vigor and 80 inch height; Laurel willow 75 percent survival with good vigor and 48 inch height; Streamco willow 100 percent survival with good vigor and 48 inch height; Geyer willow 80 percent survival with poor vigor and 60 inch height; Coyote willow 100 percent survival with good vigor and 48 inch height. Meeker willows – Scouler willow 60 percent survival with fair vigor and 40 inch height; Pacific willow 100 percent survival with good vigor and 90 inch height; Booth (827) willow 100 percent survival with fair vigor and 48 inch height; Drummond (828) willow 80 percent survival with fair vigor and 48 inch height; Greyleaf willow 40 percent survival with poor vigor and 28 inch height; Wolf willow 40 percent survival with poor vigor and 28 inch height; Geyer (832) willow 60 percent survival with good vigor and 60 inch height. FY01 riparian planting with moisture provided by stream/subirrigation through 1st week of July (2 years of drought have affected this planting – however, tree type willows Pacific, White, and Streamco are best performers perhaps because they were able to root more deeply than shrub type willows). Scouler willow – 40% survival, very poor vigor, 4 feet height, and 3 feet crown width. Pacific willow – 100% survival, good vigor, 7 feet height and 7 feet crown width. Booth willow (827) – 100% survival, poor vigor, 2.5 feet height, and 3 feet crown width. Drummond willow (828) – 100% survival, poor vigor, 2.5 feet height, and 2 feet crown width. Greyleaf and Wolf willow failed. Geyer willow (832) – 40% survival, fair vigor, 4 feet height, and 4 feet crown width. White willow – 100% survival, fair vigor, 7 feet height, and 6 feet crown width. Laurel willow – 75% survival, poor vigor, 3 feet height, and 3 feet crown width. Streamco willow – 100% survival, good vigor, 6 feet height, and 8 feet crown width. Geyer (Aberdeen) willow – 100% survival, poor vigor, 3 feet height, and 3 feet crown width. Coyote willow – 40% survival, poor vigor, 4 feet height, and 2 feet crown width.

ID97019c Camas Creek site 2 Willow field planting. Cuttings of Meeker PMC Drummond (827), Drummond (829), Booth (827), Booth (825), Sandbar (831), Geyer (822), Yellow (819), Yellow (834), and Yellow (835). Planted April 17, 1997 for streambank protection (no irrigation). All cuttings submerged at mid May for about one month. FY97 Survival/Vigor/Height: Drummond (827) 80%/good/2 feet; Drummond (829) 60%/fair/1 foot; Booth (827) 40%/good/1.5 feet; Booth (825) 60%/ fair/1 foot; Sandbar (831) 80%/fair/1 foot; Geyer (822) 60%/ poor/1 foot; Yellow (819) 40%/fair/1.5 feet; Yellow (834) 100%/excellent/1.5 feet; Yellow (835) 60%/fair/1.5 feet. FY98 Survival/Vigor/Height: Drummond (827) 60%/fair/3.5 feet; Drummond (829) 0%; Booth (827) 20%/fair/3 feet; Booth (825) 60%/fair/2.5 feet; Sandbar (831) 100%/excellent/5 feet; Geyer (822) 20%/poor/3 feet; Yellow (819) 40%/good/5 feet; Yellow (834) 100%/excellent/7 feet; and Yellow (835) 40%/good/ 3.5 feet. FY99 Drummond (847) willow 60% survival with good vigor and 5 feet height. Drummond (829) willow failed. Booth (827) willow 60% survival with good vigor and 5 feet height. Booth (825) willow failed. Sandbar (831) willow 100% survival with excellent vigor and 8.3 feet height. Geyer (822) willow failed. Yellow (819) willow 60% survival with good vigor and 7 feet height. Yellow (834) willow 60% survival with good vigor and 8 feet height. Yellow (835) willow 20% survival with fair vigor and 4 feet height. FY00 Coyote willow (native) is thriving and dominating the site with average of 1 plant/foot. Weeds are being crowded out. The planted willows performing the best are Booth (825) and Yellow (819) willows. Drummond (827) willow 60 percent survival with good vigor and 76 inch height. Drummond (829) willow failed. Booth (827) willow 20 percent survival with good vigor and 84 inch height. Booth (825) willow 80 percent survival with excellent vigor and 100 inch height. Sandbar (831) willow 100 percent survival with excellent survival and 96 inch height. Geyer (822) willow 20 percent survival with good vigor and 90 inch height. Yellow (819) willow 60 percent survival with excellent vigor and 100 inch height. Yellow (834) willow failed. Yellow (835) willow 20 percent survival with fair vigor and 84 inch height. FY01 5 five-year-old planting is naturally irrigated from streambank moist and is suffering from severe drought. The jungle of native coyote willow provided severe competition. Half of native coyote willows died due to drought and other are now defoliated. All Yellow willows died due to severe competition. The Drummond willow closest to the weir survived because no coyote willows established in that location. Coyote willow is only willow that will survive on this site (even though many have died this year, it has such a superior spreading ability, that new generations will occupy site as moist conditions improve. **Cancel** future evaluations at this location.

