Germplasm Development and Management of Buffalograss Varieties

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Objectives:

1. Breed, select, and evaluate seeded and vegetative genotypes with improved turfgrass quality, pest resistance, and stress tolerance.
2. Improve our basic knowledge of the genetics of buffalograss through modern molecular marker technologies.
3. Expand understanding and use of efficient management practices for best genotypic performance.
4. Develop protocols for best turfgrass establishment.

Start Date: 2006
Project Duration: three years
Total Funding: $90,000

During 2008, several trials were conducted to address these objectives. Twenty-one single crosses were constructed to assess seed yield potential and continue to create variation in our germplasm. Significant yield differences were observed among the crosses, and high yielding compatible parents were identified. Approximately 1,300 individual plants were selected from these progeny. In addition, 25 collections were made from five states. These selections and collections were established in the greenhouse and transplanted to the field in June for turfgrass performance evaluations. Hybridization and collection have enriched the germplasm as a major source of new genotypes for cultivar development.

A new set of buffalograss advanced lines (Series IV), consisting of 104 genotypes was established in replicated plots at the John Seaton Anderson Turfgrass Research Facility located near Mead, NE. The genotypes in the Advanced Lines IV trial were from previous advanced line trials, selection trials, and recent collected materials. These genotypes will be evaluated for turfgrass performance characteristics and seed yield potential for three or more years. Outstanding genotypes will be identified and further evaluated for possible release.

Buffalograss performance is best met through genetic improvement and development for optimum management practices.

An experimental line and cultivar evaluation trial, consisting of 20 genotypes was initiated in 2007 at five locations to assess the performance of these elite genotypes over a wide range of environments. Some genotypes did not establish well in some locations in 2007, so those sites were re-established in 2008 along with four additional locations, providing nine locations in eight states. Data from each location were analyzed separately for seeded and vegetative genotypes.

Buffalograss performance is best met through genetic improvement and development for optimum management practices. Even though buffalograss is an ideal low-input turfgrass, it is still important to know its response to different mowing heights and fertilizer application rates. Management studies involving nitrogen rates, mowing heights, and cultivars were conducted. Results from these studies indicated significant differences among N rates, mowing heights, and genotypes. Interactions were mostly non-significant. Buffalograss genotypes responded differently to the management practices.

The effects of growing degree days (GDD) of harvested sprigs, environment, and their interaction on buffalograss vegetative establishment from sprigs were studied. Though genotype and environment do play a role, GDD proved to be the major contributor in successful establishment suggesting that sprigging after 1,050 GDD will not be successful. Further study is needed to better understand the GDD influence on pre- and post-harvest physiology of sprigs.

Developing a buffalograss genome map will be helpful to better understand the function, location, and inheritance of genes involved in pest resistance, stress tolerance, and improved turfgrass quality. Crosses were made between two diploid (NE 3297 x NE 2871) parents. An F_1 mapping population was generated. Sequence Related Amplified Polymorphism (SRAP) markers were used to evaluate the pattern of polymorphism in the parents and their progenies. Based on marker segregation, F_2 and backcross types of segregations were observed among the progenies.

USGA's research committee members view improved buffalograss selections at the University of Nebraska.

Summary Points

- Germplasm was enriched through collection and hybridization. New selections and advanced lines were established.
- Elite genotypes were evaluated under a wide range of environments. Significant differences were observed among genotypes tested for most traits. The trial will continue and seeds of some elite genotypes will be increased.
- Results from management studies showed significant differences among N rates, mowing heights, and genotypes, but not for their interactions. The trials will continue for conclusive results.
- Growing degree-day accumulation is a major contributor to successful establishment. Further study is needed to further understand the nature of the influence.
- Framework mapping of diploid population of buffalograss will be developed to better understand this grass.