# *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**: $113,970

This year we made substantial progress in plantings. The new nursery established in August of 2003, contains 2,500 plants, including elite parents and original accessions to serve as checks against other populations. Topcross progeny of open pollinated elite females are maintained as female lines. The elite males served as the topcross pollen. These, as a group, will be compared with the group of original accessions to see how much shoot density, height, rust resistance, and seed yield has improved.

Progeny of individual single crosses of the best elite parents will be evaluated for segregation, vigor as a measure of inbreeding (since some parents were related), and as a source for improved germplasm and/or lines. New material consists of 300 plants collected by Christensen in 2002, and 100 plants collected by Drs. Tony Koski and Dave Kopec in 2002. More accessions are anticipated in spring of 2004.

In addition, 25 single-cross blocks were planted in isolation around the Horticulture Field Center. Two polycross blocks are being maintained. Seed was harvested from all of these blocks in 2003.

Accessions A50, A49, and 72 have been identified for their superior salinity tolerance. These also happen to be the best of turf types. However, saltgrasses are less tolerant to salinity during germination compared to mature stands. Salinity levels that resulted in significant germination reduction ranged from 6 to 14 dS/m among accessions. High soil salinity may become an impediment to saltgrass seed establishment.

*A new selection showing dwarf characteristics*

Many elite accessions of saltgrass have been evaluated for freeze tolerance and soluble carbohydrates with an attempt to enhance knowledge of freeze-tolerance mechanisms. Results indicated that considerable genetic variability in freeze tolerance exists. Higher fructose, glucose, and raffinose concentrations were frequently observed in accessions with superior cold hardiness during mid-winter, suggesting these soluble carbohydrates may play important roles in saltgrass freeze tolerance. A future study will compare cold hardiness of saltgrass accessions from California to accessions from Colorado.

*Meg Stetson showing a clean rotary mower cut on the plants on the right.*

Following a two-year establishment of two accessions, we are continuing to evaluate the effect of nitrogen (N) applications on saltgrass quality. An association was found between nitrogen rate and turf coverage during establishment. However, N levels had little effect on saltgrass turf quality after establishment. This may result from the extremely deep root system of saltgrass that can absorb N efficiently from a large volume of soil. Work is in progress to determine rooting characteristics of saltgrass accessions.

*The plants in the foreground shows no mowing injury, while surrounding plants show varying degrees of leaf shredding. These plants receive only six inches of precipitation per year.*

The old nursery was converted to a mowing study by Dr. Tony Koski and notes are taken in response to 1- and 2.5-inch mowing heights. A correlation exists between good response to mowing and short height and high shoot density.

A majority of correlations are beneficial towards turf types. For example, high shoot density, a rare trait, also results in genotypes with shallower rhizomes and more of a sod type (trait usually lacking). Dense types also tend to have high seed yields.

## Summary Points

- Progeny of individual single crosses of the best elite parents are being evaluated for segregation, vigor as a measure of inbreeding (since some parents were related), and as a source for improved germplasm and/or lines.
- Accessions A50, A49, and 72 have been identified for their superior salinity tolerance. However, saltgrasses are less tolerant to salinity during germination compared to mature stands.
- Higher fructose, glucose, and raffinose concentrations were frequently observed in accessions with superior cold hardiness during mid-winter.
- Saltgrass accessions continue to be evaluated in response to different mowing heights and nitrogen fertilizer applications.