ID97022 Hager Field Planting. Non-Irrigated or Partially Irrigated-Bannock thickspike wheatgrass, Newhy hybrid wheatgrass, P27 Siberian wheatgrass and Irrigated-Rush intermediate wheatgrass, Paiute orchardgrass, and Regar meadow brome. Site is on a Bannock silt loam soil with gravel modifier, 0-2% slope, west aspect, 4795 feet elevation, 10-12 inch ppt., irrigated to partially irrigated, T4N R38E SW1/4 Section 28. Seed ordered 3/3/97. Planting planned

for spring 1997. FY97 planted mid May by broadcast and harrowing. All species irrigated with sprinkler the first season June through September at 1 inch per week. Stand/Plants per Ft²/Vigor/Tons per Acre: Regar good/6/good/0.9; Rush excellent/20/excellent/1.9; Paiute excellent/6/good /1.05; Bannock poor/2/ poor/0.65; Newhy good/7/good/0.8; P27 good/5/fair/0.65. Excellent stand of Rush with earlier start and double the production of other fully irrigated species. FY98 Stand/Plants per Ft²/Vigor/Tons per Acre: Regar fair/3/good/3.5; Rush excellent/5/excellent/3.5 to 4.5; Paiute fair/5/poor/1.5; Bannock poor/2/ fair/1.4; Newhy excellent/3/excellent/2.0; and P27 good/9/good/1.7. FY99 Irrigated – Regar fair stand with fair vigor and 3 plants per square foot. Rush excellent stand with excellent vigor and 4 plants per square foot. Paiute fair stand with very poor vigor and 4 plants per square foot. Non-irrigated – Bannock poor stand with fair vigor and 1 plant per square foot. Newhy good stand with good vigor and 5 plants per square foot. P27 good stand with good vigor and 4 plants per square foot. Rush (irrigated) and Newhy (non-irrigated) have best stands in these gravelly soils. FY00 Due to drought production and vigor considerably less than prior years. Wildfire in late June burned all if Bannock, Paiute, and most Newhy and Rush. Regar and Rush are semi-irrigated with total rainfall and irrigation totaling 10-12 inches this year. All other species received 5-6 inches this year. Irrigated - Regar poor stand with poor vigor and 1500 pounds of production; Rush excellent stand with poor vigor and 3400 pounds of production. Non-Irrigated – Paiute and Bannock no regrowth following fire; Newhy good stand with very poor vigor and 1200 pounds of production; P-27 good stand with very poor vigor and 1000 pounds of production. FY01 5th year of planting with past two being severe drought. Rush and Regar were partially irrigated through June. All plants are very drought stresses. Production has decrease significantly the last two years. Regar and Paiute are about gone – mostly replaced by quackgrass. Rush and P-27 are still full stands, although vigor is poor due to drought. Bannock and Newhy are maintaining stands although Newhy vigor is very poor.

ID98010 Hager Willow and shrub field planting (Aberdeen - Laurel willow and Pullman shrub - Blanchard Blue Elderberry). Materials ordered 2/9/98. Site is loam soil, 0-2 % slope, west aspect, 4795 feet elevation, 10-12 inch ppt, irrigated, T4N R38E SW1/4 Section 28. FY98 Survival/Vigor/Height: Laurel willow (deep soil with fabric) 100%/excellent/3.5 feet; Laurel willow (gravelly soil with fabric) 100%/good/2.5 feet; Elderberry (with fabric) 80%/excellent/1.33 feet; and Elderberry (without fabric) 50%/very poor/0.5 feet. FY99 Laurel willow loam soil – 100% stand with good vigor and 6 feet height. Laurel willow gravelly soil – 100% stand with fair vigor and 4.8 feet height. Blanchard weed barrier material – 80% stand with excellent vigor, berry production, and 5.2 feet height. Blanchard no weed barrier material – failed. FY00 Laurel willows are vigorous, healthy and thriving under drip irrigation. Blanchard elderberry are vigorous and produced abundant elderberries beginning around first of August. Laurel willow on loamy soil had 100 percent survival with good vigor and 84 inch height. Laurel willow on gravelly soil had 100 percent survival with fair vigor and 80 inch height. Blanchard elderberry under weed barrier material has 80 percent survival with good vigor and 80 inch height. FY01 plants are 3 years old and are drip irrigated. Laurel willow (loamy site) – 100% survival good vigor, 8 feet height, and 9 feet crown width. Laurel willow (gravelly site) – 100% survival, good vigor, 8.5 feet height, and 7 feet crown width. Blanchard blue elderberry – 80% survival, good vigor, 8 feet height, 8.5 feet crown width and abundant elderberries use heavily by Brewer sparrows.

ID98013 Jefferson County Landfill Field planting 1) Ephraim crested wheatgrass, Sodar streambank wheatgrass, and Bannock thickspike wheatgrass; 2) Covar sheep fescue, Schwendimar thickspike wheatgrass, and Secar Snake River wheatgrass. Seed ordered Feb 9, 1998. Site is silty clay loam soil, 0-1 % slope, east aspect, 4785 feet elevation, 10-12 inch ppt, non-irrigated, T6N R33E SE1/4 Section 14. FY98 initial evaluation showed very poor to no establishment of Covar, Schwendimar, Secar, Sodar, and poor to very poor establishment of Ephraim and Bannock. The clay soil portions of the seeding crusted and the sandy soil portion of the seeding may have been too dry. Site should be evaluated one more season before a decision to reseed is made. FY99 Covar – fair stand with poor vigor and .2 plants per square foot. Schwendimar – very poor stand with poor vigor and .1 plants per square foot. Secar – very poor stand with poor vigor and .1 plant per square foot. Bannock fair stand with poor vigor and 1 plant per square foot. Sodar – poor stand with poor vigor and .1 plants per square foot. Ephraim – fair stand with fair vigor and 1 plant per square foot. FY00 Planting Mix 1 – fair stand of Ephraim/Sodar/Bannock is establishing with fair vigor and stand is limiting weed growth. Planting Mix 2 – poor stand of Covar/Swendimar/Secar is establishing with fair vigor. Secar and Schwendimar failed in planting for the most part, but Covar is establishing slowly. Stand is dominated by kochia weed. Planting 3 – Bannock has good stand with fair vigor. Windbreak planting (drip irrigated) is irrigated once per week for 12-16 hours, is doing very well, and trees are uniform – Russian Olive 5-8 feet height with 5 feet crown width; Rocky Mountain Juniper 3-5 feet height with 3 feet crown width; Siberian Peashrub 4-7 feet height with 4 feet crown width. FY01 the Ephraim-Bannock-Sodar mix and Bannock only plantings are increasing and spreading. Covar in the Covar-Swendimar-Secar mix is also increasing. Grass densities of 2+ plants per foot squared occur on more favorable sandy soils. The hard packed clayey areas have few grass seedlings established. The windbreak planting is doing very well

with 100% survival and very good maintenance for water (drip irrigation system) and weed control. Russian olive is averaging 9 feet tall and 7 feet crowns on sandier soils and 5-6 feet tall with 5 feet crowns on clayey hard packed soils. Junipers and Siberian peashrub are not affected as much by varied soil conditions with Junipers averaging 5 feet tall with 4 feet crowns on sandy soils and 4.5 feet tall with 4 feet crowns on clayey soils. The Siberian peashrub is averaging 6 feet tall with 5 feet crowns on sandy soils and 5.5 feet tall with 5 feet crowns on clayey soils.

