

Grantsville Off-Center Advanced Test Site
1997 Progress Report
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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 annual precipitation in northwestern Utah. Many areas within this region are heavily infested with cheatgrass. The test site may identify plant materials which will establish and compete in such sites.

The site is located approximately 5 miles southeast of Grantsville, Utah on land owned by the Grantsville Soil Conservation District. The off-center advanced test site is composed of three components, the inter-center strain trial, row spacing trial and a display nursery and was seeded in November, 1994. For a detailed description of the project and site characteristics see the Grantsville Off-Center Advanced Test Site - 1995 Progress Report.

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 Table 1.

The following summarizes precipitation received during the 1997 crop year. This data was provided by the Grantsville Irrigation Company and is collected at Grantsville Reservoir located approximately 6 miles west of the test site:

Month	Precipitation (inches)
October 1996	0.83
November	1.24
December	0.91
January 1997	2.135
February	2.26
March	0.37
April	2.04
May	1.34
June	2.98
July	1.79
August	1.19
<u>September</u>	<u>1.85</u>
Total	18.93

No long term precipitation records are available, however, the site is located in a 10-12 inch precipitation zone. During the 1996 crop year precipitation was 9.84 inches.

All evaluation data collected during 1997 was collected in an identical manner as in previous years.

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 1).

Percent stand data was analyzed utilizing analysis of Variance (ANOVA) and Duncan's Multiple Range Test. Percent stand ranged from 2.0 percent for 9040187 bottlebrush squirreltail to 53.5 percent for 'Tetracan' Russian wildrye. Table 1 is arranged in order by percent stand from greatest to least and means followed by the same letters are not significantly different.

Plant density at the May evaluation ranged from 0.5 plants per foot ² for 9040187 bottlebrush squirreltail to 4.0 plants per foot ² 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). Vigor is rated 1 = best and 9 = worst or dead. 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-27459 Siberian wheatgrass (1198) and Vavilov (957). Further statistical analysis of the forage production data is not appropriate because of the extremely high variability between the plots.

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. Percent stand data for the shrubs was also analyzed utilizing (ANOVA) and Duncan's Multiple Range Test. 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. This can probably be attributed to increasing competition from the cheatgrass understory which is becoming more pronounced.

Data was collected from the non-replicated display plots and is also shown in Table 1. 'Parkway' crested wheatgrass produced the most forage followed by 'Kirk'. None of the forb or shrub plots in the Display Nursery have been able to compete with the cheatgrass cover.

The row spacing trial was evaluated for height, percent cover, and a subjective rating for between-row weed competition during the May 7 evaluation. In July, vigor, plant height and forage production data was collected. Forage was clipped from a 6 foot section of row at each sample point, air-dried, weighed and the data converted to pounds per acre dry weight.

The following table summarizes the data collected from the row spacing trial during 1997:

Grantsville Row Spacing Trial 1997 Evaluation Summary

Row Spacing (inches)	<u>6</u>	<u>12</u>	<u>18</u>	<u>24</u>	<u>30</u>	<u>36</u>	<u>48</u>
Bozoisky Russian wildrye							
May 7, 1997							
BRWC ^{1/}	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 ^{2/}	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 prod. (pounds/acre)	1281	600	800	NA	640	1094	1001
Hycrest crested wheatgrass							
May 7, 1997							
BRWC ^{1/}	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 ^{2/}	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 prod. (pounds/acre)	1121	2481	1814	1520	1505	1748	300

^{1/} 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.

^{2/} Vigor is a subjective rating of plant health and appearance with 1=best and 9=worst

During the May evaluation, Between-Row-Weed-Competition (BRWC) on '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. The data from the row spacing trial is limited and variable so only general observations and not specific recommendations can be made. Wider row spacings appear to allow plants to achieve more height but does not result in greater forage production. The Plant Materials Center plans to continue evaluating the site for the next two years to determine long term performance of the plant materials.

