Development of Stress-tolerant, Turf-type Saltgrass Varieties

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Objectives:

1. Evaluate new collections and first cycle of population improvement, select parents from the nursery, and intercross for the second cycle of population improvement.
2. Screen salinity tolerance among saltgrass advanced selections and determine the level of salinity tolerance during germination (seeded type only) and as mature turf for potential new cultivars.
3. Quantify cold hardiness of potential varietal releases, advanced lines, and breeding accessions.

Start Date: 2003
Project Duration: three years
Total Funding: $65,842

Twelve inland saltgrass (*Distichlis spicata* L.) clones [A37, A49, A50, A60, 72, A86, A107, A126, A128, A138, 239, and 240] were studied in a greenhouse to evaluate their growth responses in terms of shoot (clippings) and root dry weights, and general turfgrass quality under salinity stress conditions.

The plants were grown as vegetative propagules using the hydroponics technique. Three replications of each treatment were used in a randomized complete block (RCB) design in this investigation. The plants were grown in the nutrient solution for 8 weeks in the summer of 2004. During this period, the plant shoots were harvested weekly in order to reach full maturity and develop uniform and equal size plants.

The salt treatments were initiated by gradually raising the EC (electrical conductivity) of the nutrient solutions to 6, 20, 34, and 48 dS m^{-1} by adding Instant Ocean salt. After the final salinity levels were reached, the shoots and roots were harvested and the harvested plant materials were discarded prior to beginning the data collection of the stress period of the experiment.

Grass Clone	Salinity Treatment (dS m^{-1}) 6	20	34	48
	----------Quality (1-9 rating)----------			
A37	8.0 cde	5.1 f	3.3 g	2.6 e
A49	7.7 def	6.4 d	4.3 ef	2.8 e
A50	8.6 abc	7.2 bc	5.0 cd	4.0 bc
A60	8.2 bcd	5.5 ef	3.9 fg	3.5 cd
72	9.0 a	7.4 bc	5.9 b	4.8 a
A86	8.5 abc	6.7 cd	5.7 b	3.9 bc
A107	7.5 def	5.9 def	5.4 bc	4.4 ab
A126	6.7 g	5.3 f	4.6 de	3.9 bc
A128	7.1 fg	6.2 de	5.0 cd	3.0 de
A138	8.6 abc	7.9 b	5.4 bc	4.2 ab
239	8.9 ab	9.3 a	6.6 a	4.2 ab
240	9.2 a	9.7 a	7.1 a	2.8 e

** The values followed by the same letters in each column are not statistically significant at the 0.05 probability level.

Table 1. *Average turfgrass quality (1-9 rating) of saltgrass clones subject to increasing salinity.*

Plant shoots (clippings) were harvested bi-weekly for the evaluation of the dry matter production. At the termination of the experiment, plant roots were also harvested and dry weights were determined. Also, general grass quality was evaluated weekly and recorded. All above shoots were maintained for re-growth observation purposes.

The results for the grass general quality are presented in Table 1.

Researchers at the University of Arizona are evaluating several inland saltgrass clones for turfgrass quality and their ability to resist salt stress.

Summary Points

- Saltgrass shoot (clippings) dry matter wt. decreased linearly with increasing salinity for all clones.
- For most clones, there was no difference among the root dry matter at different salinity levels.
- General quality of the grass followed the same pattern as the shoot (clippings) wt. in that it decreased linearly with increasing salinity levels for all clones.
- Considering all the study parameters together, there was a wide range of salinity tolerance found among the 12 saltgrass clones.
- The 240 & 239 clones were the most salt tolerant clones followed by A128, 72, A138. These were closely followed by A50, A86, and A49 in salinity tolerance. A49 clone ranked between this and the last group in regards to salinity tolerance. A60, A107, A37, and A126 were among the lowest salinity tolerant grasses which the A126 was the least tolerant clone.