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 SE1/4 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 cooperater had fertilized planting.

ID98015 Holly Canal Company Canal bank erosion control trial plots with Alma blue grama, Hachita blue grama, Willis blue grama, Covar sheep fescue, Tegmar intermediate wheatgrass, Sodar streambank wheatgrass, Ephraim crested wheatgrass, Bannock thickspike wheatgrass. Seed ordered 2/9/98. Site is silty clay loam, 0-33 % slope, all aspects, 4790 feet elevation, 10-12 inch ppt, dry to partially irrigated T6N R35E SW1/4 Section 2. FY98 plots planted the first week of April along recently constructed canal bank via broadcast and hallow. Stand/Plants per foot²/Vigor: Tegmar excellent/3/excellent; Sodar poor/0.7/ fair; Ephraim fair/1/fair; Bannock excellent/1.3/good; Covar poor/0.4/very poor; Alma good/0.8/excellent; Hachita very poor/0.1/very poor; and Willis fair/0.5/fair. FY99 Tegmar - good stand with fair vigor. Sodar - good stand with fair vigor. Ephraim good stand with good vigor. Bannock - good stand with good vigor. Covar - good stand with good vigor. Alma very poor stand with good vigor. Hachita - failed. Willis - poor stand with good vigor. Ephraim has the best stand and Covar has increased considerably and is spreading. FY00 Much of grass planting was killed on NW bank due to chemical treatment for potatoes last year. Ephraim, Bannock, and Sodar are increasing and will eventually dominate drier sites, Covar is doing poorly, Hachita failed, Alma has a few scattered plants, and Willis occupies a considerable area of East Top Bank. Very little grass establishment on inside bank where quackgrass and smooth brome dominate. FY01 kochia dominates all areas that were sprayed through pivot. Smooth brome and quackgrass have taken over canal bank and areas irrigated by pivot. Bannock, Tegmar and Ephraim have survived the best primarily on tops of canal dike. **Cancel**

ID00013 Hager Field Planting - 9033732 mockorange, 9033800 mockorange, 9033580 serviceberry, and 9033672 serviceberry. Materials ordered March 13, 2000 for shipping about April 10, 2000. FY00 Plantings are drip irrigated. Mockorange (732) 45 percent survival fair vigor and 7 inch height. Mockorange (800) 67 percent survival with good vigor and 10 inch height. Serviceberry (580) 95 percent survival with poor vigor and 4 inch height. Serviceberry (672) 100 percent survival with poor vigor and 6 inch height. FY01 plants drip irrigated. 9033732 Mockorange 20% survival very poor vigor, and 1-31 inch height. 9033800 Mockorange 67% survival, fair vigor and 13-25 inch height. 9033580 Serviceberry 80% survival, poor vigor and 8-15 inch height. 9033672 Serviceberry 85% survival, fair vigor and 16-22 inch height. Overall growth is slow for both species, but much improved over last year. Growth rates are doubled when using fabric mulch materials verses not using materials.

ID01004 Cooperator unknown cottonwood field planting. Ten cuttings each of 9067408 Narrowleaf cottonwood, 9067443 Narrowleaf cottonwood, 9067484 Narrowleaf cottonwood, 9067502 Narrowleaf cottonwood, Robust poplar, Carolina poplar, and Siouxland poplar. FY01 no evaluation.

ID02005 SCD Leafy Spurge Demonstration Plots. Covar sheep fescue, Durar hard fescue, and Manchar smooth brome. Seed ordered September 2001.

FIELD OFFICE: SALMON

ID81016 Smith Rincon fourwing saltbush field planting for rangeland. Evaluate every 3 years. Site is Dacore-Resoot-Nielson complex soil, non-irrigated, 12-inch ppt, 5920 feet elevation, and 2-4% slopes on a NW exposure. Planted 65 seedlings. FY92 75% survival and no seed production last 2 years. FY94 90% survival with good vigor, 3 feet height, 3.5 feet crown width and 60% branching density. Several plants have died back and resprouted over the years. Some seed germination has occurred in the plots down wind of mother plants. FY99 85 percent survival with good to

excellent vigor, 36-inch height, 3.5 feet canopies width, and fair fruit production. **Planting Canceled – retain write-up and file.**

ID00012 SCD Field Planting – Blanchard blue elderberry, 9023733 dogwood, 9023739 dogwood, and 9023740 dogwood. Materials ordered March 13, 2000 for shipping on April 10, 2000. FY00 and FY01 no evaluations.

FIELD OFFICE: ST. ANTHONY

ID93005 Fremont County willow field planting for Stream Stabilization at Frome Park, Henries Lake. FY93 70-90% survival of Curlew, Rivar and Palouse willows. FY94 27% survival Curlew, 43% survival Rivar, 37% survival Palouse, 0% survival of native willow. Planting was made into riprap with two equal rows, the first row high on the bank and the second row in a lower position. The upper row had 70-90% survival and the lower row had 0% survival and was assumed drowned. FY95 40% Curlew, 50% Rivar and 50% Palouse survival. Rivar moderate branching and Curlew/Palouse dense branching. Only one willow, Palouse failed during past year and all look very good. FY96, FY97, FY98, FY99, FY00 and FY01 no evaluations. **Cancel**

ID99009 Henrys Lake area field planting. Species include Coyote willow, Geyer 435 willow, Geyer 448 willow, Geyer 483 willow, Geyer 491 willow, Geyer Meeker willow, Snowberry, Elderberry, Dogwood 733, Dogwood 740, Booth willow, Drummond willow, Serviceberry 548, Serviceberry 580, Serviceberry 672, and Mockorange. FY99, FY00 and FY01 no evaluations.

