

Grantsville Off-Center Advanced Test Site
1996 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 sites within this region are heavily infested with cheatgrass and this test site may also 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.

1996 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 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 Table 1.

The following summarizes precipitation received during the 1996 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 1995	0.12
November	0.31
December	0.65
January 1996	2.05
February	1.56
March	1.13
April	1.06
May	1.52
June	0.59
July	0.00
August	0.02
<u>September</u>	<u>0.83</u>
Total	9.84

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 much more near normal and is 9.98 inches less than what was received during the 1995 crop year.

All evaluation data collected during 1996 was collected in an identical manner as in 1995 with the exception of forage production data which was not collected in 1995.

Forage production data collected from plots with 10 inch row spacing was accomplished by centering a 60 cm X 200 cm frame on the middle 2 rows of each plot, clipping the test material above the plant crown and placing it into individual paper bags. 120 cm X 200 cm frames were used on plots with 20 inch row spacing. The samples were brought back to the PMC and air-dried until August 30, 1996 when the samples were weighed and the data was converted to pounds per acre dry weight.

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 1).

Percent stand data was analyzed utilizing analysis of Variance (ANOVA) and Duncan's Multiple Range Test. Percent stand ranged from 0.8 percent for Nezpar to 67.3 percent for 'Tetracan' Russian wildrye. Table 1 is arranged in order by percent stand from greatest to least.

Plant density at the May evaluation ranged from 0.8 plants per foot ² for Nezpar to 3.3 plants per foot ² for 'Vavilov' Siberian wheatgrass, 'Nordan' crested wheatgrass, Bannock and 'Critana' thickspike wheatgrass.

Vigor ratings in May indicated that Tetracan had the best vigor (1.5) and Nezpar had the worst rating (7.5). Vigor is rated 1 = best and 9 = worst or dead. In July, Bannock thickspike 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). Further statistical analysis of the forage production data is not appropriate because of the extremely high variability between the plots.

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. Percent stand data for the shrubs was also analyzed utilizing (ANOVA) and Duncan's Multiple Range Test. 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.

Data was collected from the non-replicated display plots and is also shown in Table 1.

The row spacing trial was evaluated for height, percent cover, and a subjective rating for between-row weed competition was also recorded at 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 1996:

Grantsville Row Spacing Trial 1996 Evaluation Summary

Row Spacing (inches)	6	12	18	24	30	36	48
Bozoisky Russian wildrye							
May 17, 1996							
BRWC ^{1/}	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 ^{2/}	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 prod. (pounds/acre)	1280	880	1014	NA	672	827	750
Hycrest crested wheatgrass							
May 17, 1996							
BRWC ^{1/}	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 ^{2/}	NA	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 prod. (pounds/acre)	NA	2361	1094	1281	1760	1467	940

^{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 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.

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.

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

The Plant Materials Center plans to continue evaluating the site for the next three years to determine long term performance of the plant materials.

