

**SNOWBALL SALINITY TRIAL, EMERY COUNTY, UT  
FINAL REPORT  
2006**

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This trial was designed to test the drought and salt tolerance of several varieties of irrigated forage plants. The replicated plots were established in 1991 and 1992 with the cooperation of several agencies and the landowner.

This salinity tolerance trial tested 18 varieties or accessions.

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|---|---|
| 1. Prairieland Altai Wildrye  | 11. Birdsfoot Trefoil   |
| 2. Magnar Basin Wildrye   | 12. Festorina Tall Fescue                                     |
| 3. Shoshone Beardless Wildrye   | 13. Forager Tall Fescue                                       |
| 4. Revenue Slender Wheatgrass   | 14. Alsike Clover   |
| 5. San Luis Slender Wheatgrass  | 15. Matua Rescuegrass or Brome                                |
| 6. Tall Wheatgrass  | 16. RS Hoffman (Natural Quackgrass X<br>Bluebunch Wheatgrass) |
| 7. Monarch Cicer Milkvetch  | 17. Kura Clover   |
| 8. Garrison Creeping Foxtail  | 18. SP90 Kura Clover.   |
| 9. Fawn Tall Fescue   |   |
| 10. NewHy Hybrid Wheatgrass<br>(Quackgrass X Bluebunch<br>Wheatgrass) |   |

The trial was located near Elmo, Utah on the Richard Snowball farm. This location was chosen because the landowner was very interested in improving his pasture productivity, access to irrigation, and marginal soils. The soil are moderately to highly saline with pH ranges from 8.5 to 8.9 and electrical conductivity (EC) from 5.7 to 20 plus. The area prior to planting was bare ground or covered with salt grass. The test area was 300 x 50 feet and ran east to west. Figure 1 details the plot layout. Within the fenced trial area, three replications of 100 x 40 feet plots were delineated. In each of the replications, species 1 through 10 were seeded in randomly replicated 10 x 40 feet wide strips in the fall of 1991. The entire plot was

surrounded by a 5 feet border of NewHy hybrid wheatgrass. In the spring of 1992, species 11-18 were added at the east end with no replications except for the fescues which were replicated. Most grasses were planted with a drill. A few species were planted with plugs. The seedbed was well prepared, but possibly a little soft. The soil surface was kept damp until all the species germinated. Species in all three replications germinated well. Garrison creeping foxtail and Monarch cicer milkvetch were the last species to come up. Fertilizer, soil amendments, irrigation, and palatability tests were conducted over the seasons and both NRCS and the Emery County Extension have copies of the data.

## Results

Information about relative palatability and salt tolerance and actual yield (clipped weights) were collected for 4 years after establishment. Table 1 summarizes the results by ranking the plants.

<b>Species/Variety</b>	<b>Salt Tolerance</b>	<b>Yield</b>	<b>Palatability</b>
1. Tall Wheatgrass	1	2	16
2. Shoshone Beardless Wildrye	2	12	9
3. Prairieland Altai Wildrye	3	13	17
4. Magnar Basin Wildrye	4	14	15
5. Revenue Slender Wheatgrass	5	9	13
6. San Luis Slender Wheatgrass	6	11	14
7. NewHy Hybrid Wheatgrass (quackgrassX bluebunch wheatgrass)	7	7	7
8. RS Hoffman (Natural quackgrass X bluebunch wheatgrass)	8	8	8
9. Fawn Tall Fescue	9	6	12
10. Festorina Tall Fescue	10	4	10
11. Forager Tall Fescue	11	5	11
12. Birdsfoot Trefoil	12	18	5
13. Monarch Cicer milkvetch	13	1	1
14. Garrison Creeping Foxtail	14	10	6
15. Alsike Clover	15	3	2
16. Kura Clover	16	15	3
17. SP90 Kura Clover	17	16	4
18. Matua Rescuegrass	18	17	18

## Observations

### Best Production

Grasses – Tall Fescues, Tall Wheatgrass, NewHy, Slender Wheatgrasses (Note: Slender wheatgrasses were short lived 3-5 years). The area between the drill rows were almost totally weed free.

