

Caribou-Targhee National Forest  
Native Grass Initial Evaluation  
2005 Progress Report  
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## INTRODUCTION

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

During the summer of 2004, CTNF collected 11 accessions of slender wheatgrass (*Elymus trachycaulus* [Link] ssp. *trachycaulus*) and 10 accessions of mountain brome (*Bromus marginatus* Nees ex Steudel). The collections were cleaned by the USDA-NRCS Aberdeen Plant Materials Center (PMC) for evaluation. Appendix 1 lists the accessions collected, the size of each collection and collection location. Evaluation plots were established May 19, the initial establishment evaluation was conducted on June 15 and the second evaluation was conducted on September 16, 2005.

## MATERIALS AND METHODS

Harvested seed collections were cleaned at the PMC seed cleaning facilities during the winter of 2004-2005. Appendix 2 provides detailed information on seed cleaning equipment and calibrations used. Estimated viability was obtained using the kerosene heater "popping" method outlined in Ogle and Cornforth (2000) and was used to approximate pure live seed (PLS).

The trial is being conducted at the Aberdeen Plant Materials Center, Fish and Game farm located approximately 5 miles northeast of Aberdeen, Idaho. Experimental design was a randomized complete block with six replications of each accession. Each plot is 20 feet long and contains one row, and plots were planted on three foot centers. Experimental design also contains plots of known industry standards from each species for comparison. Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 8.75 inches. Ground was plowed in the fall of 2004 and subsequently disked and roller packed in the spring of 2005 prior to planting.

Plots were seeded on May 19, 2005 using a hand-pushed belt seeder calibrated to drill 30 pure live seeds (PLS) per foot of row. Seeds were drilled to an approximate depth of one half inch. Border rows of 'Tegmar' intermediate wheatgrass (*Thinopyrum intermedium* [Host] Barkworth & D. Dewey) were planted on the outside of the blocks to eliminate edge effect. Plots were sprinkler irrigated for initial establishment and as needed throughout the growing season. Weeds were controlled with herbicide treatments and between row mechanical cultivation.

The initial establishment evaluation was conducted on June 15, 2005 (27 days after planting) when most of the plants from both species had reached a one to two leaf stage. Plots were evaluated for percent stand, plant density and seedling vigor. Percent stand was measured using a twenty foot rope marked with one foot increments stretched the

length of the plot and anchored at either end. Plants intercepting the one foot increments were summed and recorded as a percentage. Plant density was measured by counting seedlings found in the middle two feet of row and converted to average plants per foot of row. Seedling vigor was measured on an ordinal scale of one to nine (one being most healthy and nine being dead). Entire plots as well as individual plants within plots were viewed and given a rating based on overall apparent vigor.

The second evaluation was conducted on September 16, 2005. Plots were evaluated for percent stand by the same procedure used in June, and plant width was also evaluated. It was originally planned to record plant height measurements at this time; however, due to weeds reaching seed maturity it was decided to mow the entire field to a height of about four inches on August 5. It is our assumption that plant width measurements should provide a minimal amount of information regarding plant biomass production as well as vigor. More indicative biometric data, e.g. plant biomass, plant height and seed production, will be taken during the second growing season.

All data were subjected to an Analysis of Variance (ANOVA) and means were separated using Duncan's Multiple Range Test using the MSTAT-C Microcomputer Statistical Program (Freed et al, 1991).

This is a progress report of evaluations conducted during 2005, the first year of evaluations. The trials will be evaluated again in 2006, and a report summarizing the evaluations from both years will be prepared.

## 2005 EVALUATIONS AND DISCUSSION

### Slender Wheatgrass

CTNF accessions of slender wheatgrass were compared against five previously released varieties; 'AEC Hillcrest', 'Pryor', 'Revenue', 'San Luis', and 'Adanac', and one non-released selection from the U.S. Army (D.O.D.). Of these, three (AEC Hillcrest, Revenue and Adanac) are from collections originally made in Canada. Pryor originates from a collection made in Montana and San Luis was originally collected in Colorado. See Tilley et al (2005b) for a detailed comparison of the characteristics for each released cultivar. The Army accession is a currently unreleased breeding population made of several collections from Colorado. AEC Hillcrest differs from the other accessions by being of the subspecies *subsecundus* and should not be considered directly comparable to the collections made by CTNF.

At the first evaluation, percent stand ranged from 25.4 % (accession no. 9076496) to 85.1 (San Luis and Adanac). The high rating from San Luis and Adanac did not, however, differ significantly from several collections with percent stands of 70% or greater. The best plant density rating came from Adanac with 18.1 plants/foot. The poorest density was recorded from accession 9076496 with a density of 2.3 plants/foot. This accession similarly had the lowest seedling vigor rating of 6.7, while the best vigor was observed in Revenue (1.2). Of the CTNF accessions 9076495, 9076498 and 9076499 performed the best in the three evaluated categories (Table 1).