PLANT MATERIALS

2001

UTAH EVALUATION SUMMARIES

FIELD, DSI and DEMONSTRATION PLANTINGS

PLANT MATERIALS PLANTINGS UTAH AREA 1

UT89011 Johnson - Tooele FO Secar Snake River wheatgrass and Hycrest crested wheatgrass field planting for jointed goatgrass control. FY90 seeded in March and stand is establishing. FY91 - FY93 no evaluations. FY94 fair stand of both species. Secar has better vigor and forage production. Secar does not establish as easily as Hycrest. Cattle prefer Secar. FY95 cooperators were disappointed in slow establishment and vigor of Secar in prior years. Secar plants are now well established and very vigorous. Secar is spreading outside of planted rows. During this favorable moisture year Secar remained green and continued to grow throughout the summer. Native bluebunch wheatgrass also remained green the entire growing season. FY96 good stand and vigor for both species. Secar is spreading outside of planted rows, but does not compete well with weeds (goatgrass and morning glory). Cooperators prefer Hycrest for early spring use. Secar is better species for use in later periods. FY97- FY99 no evaluations. FY00 Secar fair stand with good vigor. Hycrest good stand with good vigor. Grazing use is higher on Hycrest (45%) than Secar (10%) in spring grazing period. FY01 no evaluation.

UT90005 Hansen - Logan FO Newhy hybrid wheatgrass field planting in 18-inch precipitation zone. FY94 excellent stand with planting showing excellent palatability for sheep and mule deer. The stand is doing very well despite heavy grazing pressure. FY95 good to excellent stand of Newhy staying more weed free than nearby stand of smooth brome. Deer heavily grazes site in spring through summer. FY96 good stand with 2 plants per square foot, good vigor and about 0.9 AUM/Acre. FY97 Stand/Plants per foot/Survival/Vigor/Height: good-excellent/2/ 95%/good/22 inches - planting receives heavy deer use in spring. FY98 no evaluation. FY99 good stand of Newhy with 85% survival, good vigor, excellent production, plant height 22 inches, and .75 AUMs per acre. FY00 good stand with 85 percent survival. Deer use continues to be high. FY01 no evaluation.

UT90012 Don Peterson – Logan FO Medusahead rye control trial with Hycrest crested wheatgrass, Sherman big bluegrass, Oahe intermediate wheatgrass, and Luna pubescent wheatgrass. 1992, the year this trial was planted, was one of the driest on record. The planting was assumed to be a total failure. Site treatment in 1991 included burning of old plant residues, spraying all new growth with Roundup-Escort mix in March 1992, and planting March 1992. FY99 evaluation by Don Peterson, Steve Dewey, and Jeff Barnes – Oahe not planted. Sherman big bluegrass failed. Hycrest 50-75 percent survival with 4 plants per square foot, good vigor, and 14 inch plant height. Luna 50-75 percent survival, 5 plants per square foot, good vigor, and 24 inch plant height. Luna pubescent wheatgrass appears to be competing the best with medusahead rye. The trial area (300 acres) was burned off in the fall 1999. Site will be sprayed in spring 2000 for additional medusahead rye control and seeded to Luna pubescent wheatgrass. Rush intermediate wheatgrass will be planted in trial areas to allow comparison with Luna. FY00 and FY01 no evaluations.

UT94004 Cowley - Logan FO Newhy hybrid wheatgrass and tall wheatgrass field planting on saline soils. Site is silty clay to silt loam soil, irrigated, 4430 feet elevation, and 0-3% slope. Seed ordered 4/93. FY94 planting postponed until spring 1995 due to drought. FY95 planting delayed until fall 1995 due to very wet conditions. FY96 planted December 1995. In June, 95% survival noted with good initial vigor and a few plants heading. Weeds are very thick but do not appear to be hindering seedling establishment. Expect weeds to be a minor problem next year. FY97 fair to good stand (80%), with good vigor, and 12 inches in height. FY98-FY00 no evaluations. FY01 planting failed – **cancel**.

UT97001 Frank Bohman – Ogden FO Rush intermediate wheatgrass field planting. Site is loamy soil, non-irrigated, 19-inch ppt, 6000 feet elevation, and 30-40% slope on north exposure. Seed ordered July 15, 1996 for dormant fall planting. Seed shipped 9/9/96. FY97 no evaluation. FY98 excellent stand and vigor with .8 AUM/acre. Planting was over-seeded by air the same year as planting resulting in small burnet, orchardgrass, and flax also present in stand. FY99 no evaluation. FY00 excellent stand and vigor with 2 AUM/acre production. This was the first year the planting was grazed in early to mid May. Cooperator is very pleased with planting and production. FY01 no evaluation.

UT98001 Cooperator Unknown – Bonneville FO Pullman PMC shrub field planting - dogwood (3 accessions), chokecherry, mockorange, and Hawthorn. Materials ordered 2/9/98. FY98-FY99 no evaluations. FY00 40 percent survival with fair vigor and 30 inch height. There is a lot of competition from other riparian species, but these plants are surviving and growing slowly. FY01 no evaluation.

UT99002 Scott Hansen - Tremonton FO P27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, and Goldar bluebunch wheatgrass field planting. Rimrock Indian ricegrass and Maybell antelope bitterbrush demo packets were also ordered. Site is a silt loam soil, 3 percent slope, east aspect, 5075 feet elevation, 20 inch rainfall, and non-irrigated. T12N R2W Section 22 SE Quarter. Seed ordered December 8, 1998 for delivery mid September 1999. FY99 area is heavily infested with weeds. Cooperator plans to control weeds during spring-summer 2000 and plant fall 2000. FY00 and FY01 no evaluation.

