BASIN WILDRYE ADVANCED EVALUATION
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DEREK J. TILLEY, RANGE CONSERVATIONIST (PLANTS)

INTRODUCTION

The purpose of this study is to evaluate the "Gund" collection of basin wildrye (*Leymus cinereus*) from Nevada for pre-varietal release potential. Basin wildrye is a perennial cool-season bunchgrass native to many of the northern cold-desert ecosystems of the Intermountain West and western Great Plains. Basin wildrye is commonly used in seed mixtures for rangeland erosion control, forage and cover seedings, wildlife habitat improvement, as well as in mine spoil and critical area stabilization projects. Currently there are three industry releases available, 'Magnar', 'Trailhead', and Washoe Germplasm. Magnar and Trailhead were both selected for drought tolerance, while Washoe Germplasm was selected for high tolerance to acidic conditions encountered in mine reclamation situations (Ogle et al, 2002).

MATERIALS AND METHODS

This trial was conducted at the Aberdeen Plant Materials Center, Fish and Game farm located approximately 5 miles northeast of Aberdeen, Idaho. Experimental design was a randomized complete block with six replications. Individual plots were 20 feet long and contained one row with rows planted on three foot centers. Experimental design also contained plots of the three industry standards for comparison. Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 8.75 inches. The test site was plowed in the fall of 2004 and subsequently disked and culti-packed in the spring prior to planting.

Plots were seeded on May 19, 2005 using a hand-pushed belt seeder calibrated to drill 30 pure live seeds (PLS) per foot of row. Seed was drilled to an approximate depth of one half inch. Border rows of 'Tegmar' intermediate wheatgrass (*Thinopyrum intermedium* [Host] Barkworth & D. Dewey) were planted on the outside of the blocks to eliminate edge effect. Plots were sprinkler irrigated and fertilized as needed during the growing season for maximum seed production. Natural precipitation was supplemented with irrigation to approximate 16 to 24 in total annual precipitation. Weeds were controlled with herbicide treatments and between row cultivation.

The first evaluation was conducted on June 15, 2005 (27 days after planting) when most of the plants had reached the one to two leaf stage. Plots were evaluated for percent stand, plant density and seedling vigor. Percent stand was measured using a twenty foot rope marked at one foot increments stretched the length of the plot and anchored at either end. Plants intercepting the one foot increments are summed and recorded as a percentage. Plant density was measured by counting seedlings found in the middle two feet of row and converted to average plants per foot of row. Seedling vigor was measured on an ordinal scale of one to nine (one being most healthy and nine being dead). Entire plots as well as individual plants within plots were viewed and given a rating based on overall apparent vigor.

The second evaluation occurred on September 15, 2005, prior to winter dormancy. Accessions were again evaluated for percent stand using the same method as discussed above. Additionally, it was planned at this point in the trial to evaluate treatments for plant height; however, due to weed pressure and weeds nearing the mature seed stage, the entire field was mowed to a height

of approximately four inches. For this reason, individual plants in each plot were selected and measured for average width (in inches) to provide additional plant measurement data.

The evaluations conducted during 2006 occurred between July 22 and 28; in 2007 from July 18 to July 25. All plots were evaluated for above ground biomass, average plant height and seed yield. Plots were evaluated when the seeds within a plot were judged to be ready for harvest. Each plot was divided in half lengthwise, and the northern adjacent three feet were harvested for seed production, while the southern three feet were sampled for forage yield. Seed samples were cleaned to a visually estimated 90% purity. Forage samples were collected in paper sacks and allowed to air dry for two weeks prior to weighing.

All data from evaluations were subjected to an Analysis of Variance (ANOVA) and means were separated using a Tukey's multiple comparison test.

RESULTS

At the spring 2005 (establishment year) evaluation the highest percent stand was observed in the Trailhead plots (57.9 %) which did not differ significantly from the next highest rating of 52.6 % from Magnar (Table 1). The lowest stand came from Gund with 13.1 % which was significantly lower than the three standards of comparison. All three industry releases had significantly higher plant density than Gund (7.9, 7.6 and 5.8 plants/foot from Magnar, Trailhead and Washoe respectively versus 0.3 plants/foot from Gund). Gund also showed the poorest seedling vigor with a rating of 7.0 out of 9.0. The three other accessions differed significantly from Gund with vigor ratings from 2.7 to 1.3.

The fall evaluation similarly showed Gund performing significantly more poorly than the other three accessions being tested. Evaluation of percent stand showed the three industry releases rated highest to lowest as Washoe (65.0 %), Magnar (62.2 %) and Trailhead (57.8 %). Gund was rated at 16.7 %. Plant size, as measured in width, was greatest in the three releases. Average widths were 4.3, 4.2, and 4.0 inches for Washoe, Magnar and Trailhead respectively. Gund measured 2.3 inches.

The 2006 evaluation (first harvest year) included plant height, above ground biomass production and seed production. Magnar had the highest ratings in all three categories while Gund had the lowest. Due to poor stand establishment, Gund had zero seed produced in the harvested area, and very little forage production. Gund plants were significantly smaller than all other accessions tested.

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

Table 1. Basin wildrye evaluation

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

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

Table 1 (continued).

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

DISCUSSION

The three industry releases of basin wildrye (Magnar, Trailhead and Washoe) performed significantly better than the Gund collection in essentially all aspects evaluated. Gund established poorly, and the established plants were smaller at maturity, produce less seed and biomass. These differences could be attributed to the industry releases being better adapted to the conditions found at the Aberdeen PMC farm. Provenance tests at other sites are advisable to determine if Gund displays superior traits under other environmental conditions.

REFERENCES

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