At the time of the second evaluation the best stand was recorded from Revenue (96.3 %). The other industry releases made up the rest of the top six in this category. Of the CTNF

collections, 9076495 had the best stand at 86.8 %, followed by 9076494, 9076499 and 9076498 with 86.0, 86.0 and 84.8 % stand respectively. The poorest percent stand rating was recorded from accession 9076496 with 56.3 % stand. With regard to plant width, the three Canadian releases, Adanac, Revenue and AEC Hillcrest were significantly larger than all other collections (4.8, 4.6 and 4.3 inches wide). The largest plants of the CTNF collections were recorded by accession 9076502 (3.7 in.) which did not differ significantly from Pryor, D.O.D., 9076495, 9076494, San Luis or 9076497. The smallest plant widths were recorded from accession 9076496 (2.8 in.).

Table 1. Slender wheatgrass

Accession No.	% Est. viability	% PLS <sup>3/</sup>	% stand		Vigor <sup>2/</sup>		Plant width
			6/15	6/15	6/15	9/16	(in.)
9076493	95	90.25	54.4 c <sup>4/</sup>	6.8 d-f	4.0 b-d	71.0 f	3.1 e-g
9076494	95	90.25	70.2 a-b	13.0 a-c	4.0 b-d	86.0 a-e	3.6 c-e
9076495	90	85.5	77.2 a-b	13.4 a-c	3.0 d-f	86.8 a-d	3.6 c-e
9076496	90	85.5	25.4 d	2.3 f	6.7 a	56.3 g	2.8 g
9076497	95	90.25	64.0 b-c	7.8 c-f	3.3 d-f	77.0 d-f	3.2 d-g
9076498	95	90.25	75.4 a-b	15.3 a-b	3.7 c-e	84.8a-e	3.1 e-g
9076499	85	80.75	71.1 a-b	14.5 a-b	3.0 d-f	86 a-e	3.1 e-g
9076500	95	90.25	51.8 c	4.8 e-f	4.8 b-c	72.8 f	2.9 f-g
9076501	95	90.25	73.7 a-b	10.8 b-e	2.8 d-f	79.8 b-f	3.0 f-g
9076502	90	85.5	51.8 c	8.2 c-f	3.7 c-e	78.8 c-f	3.7 c-d
9076503	85	80.75	52.7 c	8.0 c-f	5.0 b	74.5 e-f	2.8 f-g
AEC Hillcrest	95	91.2	71.9 a-b	13.3 a-c	2.7 e-f	91.0 a-c	4.3 b
Pryor	99.9	91.9	71.9 a-b	12.3 a-d	2.2 f-g	90.3 a-c	3.8 c
Revenue	*	80.1	79.8 a-b	17.9 a	1.2 g	96.3 a	4.6 a-b
San Luis	99	87.12	85.1 a	16.9 a-b	5.2 b	92.0 a-b	3.3 c-f
D.O.D.	98	90.2	79.8 a-b	16.6 a-b	1.3 g	90.2 a-c	3.8 c
Adanac	98	84.3	85.1 a	18.1 a	1.5 g	95.5 a	4.8 a
LSD (0.05)			13.8	1.9	0.4	10.4	0.5

<sup>1/</sup> Plants per foot of row

<sup>2/</sup> Rated 1-9 with 1best, 9 worst

<sup>3/</sup> Percent PLS based on estimated 95% purity for CTMF collections

<sup>4/</sup> Means followed by the same letter are not significantly different

\* Information not available from source

### Mountain Brome

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

At the first evaluation, the best percent stand and plant density were recorded from Garnet (81.6 % and 22.3 plants/foot). Second best in both categories was Bromar (78.1 % and 14.1 plants/foot) which also had the best possible rating for seedling vigor (1.0). In

general, the CTNF accessions showed little if any significant differences from one another (Table 2).

At the time of the second evaluation there was no significant difference between accessions for percent stand. All plots showed nice, dense stands with vigorous plant growth. There was, however, significant difference detected with regard to plant width. Bromar was significantly larger than all other accessions tested with a width of 6.8 inches. The best performing CTNF collection was 9076507 with a width of 5.4 inches.

Table 2. Mountain brome

Accession No.	% Est. viability	% PLS	% stand		Vigor		Plant width (in.)
			6/15	6/15	6/15	9/16	9/16
9076504	85	80.75	72.8 a-c	10.9 b	3.8 a	93.0 <sup>1/</sup>	4.9 c-e
9076505	85	80.75	66.7 a-c	11.3 b	3.3 a-b	83.3	5.0 b-e
9076506	90	85.5	66.7 a-c	8.7 b	2.7 a-b	85.7	4.4 d-e
9076507	90	85.5	70.2 a-c	9.8 b	3.8 a	92.0	5.4 b-c
9076508	85	80.75	74.6 a-c	12.8 b	2.8 a-b	93.2	5.0 b-e
9076509	95	90.25	73.7 a-c	12.6 b	3.2 a-b	91.0	4.2 e
9076510	95	90.25	74.6 a-c	12.8 b	2.8 a-b	93.7	5.3 b-d
9076511	90	85.5	59.7 b-c	10.8 b	3.2 a-b	82.5	4.8 c-e
9076512	90	85.5	59.7 b-c	11.9 b	2.3 a-c	88.3	5.1 b-e
9076513	90	85.5	54.4 c	10.1 b	2.2 b-c	78.0	5.2 b-d
Garnet	55	53.35	81.6 a	22.3 a	2.0 b-c	96.7	5.9 b
Bromar	97	96.0	78.1 a-b	14.1 b	1.0 c	94.7	6.8 a
LSD (0.05)			18.4	1.9	0.5	15.7	0.8

<sup>1/</sup> No significant difference detected between treatments.