UT99003 Hathaway Family - Tremonton FO P27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, Goldar bluebunch wheatgrass, Ephraim crested wheatgrass, Nordan crested wheatgrass, and Lincoln smooth brome field planting. Site is a former beet dump with high organic soil, 1 percent slope, east aspect, 4800 feet elevation, 18 inch rainfall, and non-irrigated. T2N R Section ? Seed ordered December 8, 1998 for delivery as soon as possible. FY99 cooperator plans an additional season of weed control in spring – summer 2000 with planting planned for fall 2000. FY00 weeds continue to be a problem following 3 applications of Roundup this season. FY01 no evaluation.

UT99004 Roger Fridal - Tremonton FO Robusta poplar, Carolina poplar, Siouxland poplar, and Golden willow field planting. Site is below a livestock feedlot with a high organic silt loam soil, 0-20 percent slope, 4300 feet elevation, 18-inch rainfall, irrigated for establishment, and non-irrigated long term. T11N R3W Section 2 SE Quarter. Cuttings ordered December 8, 1998 for delivery about April 1, 1999. FY99 50 percent survival of all species. All have good vigor, 2-3 feet height, and good uniformity. The cuttings planted along edge of river are dead possibly due to saline conditions. The cuttings planted along fresh water seep are all doing well. FY00 site was severely damaged by livestock this season – a few willows and cottonwoods remain and will be evaluated next year. FY01 no evaluation.

UT99005 Gordon Zito - Tremonton FO Robusta poplar, Carolina poplar, Laurel willow, Golden willow, and White willow field planting. Site is a silt loam soil, 0-25 percent slope, west aspect, 4300 feet elevation, 18 inch rainfall, and non-irrigated. T11N R3W Section 2 NE Quarter. Cuttings ordered December 8, 1998 for delivery about April 1, 1999. FY99 Carolina poplar and white willow failed. Robust poplar .6 percent survival (1 of 15), Laurel willow 13 percent survival (2 of 15), and Golden willow 13 percent survival (2 of 15). Best survival in areas near fresh water seep – failure in more saline areas. FY00 site was severely damaged by livestock this season – a few willows remain and will be evaluated next year. FY01 no evaluation.

UT99006 Ross McKinnon - Randolph FO Luna pubescent wheatgrass, Rush intermediate wheatgrass, Largo tall wheatgrass, Jose tall wheatgrass, Alkar tall wheatgrass, Bozoisky Russian wildrye, Shoshone beardless wildrye (both seed and plugs), and Prairieland Altai wildrye field planting for saline soil demonstration. Site is silty clay loam soil (saline), 0-1 percent slope, west aspect, 6230 feet elevation, 11 inch rainfall, and non-irrigated. T11N R7E Section 23 NW of NW Quarter. Seed ordered December 8, 1998 for delivery October 1, 1999. FY99 seeding completed in late November 1999. FY00 and FY01 no evaluations.

UT99008 Bryner - Logan FO Laurel willow field planting – nursery. Site is Airport loam soil, 7.7 pH, heavy clay sub-soils, 0 slope, 16-inch rainfall zone, high watertable, and 4430 feet elevation. FY99 cuttings planted April 17, 1999 into 12 inch scalped circles, T12N R1E SW quarter of Section 31. Trees are drip-irrigated. June 4, 1999 cuttings have sprouted and appear to be establishing well. FY00 and FY01 no evaluations.

UT00001 Don Peterson - Logan FO spring field planting of Rush intermediate wheatgrass (medusahead wildrye control). Leatham silt loam soil, 30 percent slopes, southwest aspect, 5400 feet elevation, 14-17 inch precipitation, non-irrigated, T9N R1E North ½ Section 5. FY00 site burned in fall 1999 and sprayed with Roundup-Escort mix in spring 2000 for medusahead control. Chemical kill of medusahead was excellent. 14 pounds per acre were drilled in 8 inch spacing on May 20, 2000 with good initial germination and establishment. FY00 and FY01 no evaluations.

UT00005A Gordon Zito – Tremonton FO willow field planting. 40 cuttings of 9067556 Coyote willow, 15 cuttings of 9067436 Yellow willow, and 40 cuttings of 9067560 Peachleaf willow were ordered on March 1, 2000 for shipment on April 10, 2000. Planted along Malad River April 20, 2000 on Kr soil, salt limitations, 0-20 percent slopes, west aspect, 4300 feet elevation, 18 inch rainfall, non-irrigated, T11N, R3W, NE ¼ Section 2. FY01 no evaluation.

UT0005B Roger Fridel – Tremonton FO willow field planting. 5 cuttings each of 9067556 Coyote willow, 9067436 Yellow willow, and 9067560 Peachleaf willow were ordered on March 1, 2000 for shipment on April 10, 2000. Planted along Malad River April 20, 2000 on Kr soil, salt limitations, 0-10 percent slopes, west aspect, 4300 feet elevation, 18 inch rainfall, non-irrigated, T11N, R3W SE ¼ Section 2. FY01 no evaluation.

UT0005C Bret Selman – Tremonton FO willow field planting. 5 cuttings each of 9067556 Coyote willow, 9067436 Yellow willow, and 9067560 Peachleaf willow were ordered on March 1, 2000 for shipment on April 10, 2000. Planted along Spring Branch of the Little Bear River April 20, 2000 on Kr soil, salt limitations, 0-10 percent slopes, west aspect, 5300 feet elevation, 18 inch rainfall, non-irrigated, T9N, R1E NW ¼ Section 21. FY01 no evaluation.

UT01003 – Randolph FO willow field planting. 9067548 Drummond willow 15 cuttings, 9067435 Geyer willow 15 cuttings, 9067491 Geyer willow 15 cuttings, 9067437 Booth willow 15 cuttings, 9067469 Booth willow 15 cuttings, 9067478 Booth willow 15 cuttings, 9067553 Lemmon willow 15 cuttings, and 9067567 Lemmon willow 15 cuttings. FY01 no evaluation.

