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Development and Release of Turf-Type Saltgrass Variety

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Start date: 2016
Project duration: 3 years
Total funding: $90,000

Objectives:

1. To increase the materials (accessions) selected from the source nursery and the first and the second generation nurseries, further develop breeder's fields, and collect data and prepare document for release of elite vegetative saltgrass varieties;
2. Continue to evaluate several seeded lines for potential release; and collect data and prepare document for potential release of seeded saltgrass varieties;
3. To establish field plots made up of progeny from elite parents and from seeds harvested from the third cycle of crossing block for advancement of saltgrass development.

Inland saltgrass is indigenous to western North America, it is adapted to specific niches of alkaline and saline soils. The planting of saltgrass on roughs and possibly even on fairways could help golf courses conserve potable water because of its tolerance to lesser quality water (reclaimed or saline waters) while maintaining acceptable turf quality and providing a playing surface. Inland saltgrass has value for use as turfgrass and/or a revegetation plant in areas that commonly have high soil salinity levels.

Material Increase and Evaluation: Three pairs of males and females were selected and increased to 1000 plugs each. These materials were transported to a turfgrass seed company for on-site evaluation of seed production via a material transfer agreement. These lines were planted to strips in three isolated fields. We expect that the evaluation of seed production of these fields can be achieved in 2020, three years after planting.

Efforts are in progress in rescuing and increasing plant materials. About 15-20 clones from the second-generation nursery were selected and increased. These saltgrass accessions were produced through several breeding cycles. Some of these increased materials were planted in the field in June 2017 for evaluation. Data on spread, establishment, growth, and general turf characteristics are collected. If performances of these lines are acceptable following the next several years of evaluation, these lines will be further supplied to the interested parties for potential release.

Two inland saltgrass accessions that have potential for turf and revegetation use have been established from sprigs and evaluated in the field. Data on turf quality, disease incidence and growth were collected. One line had better quality and stronger rhizomes than the other. Both lines maintained an average turf quality rating between 6 and 8 with 6 as the minimal

acceptable rating for the quality and color. Rust was seen in July to September. Two lines differ dramatically in the severity of rust infection with one line almost immune to rust infection. Without mowing, the plants had a 16 to 18 cm maximal height.

Seed Production and Evaluation of Seeded Lines: The elite saltgrass accessions selected out of the second-generation nursery were planted in open pollination crossing blocks to evaluate seed production, survival, and spread. Seed production was insignificant the first 2 years after planting. Three years after planting, seed production was more substantial. Seed yield was determined by hand harvesting a 1 square foot area, hand threshed, and weighed to get seed yield for each mother clone. Nine different elite female accessions produced seed, and five females never produced seeds. Seed production in four different females was within 450 to 500 kg/ha. Female number 5 yielded at roughly 740 kg/ha, while number 2 had the highest yielding clone at nearly 1,045 kg/ha. Numbers 2 and 3 were the only two females that produced seed in all four replications (Figure 1). Five out of 14 females reaching commercial seed production levels in our research plots shows promise for commercial seed production. In June, 2017, the second-generation elite accessions were again planted in 4 replicated crossing blocks.

Four potential seeded lines have been established in the field for evaluation. Due to limited availability of seeds, these testing plots are relatively small. These lines will be evaluated for several years for trait stability and turf quality. If these plots prove to have acceptable turf quality and trait persistence, they will have potential to be released to interested parties.

Cycle 3 Breeding Effort: In a continuing effort of the development of turf-type saltgrass, we started an evaluation of the third generation. Seeds from the third generation crossing block were harvested. Individual seeds were stratified and germinated in the greenhouse in containers to generate saltgrass plugs. The single seed plugs were planted in field plots in the spring of 2017 (Picture 1). A total of ~300 clones for the third generation of saltgrass are under evaluation. After planting, plugs were monitored biweekly on percent coverage, grass height, shoot density (number of tillers per unit area), disease incidence, and turf quality. The first year data indicated that some lines perform better than the others.

Summary points:

1. Materials were increased. Three 3 pairs of males and females have been planted in the field for commercial seed production evaluation.
2. Five out of 14 selected elite saltgrass females reached commercial seed production levels in the research field evaluation and showed promise for commercial production.
3. Seeds of the third generation crossing block were harvested, processed, and planted for cycle 3 field evaluations. The first year data indicated that some lines perform better than the others.

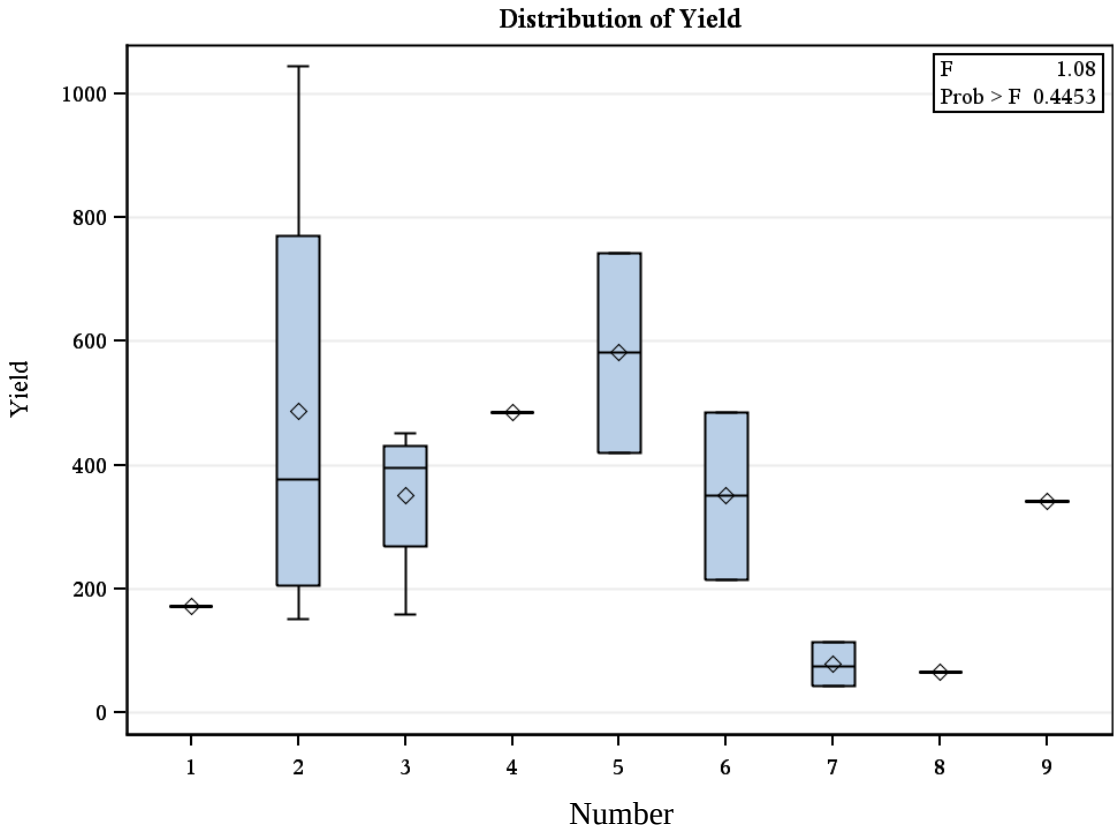

Figure 1. Seed yield (kg/ha) of flowering females in crossing blocks. Number on x-axis corresponds to female clones producing seed for that female.

Figure 2. Cycle 3 field plots.