## REFERENCES

Freed, R. D, S. P. Eisensmith, E. H. Everson, M. Weber, E. Paul and E. Isleib. 1991. MSTAT-C: A Microcomputer Program for the Design, Management, and Analysis of Agronomic Research Experiments. Michigan State University.

Ogle, D., and B. Cornforth. 2000. Technical Note 35: A Quick Method to Estimate Germination Percentages for Seed Species. USDA-NRCS, Boise, ID. ID-TN35, Mar. 2000. 3p.

Tilley, D.J., D.G. Ogle and L. St. John. 2005a. Mountain Brome. NRCS Plant Guide. USDA, NRCS, Idaho State Office & the National Plant Data Center. 5p.

Tilley, D.J., D.G. Ogle and L. St. John. 2005b. Slender Wheatgrass. NRCS Plant Guide. USDA, NRCS, Idaho State Office & the National Plant Data Center. 5p.

Appendix 1. Seed collection and origin data

Accession No.	Species	Date collected	Cleaned wt. (lbs)	National Forest	District	Location	Elevation (ft)
9076493	ELTR7	8/31/04	1.00	Bridger-Teton	Jackson	Shadow Mt	7,872
9076494	ELTR7	8/10/04	0.85	Targhee	Island Park	Taylor Creek	6,619
9076495	ELTR7	8/31/04	1.06	Bridger-Teton	Jackson	Curtis Canyon	7,662
9076496	ELTR7	8/23/04	0.92	Caribou	Montpelier	Green Canyon	8,309
9076497	ELTR7	9/1/04	0.49	Targhee	Dubois	Bear Trap Creek	7,402
9076498	ELTR7	7/29/04	0.20	Caribou	Westside	Big Springs	6,290
9076499	ELTR7	8/19/04	1.54	Caribou	Soda Springs	Diamond Creek	6,784
9076500	ELTR7	8/3/04	0.70	Caribou	Palisades	McCoy Creek	5,766
9076501	ELTR7	8/11/04	0.57	Targhee	Teton Basin	Dry Creek	6,743
9076502	ELTR7	9/9/04	1.62	Bridger-Teton	Buffalo	Togwotee Pass	8,514
9076503	ELTR7	7/30/04	0.10	Caribou	Palisades	Little Elk Creek	5,990
9076504	BRMA4	8/24/04	0.84	Caribou	Montpelier	Egan Basin	8,135
9076505	BRMA4	8/4/04	1.46	Caribou	Palisades	Moody Meadow	6,307
9076506	BRMA4	8/3/04	0.76	Caribou	Palisades	McCoy Creek	5,766
9076507	BRMA4	7/30/04	0.24	Caribou	Palisades	Little Elk Creek	5,990
9076508	BRMA4	8/11/04	0.36	Targhee	Teton Basin	Dry Creek	6,743
9076509	BRMA4	8/31/04	2.04	Bridger-Teton	Jackson	Shadow Mt.	7,872
9076510	BRMA4	8/10/04	0.94	Targhee	Island Park	Taylor Creek	6,619
9076511	BRMA4	7/29/04	0.20	Caribou	Westside	Big Springs	6,290
9076512	BRMA4	9/9/04	3.60	Bridger-Teton	Buffalo	Togwotee Pass	8,514
9076513	BRMA4	8/19/04	2.25	Caribou	Soda Springs	Diamond Creek	6,784

Appendix 2. Seed cleaning calibrations

**Mountain Brome**

I. Air Screen Cleaner

1. Screens
  - a. top: 5.550
  - b. middle: 4.750
  - c. bottom: blank
2. Valves
  - a. 3.25
  - b. 3.5
  - c. 5.0
  - d. closed
3. Settings
  - a. sieve: 10.0
  - b. blower 5.0

II. Indent Cleaner (used to remove seeds infected w/ smut)

1. Drum: 7.25

**Slender wheatgrass**

I. Hammermill

1. Screen: 0.5 inch
2. Air: low

II. Air Screen Cleaner\*

1. Screens
  - a. top: 3.550
  - b. bottom: 6x24
2. Valves
  - a. 3.45
  - b. 3.50
  - c. 4.75
  - d. closed
3. Settings
  - a. sieve: 2.0
  - b. blower: 2.0

\*Ran through three times to clean out inert matter.