UT01005 Scott Hansen – Tremonton FO field planting. Tarweed control. P27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Goldar bluebunch wheatgrass, Nezpar Indian ricegrass, Rimrock Indian ricegrass, Arriba western wheatgrass, Bozoiisky Russian wildrye, Mankota Russian wildrye, and Richfield Selection firecracker penstemon. Seed ordered April 16, 2001. FY01 no evaluation.

UTAH AREA 2

UT98002A LaDon Anderson Fillmore FO Aberdeen PMC - Laurel willow and Pullman PMC. Materials ordered 2/9/98. FY98 41 of 46 Laurel willows are surviving at the end of the first growing season. FY00 38 of 46 surviving with good to poor vigor, 3-10 feet height, 2-5 feet crown widths. All plants are brown and chlorotic due to lack of irrigation, saline water source, and saline soils. Plant loss is probably due to livestock damage and weed control is not being performed. FY01 80 percent survival with fair vigor – plants did not grow much in height, but did get much denser. Site conditions with high pH saline soil with saline water source are limiting plant performance.

UT98002B Randy Coates Fillmore FO - Blue Elderberry. Materials ordered 2/9/98. Elderberry will be planted this fall. FY99 no evaluation. FY00 3 of 5 plants surviving during June evaluation. August evaluation plants dormant due to severe drought. FY01 planting failed - **cancel**.

UT99001 Continental Lime Inc. – 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 no evaluation.

UT99010 Gavin Brown – Cedar City FO Vavilov Siberian wheatgrass field planting. Site Characteristics: Calcross silty clay loam soil, pH 8.8, slope 1 percent, elevation 5495, 11 inch precipitation, non-irrigated, MLRA D35A, Section 14 T36S R12W. Seed ordered July 23, 1999. FY99 seed shipped July 26, 1999. FY01 planting failed - **cancel**.

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

UT00004 Peterson – Fillmore FO Laurel willow field planting. 100 cuttings ordered March 1, 2000 with shipment April 10, 2000. FY00 no evaluation. FY01 50 percent survival with fair vigor due to inadequate water management. Plant height is 60 inches and crown width is 1-3 feet

UT00006 Don Taylor – Cedar City FO Pete eastern gamagrass field planting. Site characteristics: Fluvent silt loam soil, 1 percent slope, pH 8.0, 2800 feet elevation, 6 inch precipitation zone, irrigated, T42S R15W Section 32. Seed ordered March 15, 2000. FY00 seed was soaked in water with fungicide for 24 hours and then received a cold treatment at 30⁰ F. for 8 weeks prior to planting. Planted on June 6, 2000 into disked-landplained seedbed with corn planter (1.5 acres 16-inch spacing and 1.5 acres 32-inch spacing) at 13 pounds per acre. Irrigated immediately following planting. On June 26, 2000 cooperator noted that germination has started and he has been able to keep the planting wet. FY00 no evaluation. FY01 planting failed - **cancel**.

UT01001 Mike Pace – Delta/Fillmore FO saline demo plots. Species – Irrigated: Shoshone beardless wildrye, Alkar tall wheatgrass, Jose tall wheatgrass, Largo tall wheatgrass, Newhy hybrid wheatgrass, Pryor slender wheatgrass, San Luis slender wheatgrass, _____ tall fescue (many new varieties available), Prairieland Altai wildrye, Rosana western wheatgrass, Arriba western wheatgrass, _____ strawberry clover (might be good in grass mix). Species – Dryland: Bozoiisky Russian wildrye, Alkar tall wheatgrass, Jose tall wheatgrass, Largo tall wheatgrass, Pryor slender wheatgrass, San Luis slender wheatgrass, Nordan crested wheatgrass, Hycrest crested wheatgrass, CD-II crested wheatgrass, P-27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Luna pubescent wheatgrass, Rush intermediate wheatgrass. Shrubs: Fourwing saltbush, Winterfat, Immigrant forage kochia. FY01 planting failed – **cancel**.

UT01002 Cooperator Unknown – Fillmore FO willow field planting. 9067408 Narrowleaf cottonwood, 9067443 Narrowleaf cottonwood, 9067484 Narrowleaf cottonwood, 9067502 Narrowleaf cottonwood, 9067537 Black cottonwood, 9067538 Black cottonwood, 9067562 Black cottonwood, 9067563 Black cottonwood, 9067568 Black cottonwood, 9067569 Black cottonwood, Robust poplar, Carolina poplar, and Siouland poplar – 10 cuttings each. FY01 cuttings were not planted - **cancel**.

See table on last page for Cedar City FO - Yields of Pasture Grasses Irrigated with Effluent Water in Iron County, Utah

UTAH AREA 3

UT86018 Smith – Roosevelt FO Hycrest crested wheatgrass, Ephraim crested wheatgrass, Appar blue flax, Arriba western wheatgrass, T28606 needle and thread, Magnar basin wildrye, and Nordan crested wheatgrass field planting. FY90 Hycrest, Ephraim, Appar, Magnar, Nordan all 80-100 % survival. Arriba and T28606 are less than 40% survival. FY91 and FY92 no evaluations. FY93 Hycrest, Ephraim, Appar, Nordan, and T28606 doing best. Magnar and Arriba poorer stands. Sagebrush invading site, heavy use by elk, and Appar has many new seedlings. FY94 Hycrest, Appar, Arriba, and Nordan all have good stands. Ephraim, T28606 and Magnar have fair stands. All species are adapted to site and wildlife use is heavy. FY95 no change except vigor has improved due to excellent moisture year. FY96 Hycrest, Ephraim, Appar, T28606 and Nordan have good vigor. Fair vigor for Arriba and Magnar. FY97 Hycrest, Ephraim, Appar, Arriba and Nordan good stands. T28606 and Magnar fair stands. Many sagebrush seedlings within plots, particularly heavy in Arriba western wheatgrass and T28606 needle and thread. FY98 Hycrest, Ephraim, Appar,

Arriba, Magnar, and Nordan all have excellent vigor. T28606 has good vigor. FY99 very heavy wildlife use in winter and spring. Poor regrowth due to dry spring/ summer and fair regrowth following late summer rains. Planting is being invaded by sagebrush. FY00 Heavy spring use by wildlife and a very dry spring and summer. Rains began in early September and plants began to green-up. Evaluation indicated good vigor for Ephraim, Appar, Arriba, T28606, Nordan and fair vigor for Hycrest and Magnar. FY01 no evaluation.