Table 1.
Grantsville Inter-Center Strain Trial
Summary of 1996 Evaluation data

Accession No.	Common Name	Scientific Name	Grass Plots		<u>1/</u>	Plant		<u>2/</u>	<u>3/</u>
			Plant		Percent	Density (per ft ²)		Vigor	Forage
			Height (cm)		Stand	5/7	5/7	7/17	Production
			5/7	7/17	5/7	5/7	7/17	pounds/acre	
Tetracan	Russian Wildrye	Psathyrostachys juncea	31.3	41.3	67.3 a	2.0	1.5	3.0	340
Hycrest	Crested Wheatgrass	A. cristatum x desertorum	25.8	42.0	65.3 a	3.0	2.0	2.5	753
Vavilov	Siberian Wheatgrass	Agropyron fragile sibiricum	26.3	47.8	61.0 ab	3.3	2.0	2.5	957
Douglas	Crested Wheatgrass	Agropyron cristatum	25.3	39.5	59.0 abc	2.5	3.0	3.5	344
Nordan	Crested Wheatgrass	Agropyron desertorum	24.8	43.0	54.8 abcd	3.3	3.0	3.8	846
Syn A	Russian Wildrye	Psathyrostachys juncea	32.3	57.0	54.5 abcd	2.3	1.8	2.3	423
Mankota	Russian Wildrye	Psathyrostachys juncea	28.3	36.5	53.5 abcd	1.8	2.0	2.5	163
Ephraim	Crested Wheatgrass	Agropyron cristatum	19.8	37.8	52.0 abcd	2.5	3.0	3.8	725
Bannock	Thickspike Wheatgrass	Elymus lanceolatus ssp. lanceolatus	25.5	65.0	46.0 bcd	3.3	2.0	1.5	697
Critana	Thickspike Wheatgrass	Elymus lanceolatus ssp. lanceolatus	15.3	20.5	42.8 bcde	3.3	3.8	5.0	112
SL-hybrid		Elymus x Pseudoroegneria	20.0	46.3	41.0 cdef	3.0	3.0	4.0	297
PI-275459	Siberian Wheatgrass	Agropyron sibiricum	25.0	38.5	40.8 cdef	2.8	3.5	4.8	465
Magnar	Basin Wildrye	Leymus cinereus	26.3	44.0	39.8 defg	1.5	3.0	3.0	149
P-27	Siberian Wheatgrass	Agropyron fragile sibiricum	23.3	32.5	38.3 defg	2.0	3.5	5.0	177
Bozoisky	Russian Wildrye	Psathyrostachys juncea	23.0	23.8	27.0 efgh	1.8	4.5	3.3	47
Trailhead	Basin Wildrye	Leymus cinereus	21.8	29.5	25.3 efgh	1.3	4.3	4.5	47
Schwendimar	Thickspike Wheatgrass	Elymus lanceolatus ssp. lanceolatus	25.5	54.0	23.3 fgh	2.5	4.5	3.8	260
9040189	Bottlebrush Squirreltail	Elymus elymoides	19.3	23.3	23.0 fgh	2.0	4.0	5.0	186
Sodar	Streambank wheatgrass	Elymus lanceolatus ssp. lanceolatus	16.8	30.0	22.5 fghi	2.0	4.5	4.5	56
9019218	Bottlebrush Squirreltail	Elymus elymoides	16.0	8.5	22.0 ghi	2.5	3.3	7.3	74
Secar	Snake River Wheatgrass	Pseudoroegneria spicata ssp. spicata	23.3	53.0	15.0 hij	1.0	4.5	4.8	167
9040187	Bottlebrush Squirreltail	Elymus elymoides	10.8	15.0	13.5 hij	1.8	5.5	5.5	149
9019219	Bottlebrush Squirreltail	Elymus elymoides	13.8	0.0	12.8 hij	2.3	4.3	9.0	0
9052861	Indian Ricegrass	Achnatherum hymenoides	9.8	12.0	8.8 hij	1.5	5.8	7.0	47
PI-478833	Indian Ricegrass	Achnatherum hymenoides	11.0	10.8	4.5 ij	1.0	6.3	7.5	19
Nezpar	Indian Ricegrass	Achnatherum hymenoides	5.8	9.0	0.8 j	0.8	7.5	7.8	0
9035287	Indian Ricegrass	Achnatherum hymenoides	0.0	0.0	0.0 j	0.0	9.0	9.0	0
Paloma	Indian Ricegrass	Achnatherum hymenoides	0.0	0.0	0.0 j	0.0	9.0	9.0	0
Volga	Mammoth Wildrye	Leymus racemosus	0.0	0.0	0.0 j	0.0	9.0	9.0	0
9024804	Columbia Needlegrass	Stipa nelsonii v. dorei	0.0	0.0	0.0 j	0.0	9.0	9.0	0
9040137	Columbia Needlegrass	Stipa nelsonii v. dorei	0.0	0.0	0.0 j	0.0	9.0	9.0	0

1/ Percent stand is equal to basal cover. 5/7/96 percent stand data was analyzed utilizing Duncans Multiple Range Test P=0.05 CV=38.23; means followed by the same letters are not significantly different.

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 1996 Evaluation data

Accession No.	Common Name	Scientific Name	Shrub Plots						
			Plant Height(cm)		<u>4/</u> Percent Stand	Number of Plants/Sample Rows		Vigor	
			5/7	7/17		5/7	7/17	5/7	7/17
Pamirian	Winterfat	Krascheninnikovia ceratoides	25.5	43.3	53.0 a	23.5	20.8	1.5	2.0
Wytana	Fourwing Saltbush	Atriplex canescens	23.0	43.3	40.8 a	22.0	18.5	3.5	2.3
9067481	Winterfat	Krascheninnikovia lanata	22.5	42.8	37.8 ab	24.8	20.3	2.3	2.0
9067480	Fourwing Saltbush	Atriplex canescens	18.3	45.3	37.5 ab	18.3	13.3	2.0	1.8
Rincon	Fourwing Saltbush	Atriplex canescens	27.5	45.5	28.3 ab	14.8	12.3	2.5	3.8
9063535	Winterfat	Krascheninnikovia lanata	16.3	34.5	26.8 ab	17.3	15.5	3.0	3.3
Hatch	Winterfat	Krascheninnikovia lanata	19.3	36.0	10.8 b	10.3	7.0	5.0	4.8

Non-replicated Display Plots

Accession No.	Common Name	Scientific Name	Plant Height (cm)		Percent Stand	Plant Density (per ft ²)	<u>2/</u> Vigor		Forage Production pounds/acre
			5/7	7/17			5/7	7/17	
Kirk	Crested wheatgrass	Agropyron cristatum	33	46	70	3	2	3	966
Parkway	Crested wheatgrass	Agropyron cristatum	25	43	73	4	3	2	1115
Newhy	RS Hybrid	Elytrigia x Pseudoroegneria	20	82	25	1	4	6	0
Fairway	Crested wheatgrass	Agropyron cristatum	23	53	48	1	4	5	669
Whitmar	Beardless wheatgrass	Pseudoroegneria spicata inermis	15	40	33	3	3	4	223
Timp	Utah Sweetvetch	Hedysarum boreale	0	0	0	0	9	9	N/A
Pryor	Slender wheatgrass	Elymus trachycaulis	15	0	23	2	3	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	N/A
9021471	Fringed sage	Artemisia frigida	0	0	0	0	9	9	N/A

4/ Percent stand is also equal to canopy cover. 5/7/96 percent stand data was analyzed utilizing Duncan's Multiple Range Test; P=0.05, CV=51.59; means followed by the same letter are not significantly different.

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