Selection of Turf Type and Seed Production of Inland Saltgrass

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Objectives:

1. Determine turf performance of seven elite CSU-USGA lines, seven elite University of Arizona lines, and seven Great Basin lines from the University of Arizona.
2. Determine the range of stress tolerance (drought, salinity) present in inland saltgrass.
3. Determine seed production of seven elite CSU-USGA lines.
4. Evaluate Kopec collection and Northern Great Plains collection.
5. Evaluate seed germination and seedling vigor of all crosses.
6. Evaluate RAPD as a means of identifying unique genotypes of saltgrass.
7. Determine the relative chromosome number of elite clones.
8. Study the viability and germination requirements of inland saltgrass seed.
9. Evaluate seed priming as a possible method by which germination can be improved.

Start Date: 1998
Project Duration: 5 years
Total Funding: $125,000

Elite lines from the germplasm nursery have been used to establish two crossing blocks made up of 14 female and 12 males for the production of cycle-1 seed. In addition, 25 single-cross blocks have been planted to provide single-cross seed for advanced testing. Seed was harvested off of all of these blocks and will be cleaned and planted in winter and used for the establishment of a new nursery to compare genetic gain. Patenting efforts are continuing for the most important clones. Plants have been sent to a cooperating sod grower for evaluation of sod production potential.

Analysis of data from the 190 clones of the original nursery by Dana Christensen has shown that flowering normally occurs from the middle of May until June 1 as observed in 2000. This season experienced abnormally high temperatures in May. In the previous season, which had a normal cool spring, flowering was two weeks later. Seed set has been substantial in females with half of the females producing the equivalent of 480 to 720 lbs/acre. However, there are many lines which produced no seed. They had a few flowers and those produced no seed. Flowering is evidently controlled by other factors than genotype.

Inland saltgrass genotypes at Colorado State University are being evaluated for their turf characteristics.

Lines were also evaluated for their ability to spread over a two-year period. A three-inch plug was planted in 10 foot square plots and % of bare ground was noted. Many failed to completely fill in the plot, but 15 lines had less than 5% bare ground with some with complete coverage.

Turf texture was also evaluated. Much of the turf texture was based on shoot density, so the higher the density, the softer the feel, or more physically supportive the turf. Some of the densest turf were lines that grew tall. A second larger nursery is being established and is made up of 300 collections by Christensen, 200 progeny (first cycle) from the 25 elite parents, the 25 elite parents, a few collections from California by Dr. Kave Kopec and Dr. Tony Koski, and 25 randomly selected plants from the original nursery.

A further evaluation of seed harvest was done comparing a rotary mower, a vacuum mower and sickle-bar raking system. The vacuum harvester picks up some soil while the rotary mower creates trash in the collection sample. The sickle bar operation appears to be the most effective.

A study of cold hardiness demonstrated that it increased gradually during the fall and maximized in mid-winter. Although the rankings did vary somewhat between the two winters, the most cold- sensitive lines were apparent during both winters.

DNA fingerprinting has been used to identify specific clones of saltgrass. This has potential in clearly separating clones for patenting purposes.

Seed scarification is necessary to obtain uniform and high germination rates. However, long water soaks and hot water soaks give greater germination rates when compared to nonscarified seed. They do not, however, germinate as well as scarified seed. Priming of seed with polyethylene glycol, a high molecular weight osmoticum, can speed germination compared to nontreated seed.

Summary Points

- Patents for selected clones are in process.
- Elite lines have been established in crossing blocks for seed production.
- Flowering and seed production is substantial in many lines, but factors other than genotype, which are poorly understood, control flowering.
- The sickle bar harvester appears to be the best of those evaluated.
- DNA fingerprinting may be used to identify specific clones.
- Water-soak treatments increase germination compared to nonscarified seed, but are not as great as scarified seed.
- Seed priming speeds germination in the laboratory.