Table 1.
Grantsville Inter-Center Strain Trial
Summary of 1997 Evaluation data

<u>Accession</u> <u>No.</u>	<u>Common Name</u>	<u>Scientific Name</u>	Grass Plots						
			Plant Height (cm)		<u>1/</u> Percent Stand	Plant Density (per ft ²)	<u>2/</u> Vigor		<u>3/</u> Forage Production
			<u>5/7</u>	<u>7/15</u>	<u>5/7</u>	<u>5/7</u>	<u>5/7</u>	<u>7/15</u>	<u>pounds</u> <u>/acre</u>
Tetracan	Russian Wildrye	Psathyrostachys juncea	23.0	26.5	53.5 a	2.5	1.3	2.3	423
Hycrest	Crested Wheatgrass	A. cristatum x desertorum	23.3	48.0	51.0 ab	3.5	1.3	1.8	1533
Vavilov	Siberian Wheatgrass	Agropyron fragile sibiricum	24.0	51.0	50.3 ab	3.5	1.3	2.5	957
Syn A	Russian Wildrye	Psathyrostachys juncea	27.0	37.8	49.0 ab	2.3	1.8	2.3	520
Nordan	Crested Wheatgrass	Agropyron desertorum	25.3	52.8	47.8 ab	3.0	1.8	2.3	1366
Ephraim	Crested Wheatgrass	Agropyron cristatum	18.8	43.0	46.0 abc	2.0	2.8	3.8	781
Mankota	Russian Wildrye	Psathyrostachys juncea	20.0	27.5	44.0 abc	2.0	1.8	2.3	405
PI-275459	Siberian Wheatgrass	Agropyron sibiricum	22.3	55.8	44.0 abc	2.5	2.0	2.5	1198
Douglas	Crested Wheatgrass	Agropyron cristatum	19.3	28.3	42.3 abc	3.3	2.3	4.8	604
Bannock	Thickspike Wheatgrass	Elymus lanceolatus ssp. lanceolatus	23.8	40.0	35.8 abcd	4.0	2.5	2.0	687
P-27	Siberian Wheatgrass	Agropyron fragile sibiricum	23.0	41.5	32.0 abcde	1.0	3.5	5.0	511
Magnar	Basin Wildrye	Leymus cinereus	26.0	31.8	30.8 bcde	1.5	3.0	4.0	251
SL-hybrid		Elymus x Pseudoroegneria	17.8	21.8	25.3 cdef	2.3	3.5	5.0	149
Trailhead	Basin Wildrye	Leymus cinereus	24.5	20.3	18.5 defg	1.0	4.5	6.0	56
Bozoisky	Russian Wildrye	Psathyrostachys juncea	18.5	20.3	17.8 defg	0.8	5.3	4.5	135
9019218	Bottlebrush Squirreltail	Elymus elymoides	14.5	3.8	17.8 defg	2.0	3.0	8.0	19
Critana	Thickspike Wheatgrass	Elymus lanceolatus ssp. lanceolatus	10.0	10.0	16.5 defg	1.5	5.5	6.5	130
Schwendimar	Thickspike Wheatgrass	Elymus lanceolatus ssp. lanceolatus	20.3	41.3	15.8 defg	1.5	5.0	4.0	353
Secar	Snake River Wheatgrass	Pseudoroegneria spicata ssp. spicata	31.0	45.3	13.3 efg	1.3	3.3	4.8	446
Sodar	Streambank wheatgrass	Elymus lanceolatus ssp. lanceolatus	9.5	4.5	8.3 fg	0.8	7.5	8.0	28
9019219	Bottlebrush Squirreltail	Elymus elymoides	6.8	0.0	3.3 g	0.8	7.0	9.0	0
9040187	Bottlebrush Squirreltail	Elymus elymoides	10.0	0.0	2.0 g	0.5	7.5	9.0	0
9040189	Bottlebrush Squirreltail	Elymus elymoides	0.0	5.0	0.0 *	0.0	9.0	8.0	9
9052861	Indian Ricegrass	Achnatherum hymenoides	0.0	3.8	0.0 *	0.0	9.0	8.3	9
Rimrock	Indian Ricegrass	Achnatherum hymenoides	0.0	6.3	0.0 *	0.0	9.0	8.3	18
Nezpar	Indian Ricegrass	Achnatherum hymenoides	0.0	0.0	0.0 *	0.0	9.0	9.0	0
9035287	Indian Ricegrass	Achnatherum hymenoides	0.0	0.0	0.0 *	0.0	9.0	9.0	0
Paloma	Indian Ricegrass	Achnatherum hymenoides	0.0	0.0	0.0 *	0.0	9.0	9.0	0
Volga	Mammoth Wildrye	Leymus racemosus	0.0	0.0	0.0 *	0.0	9.0	9.0	0
9024804	Columbia Needlegrass	Stipa nelsonii v. dorei	0.0	0.0	0.0 *	0.0	9.0	9.0	0
9040137	Columbia Needlegrass	Stipa nelsonii v. dorei	0.0	0.0	0.0 *	0.0	9.0	9.0	0