UT88009 Skyline Mine - Price FO Multiple Grass on critical area planting – slopes. FY90 and FY92 planting summaries available. FY93 portion of seeding destroyed for new beltline. Rest of seeding doing very well. FY95 Appar flax is spreading, both intermediate and pubescent wheatgrass have spread, thickspike wheatgrass is doing very well, Sherman big bluegrass is doing great, mountain rye is not producing well, Paiute is doing well in plots but has not spread, Aster is improving, Covar sheep fescue is not performing well. FY96 seeding about the same as last year, erosion from slope covered some of the seeding and it will be interesting to see how the plants can withstand this sedimentation. Rush, Sherman and Mountain ryegrass are doing the best overall. FY97 and FY98 no evaluations. **FY99 Ten Year Evaluation. Mixture 1:** Luna pubescent wheatgrass is very good on steep slopes and fair on gentle slopes. Hycrest crested wheatgrass failed. Manchar smooth brome is not present on steep slopes, but doing very well on gentle slopes. Appar blue flax is fair on steep slopes and excellent on gentle slopes. Kalo birdsfoot trefoil failed on steep slopes and fair on gentle slopes. Delar small burnet and roses are present on both steep and gentle slopes. **Mixture 2:** Topar pubescent wheatgrass is very good on steep slopes and good on gentle slopes. Ephraim crested wheatgrass and Sodar streambank wheatgrass failed. Delar small burnet is fair on steep slopes and very good on gentle slopes. Roses are present on both slopes. **Mixture 3:** Rush intermediate wheatgrass is good on both steep and gentle slopes. P27 Siberian wheatgrass failed. Critana thickspike wheatgrass is fair on both slopes. Cedar Palmer penstemon is poor on steep slopes and fair on gentle slopes. Summit Louisiana sagewort and roses are present on both slopes. **Mixture 4:** Arriba western wheatgrass is fair to good on both slopes. Mountain rye is very good on gentle slopes. Sherman big bluegrass is good steep slopes and excellent on gentle slopes. Summit Louisiana sagewort is fair on both slopes. Roses are present on both slopes. **Mixture 5:** Rosana western wheatgrass is fair on both slopes. Paiute orchardgrass is very good on both slopes. Covar sheep fescue is good on steep slopes and fair on gentle slopes. Bandera Rocky Mountain penstemon is fair on both slopes. Roses are present on both slopes. **Mixture 6:** Tegmar intermediate wheatgrass is fair on both slopes. Durar hard fescue is fair on steep slopes and high fair on gentle slopes. Bannock thickspike wheatgrass is high fair to good on both slopes. Lutana cicer milkvetch is good on both slopes. Roses are present on both slopes. **Mixture 7:** San Luis slender wheatgrass is good on both slopes. Newhy hybrid wheatgrass failed. Cascade birdsfoot trefoil is poor on steep slopes and good on gentle slope. Blueleaf aster is good to very good on both slopes. Western yarrow is good on both slopes. Roses are present on both slopes. FY00 and FY01 no evaluations.

UT90017 Snowball - Price FO Multiple species irrigated demo plots for saline soils. FY92 and FY94 detailed reports available. Irrigation has pushed salinity down below root zone to a large degree. FY95 and FY96 Cicer milkvetch best producer (5279 lbs/ac) followed by San Luis (2587), Revenue (2326), Alsike (1986), Newhy (1673), Hoffman (1646), Festorina/Forager/Tall wheatgrass (1460), Shoshone/Fawn/Altai (1350), Magnar (1125), Garrison (1050), and Kura/Matua/ Trefoil 850) FY97 and FY98 no evaluations. FY99 No yield data gathered. Excellent stands include Shoshone beardless wildrye, Fawn tall fescue, Newhy hybrid wheatgrass, Festorina tall fescue, Forager tall fescue, RS Hoffman, Kura clover, and SP90 Kura clover. Good stands include: Prairieland Altai wildrye, Revenue slender wheatgrass, San Luis slender wheatgrass, Jose tall wheatgrass, Garrison creeping foxtail, Johnstone tall fescue X perennial rye, Lutana/Monarch cicer milkvetch, Regar meadow brome, and orchardgrass. Poor stands include Magnar basin wildrye, some plots of cicer milkvetch, Cascade birdsfoot trefoil, and Dakota/Forestburg switchgrass. Mowing significantly reduces vigor of basin wildrye and switchgrass. Festorina and Forager are preferred over Fawn by sheep. Alsike clover and Matua brome failed/died. The fescue x perennial ryegrass appears to show some signs of winterkill. FY00 and FY01 no evaluations.

UT91007 Ruble – Roosevelt FO Pryor slender wheatgrass, San Luis slender wheatgrass, Newhy hybrid wheatgrass field planting for erosion control. FY93 Newhy 10% survival, Pryor 70% survival, San Luis 90% survival and rated the best of evaluated species. FY94 San Luis continues as best performer, with Pryor a close second. Newhy is doing poorly. We should continue to evaluate stands to determine how long slender wheatgrass, a short-lived species will maintain on site. Note slender wheatgrass should normally be used as a cover crop species with the understanding it will not stay in the stand for too many years. FY95 good stands of both Pryor and San Luis are present and a fair to poor stand of Newhy is present. FY96 stands are the same as 95 with the slender wheatgrasses showing more drought tolerance than Newhy. FY97 good stand of San Luis, fair stands (50%) of Pryor and very poor stand to no stand of

Newhy. FY98 plant vigor is excellent for all species due to very good moisture year. San Luis is beginning to decline in percent stand. FY99 plant growth below previous years due spring/ summer drought and no irrigation. FY00 very dry spring and summer. Rains began in early September resulting in green-up and fair vigor for Pryor and San Luis and very poor vigor for Newhy. FY01 no evaluation.

