Development of Seeded Turf-type Saltgrass Varieties

Dana Christensen and Yaling Qian
Colorado State University

Objectives:

1. Evaluate new collections and Cycle 2 population. Select parents from these and intercross for the Cycle 3 population.
2. Screen the collection for rhizome depth.
3. Evaluate potential for commercial seed harvest of selections.
4. Correlate meristems to plant size.

Start Date: 2006
Project Duration: three years
Total Funding: $78,822

Golf courses in western North America have limited water supplies, poor water quality, and soils that are arid, alkaline, and salty. Inland saltgrass is native to this area and shows potential as a turfgrass. Under hot, dry conditions, saltgrass remained green, while bermudagrass, buffalograss, and blue grama went dormant. Under high traffic, saltgrass does not die out, but instead grows short, petite, and increases shoot density.

This past year we took rust resistance and shoot density ratings, seed yield, height, and other trait measurements on 3,000 plants. Even though rust pressure was light, some plants showed dieback in August. Seed yield is variable, reflecting number of flowers and flowering dates, with southern types showing little or no flowering in Ft. Collins. Seed production of the species is limited in the wild, with reproduction predominantly by rhizomes.

Individual plants are variable in rate of spread and fill-in of the plots. In addition, shoot density is variable. In order to take out subjective estimates from visual scoring of these traits, we digitally photograph each plant and analyze with Sigma-Scan 5.0 to determine spread in a growing season. Also, having a photograph provides a view of the plant for future reference for selection of parents.

Six parents were selected out of 2000 individuals and put into crossing blocks for future study of their ability for commercial seed harvests. Males are planted in strip rows between females, so that they will not compete in the seed harvest strip. Additionally, selected individuals were harvested by two methods this August, a conventional combine, and a head stripper. Turf-type saltgrass has heads very close to the ground and are difficult to mechanically harvest. Nevertheless, some intermediate types will yield over 600 pounds of seed to the acre. Some modifications to both harvesters were made to handle the morphology of saltgrass.

Researchers digitally photograph each plant and analyze with Sigma-Scan 5.0 to determine spread in a growing season.

In order to carry the main breeding population into the future, 25 parents were selected for leaf rust resistance, seed yield, shoot density, and reduced height. These were brought into the greenhouse in the fall and hand-crossed to produce seed. Single crosses were made, and these were backed up by field crosses in the spring. Since seed is limited, germination is under sterile conditions in growth chambers. These are kept in growth chambers to enhance growth before being planted into the field.

Additionally, parents are screened to verify that they have 38 chromosomes, since different ploidy levels do occur, and sterility can occur from mating different ploidy types.

Saltgrass maintains a loose horizontal rhizome mass about 6 inches below the soil surface from which shoots arise. Sod production would require this mass to be closer to the surface, so this fall the nursery will be screened for mass depth to determine if there is variability.

Twenty-five parents were selected for leaf rust resistance, seed yield, shoot density, and short height. These were brought into the greenhouse in fall and hand crossed to produce seed.

Summary Points

- 2,000 plants were digitally analyzed for spread during the growing season.
- Second-cycle parents were primarily selected for rust resistance and shoot density and hand-crossed in the winter greenhouse. Progeny are being grown out in growth chambers.
- Started commercial-type harvests by modifying seed harvesters.
- Prepare chromosome splashes to maintain 38-chromosome population.