1/ Percent stand is equal to basal cover. 5/7/97 percent stand data was analyzed utilizing Duncans Multiple Range Test P=0.05 CV=43.85; means followed by the same letters are not significantly different. Accessions with a * were not included in analysis.

2/ Rated 1-9 with 1 best, 9 worst.

3/ Forage air-dried and weighed. Due to extremely high variability between the plots, further statistical analysis is not appropriate.

Table 1. Continued
Grantsville Inter-Center Strain Trial
Summary of 1997 Evaluation data

Shrub Plots

<u>Accession No.</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Plant Height(cm)</u>		<u>4/ Percent Stand</u>	<u>Number of Plants/Sample Rows</u>		<u>Vigor</u>	
			<u>5/7</u>	<u>7/15</u>	<u>5/7</u>	<u>5/7</u>	<u>7/15</u>	<u>5/7</u>	<u>7/15</u>
Pamirian	Winterfat	Krascheninnikovia ceratoides	33.5	40.5	44.5 a	18.0	15.8	1.8	2.0
9067481	Winterfat	Krascheninnikovia lanata	36.3	39.8	37.3 a	17.3	16.3	2.8	2.0
9067480	Fourwing Saltbush	Atriplex canescens	44.0	45.5	34.0 ab	13.0	12.5	2.0	1.8
Rincon	Fourwing Saltbush	Atriplex canescens	34.5	43.8	33.5 ab	12.0	16.3	4.0	2.0
9063535	Winterfat	Krascheninnikovia lanata	24.3	24.0	23.3 ab	14.3	14.3	4.3	3.8
Wytana	Fourwing Saltbush	Atriplex canescens	33.0	28.8	22.8 ab	11.5	11.0	3.8	3.0
Hatch	Winterfat	Krascheninnikovia lanata	26.8	34.3	9.8 b	5.8	5.3	5.5	4.0

Non-replicated Display Plots

<u>Accession No.</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Plant Height (cm)</u>		<u>1/ Percent Stand</u>	<u>Plant Density (per ft²)</u>	<u>2/ Vigor</u>		<u>3/ Forage Production pounds /acre</u>
			<u>5/7</u>	<u>7/15</u>	<u>5/7</u>	<u>5/7</u>	<u>5/7</u>	<u>7/15</u>	
Kirk	Crested wheatgrass	Agropyron cristatum	22	50	45	2	3	3	929
Parkway	Crested wheatgrass	Agropyron cristatum	21	43	80	5	1	2	1226
Newhy	RS Hybrid	Elytrigia x Pseudoroegneria	24	63	13	2	5	6	74
Fairway	Crested wheatgrass	Agropyron cristatum	20	43	28	2	4	3	818
Whitmar	Beardless wheatgrass	Pseudoroegneria spicata inermis	21	0	20	1	4	9	0
Timp	Utah Sweetvetch	Hedysarum boreale	0	0	0	0	9	9	NA
Pryor	Slender wheatgrass	Elymus trachycaulis	18	0	18	1	4	9	0
San Luis	Slender wheatgrass	Elymus trachycaulis	0	0	0	0	9	9	0
Immigrant	Forage Kochia	Kochia prostrata	0	0	0	0	9	9	NA
9021471	Fringed sage	Artemisia frigida	0	0	0	0	9	9	NA

4/ Percent stand is also equal to canopy cover. 5/7/97 percent stand data was analyzed utilizing Duncan's Multiple Range Test; P=0.05, CV=51.80; means followed by the same letter are not significantly different.

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