UT93005 Smith – Roosevelt FO Trailhead basin wildrye, Magnar basin wildrye field planting for erosion control. FY94 planted October 1993 and initial evaluation indicated Magnar with best seedling establishment and Trailhead doing best in run in areas. FY95 both Trailhead and Magnar rated good stands. Magnar is best adapted. FY96 good stands for both, good vigor for both, good drought tolerance for both, all seedheads of both species eaten by wildlife. FY97 excellent stands and plant vigor for both cultivars. Plant height about 50 inches for Magnar and 38 inches for Trailhead. Magnar has excellent seed production and Trailhead has fair seed production. FY98 excellent vigor and long seedheads for both cultivars. Magnar is a more robust and taller plant than Trailhead. FY99 no evaluation. Excellent stands of each with good vigor and approximately 50 inch height. Basal areas are getting larger, but no seed production this year due to spring/summer drought. FY00 due to very dry spring and summer with rains coming in early September resulting in green-up, both Trailhead and Magnar had fair vigor and only 36-40 inches of growth. FY01 no evaluation.

UT98005 Prevedel – Roosevelt FO Rush intermediate wheatgrass 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 no evaluation.

UT99007 Curtis Rozmon - Price FO field planting on irrigated pasture. Trial includes 905438 switchgrass, 905439 switchgrass, Cave-In-Rock switchgrass, Blackwell switchgrass, Kanlow switchgrass, Latar orchardgrass, perennial ryegrass, and white clover. Site is MLRA D35, loamy fine sand soil, 0-1 percent slope, southwest exposure, 4000 feet elevation, 6-8 inch precipitation, irrigated, T23S R16E SE1/4 Section 25. Seed ordered March 22, 1999. FY99 not planted this year. FY00 didn't plant due to extreme drought. FY01 no evaluation.

UT00002 Mike Wilcox - Monticello FO field planting. UT98004 planted fall (seeding germinated) 1998, but failed due to drought with little to no winter-spring precipitation. This is a dormant fall replanting of Rush intermediate wheatgrass. Luna pubescent wheatgrass is the standard of comparison. Barnam loam soil, 3 percent slopes, south aspect, 6000 feet elevation, 14 inch precipitation, non-irrigated, T31N R26E Section 8. FY00 very little germination this spring (<10%) due to very dry spring. FY01 no evaluation.

UT00007 George Carter – Monticello FO 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.

UT01004 Monument Valley High School. Critical Area Planting – Volga mammoth wildrye. Seed ordered April 2001. FY01 no evaluation.

Cedar City FO - Yields of Pasture Grasses Irrigated with Effluent Water in Iron County, Utah

Variety/Species	Yield – Production						Crude Protein %					Grazing Preference*			Soil Test Nitrate N.	
	Spr. 99 lbs/acre	Fall 99 lbs/acre	Spr. 00 lbs/acre	Fall 00 ³ lbs/acre	Spr. 01 lbs/acre	Total lbs/acre	S99	F99	S00	F00	S01	F99 ¹	S00 ²	S01 ³	F00 ⁴	F01 ⁴
Johnstone Tall Fescue	1748	9945	2325	4925	1873	20816	25.0	15.7	17.2	18.9	15.4	8	6	8	3.2	2.5
Newhy Hybrid Wheatgrass	1846	6465	5896	3404	2529	20140	18.8	14.4	16.3	15.4	18.0	4	4	7	1.3	2.3
Stargrazer Tall Fescue	2094	5353	2255	6708	2279	18689	19.7	15.1	15.5	11.8	14.1	4	6	7	1.2	4.2
Regar Meadow Brome	3361	3701	5383	3787	2011	18243	21.7	11.9	13.9	14.6	17.6	5	4	8	2.0	4.0
Paddock Meadow Brome	2054	4621	5632	2489	2820	17616	20.9	14.2	15.9	14.4	15.6	7	5	8	1.0	1.8
Oahe Intermediate Wheatgrass	3388	4592	4258	2053	2024	16315	16.2	16.1	15.1	11.3	14.3	9	9	9	1.5	2.5
Potomac-Rush-Paddock Mix	2482	3368	4128	3490	1542	15010	17.3	11.8	12.5	13.7	15.9	6	6	8	0.8	3.3
Potomac Orchard Grass	3041	4278	3212	2200	1259	13990	16.3	11.1	17.2	18.6	18.3	5	7	9	1.0	5.0
Rush Intermediate Wheatgrass	2671	2423	4657	2672	2288	14711	24.8	14.2	15.0	14.4	15.8	9	8	9	1.7	3.6
Oahe-Paddock Mix	2727	2358	3122	2053	1705	11965	15.0	11.7	17.1	25.7	14.7	8	7	9	1.9	1.8

Notes: All Yields are reported on a 100% Dry Matter basis

S99=Spring1999; F99= Fall 1999; S00= Spring 2000; F00= Fall 2000; S01= Spring 2001; F01= Fall 2001

Quality Data was determined by NIR analysis and reported on 100% Dry Matter Basis

* Grazing Preference = average of two independent observers rating on scale of 1-10 with 10 being extensively grazed and 1 being not grazed at all.

¹ Seventy, 950lbs heifers for 40 days. Rating was done on 12/13/99

² Eighty-one, 1050lbs heifers with calves for 30 days. Rating was done on 6/21/00

³ Seventy cows, 60 calves and 3 bulls for 10 days. Rating completed 5/24/01

⁴ Nitrate-Nitrogen-N in parts per million (ppm)