Legumes – Cicer Milkvetch, Alsike Clover

### Best Mid-Summer Regrowth

Grasses- Tall Fescues

Legumes – Alsike Clover

### Palatability

Highest – All Clovers and Cicer Milkvetch

High - NewHy, RS Hoffman, Garrison Creeping Foxtail

Medium – Tall Fescues, Shoshone, Slender Wheatgrass

Lowest – Tall Wheatgrass and Wildrye accessions

(Palatability depends on many factors including the time of year, growth stage, moisture content, etc. The above observations were based on use of a small band of sheep during mid season in 1993.)

## Best Irrigated Grasses

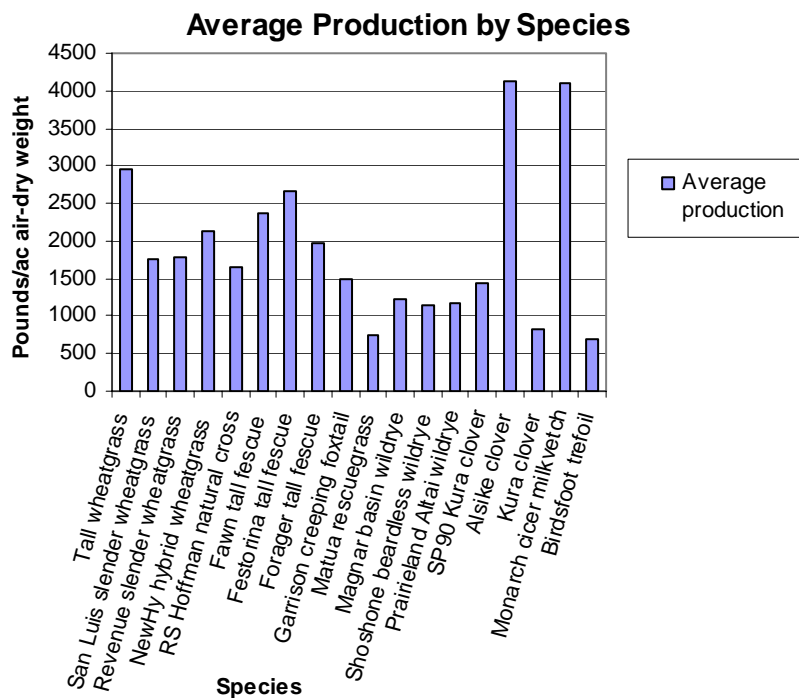
NewHy – Well suited for good to fair soils, easy to establish, and spreads to a heavy stand. Somewhat drought (14 inch + MAP) and very salt tolerant. Good early and late season production and fair regrowth in mid season. Very palatable even in later growth stages

Forager Tall Fescue – Good yields, easy to establish with good salt and drought tolerance. Good midseason regrowth. Better palatability than older varieties of tall fescue.

Garrison – For best production plenty of water and good fertility is required. It will tolerate dry periods from mid to late growing season. It will not tolerate EC levels much above 10. It is very palatable and likes significantly more water than it received in this study.

## Discussion

Most accessions germinated readily in all of the replications; however, the slender wheatgrass accessions, tall fescue, and NewHy were outstanding with very thick stands established. Tall wheatgrass had the highest tolerance to salinity, the highest production for a grass, but was near the lowest in palatability of the species tested. Much of the data indicate that varieties that were the most salt tolerant were also the lowest in palatability. However, NewHy and RS Hoffman grasses performed well; being tolerant of salts with moderate production and moderate palatability. Cicer milkvetch and Alsike clover had very high yields and were very palatable, but their low tolerance of saline conditions makes them difficult to recommend for use under extremely saline soils conditions.



In the less saline soils (replication 1) weed competition negatively affected establishment. Negative impact from the weeds was reduced through mowing and the irrigation regime. The plots were mowed twice at 3-4 inch height. Unfortunately the mowing treatments severely reduced the wildrye plots productivity. The most prevalent weed was kochia with salt grass, sunflower, bindweed, nightshade, and Russian thistle present.

Most years the plots received 30 inches or more of applied irrigation. However in 1994, there was a drought, with only 55% of normal irrigation water available. Including the natural precipitation and the irrigation water, only 23.3 inches of water were applied. The data shows that both slender wheatgrass

accessions produced very well under drought conditions (Table 2) indicating good drought tolerance. Also, observations were made that the sprinkler irrigation helped to improve the pH levels in the root zone. Fertilizers were used; Live Earth product was also applied the first year and in the fall of 1992 nitrogen was applied. There was a very evident beneficial effect where the powdered Live Earth product was used. The data showed a 14% increase in yield for slender wheatgrass to a 47% increase in yield for Fawn tall fescue where the Live Earth product was applied.

<b>Plants</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>Average production</b>
Tall Wheatgrass	2,430	6,515	1,444	1,464	2,963
Fawn Tall Fescue	2,335	3,873	1,842	1,385	2,359
San Luis Slender Wheatgrass	871	2,159	1,380	2,587	1,749
Revenue Slender Wheatgrass	1,238	2,609	924	2,326	1,774
NewHy Hybrid Wheatgrass	1,374	4,124	1,312	1,673	2,121
RS Hoffman Wheatgrass	na			1,646	1,646
Festorina Tall Fescue	na	2,307	4,170	1,490	2,656
Forager Tall Fescue	na	1,640	2,802	1,437	1,960
Garrison Creeping Foxtail	894	2,543	1,440	1,045	1,481
Matua Rescuegrass	na	708	winterkill	784	746
Magnar Basin Wildrye	882	1,090	1,800	1,124	1,224
Shoshone Beardless Wildrye	773	1,709	726	1,359	1,142
Prairieland Altai Wildrye	637	1,479	1,230	1,333	1,170
Berseem Clover (annual)	na	1,450	na	na	1,450
Alsike Clover	na	940	6,462	4,986	4,129
Kura Clover	na			836	836
Monarch Cicer Milkvetch	526	1,203	9,381	5,279	4,097
Birdsfoot Trefoil	na			679	679

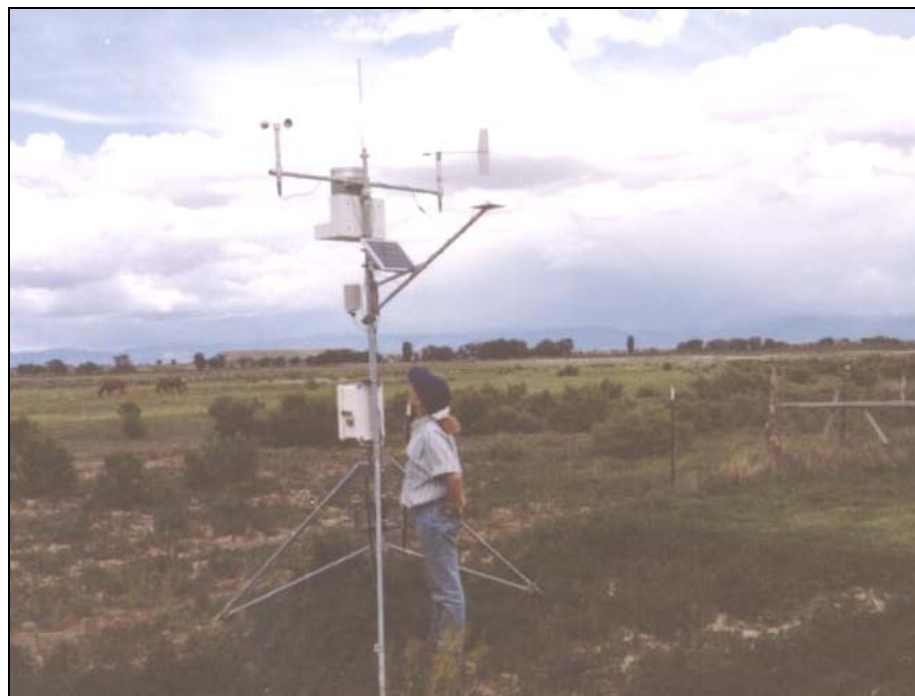
Tony Beals (NRCS), Dennis Worwood (Emery Co. Ext. Agent) and the landowner initiated the project. Howard Horton with ARS coordinated efforts and completed the planting. If there is further interest in this project, please contact Tony Beals at the Price NRCS Field Office.



**Photos**



**Close-up of slender wheatgrass and its weed control attributes**



**Weather station donated by BOR gathered local data for use in evaluating the salinity trials**