Germplasm Development and Management of Buffalograss Varieties

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Objectives:

1. Identify and evaluate seeded and vegetative buffalograss biotypes with improved resistance to biotic and abiotic stresses.
2. Develop protocols for establishing vegetative and seeded biotypes of buffalograss cultivars.
3. Develop improved turf-type buffalograsses with superior pest resistance and stress tolerance using plant breeding methods, statistical approaches, and applying biotechnological tools.

Start Date: 1998
Project Duration: 5 years
Total Funding: $200,000

The buffalograss breeding and genetics program has many advanced lines with improved turfgrass color, quality, and seed production characteristics.

The Nebraska buffalograss breeding and genetics program has extensive germplasm collections differing in origins and ploidy levels. In 2003, we selected over 200 promising buffalograss genotypes using two different selection intensities. These germplasm were planted in replicated trials for turfgrass performance and seed production evaluation. These genotypes are advanced selections from the germplasm evaluated for low mowing height from 1998 to 2001. Over 250 new vegetative single-clone tiller plots were established, 600 buffalograss evaluation plots. In 2004, 72 genotypes were advanced and planted in replicated trials for turfgrass performance and seed production characteristics evaluations.

Two crossing blocks were established, which were designed to develop genetically stable progeny and to create diversity for evaluation germplasm with enhanced resistance to biotic and abiotic stress, and seed production potential. In 2005, progeny from these crosses will be established in spaced-plant nurseries for turf quality characteristics, uniformity as well as seed production characteristics evaluations.

Germplasm evaluation results provided a useful reference for selection of appropriate parents in the development of crossing schemes, sampling strategies, and managing buffalograss germplasm repositories. It is now our intention to build a buffalograss genetic linkage map to test utility and distribution of available markers and identify genetic markers associated with agronomically important traits.

To be able to obtain genetically well-defined buffalograss germplasm, mitochondrial (mtDNA) and chloroplast DNA (CpDNA) variations of germplasm were evaluated. From these analyses, it was evident that many genotypes were found to overlap, showing redundancy in these accessions. Hence, a base collection was identified by eliminating overlapping genotypes.

Dormancy in the late fall and spring is a potentially limiting factor to the acceptance and use of buffalograss as a turf. Fine fescues have desirable drought resistance and low maintenance characteristics, and offer minimal completion with buffalograss during its optimal growth period. These features make them a desirable candidate for overseeding buffalograss turfs in an attempt to enhance color retention in the spring and fall.

Overseeding trials were conducted with the fine leaf fescues (i.e. hard, blue, sheep, and Chewings) to enhance fall color retention and spring green up. To date, sheep fescue/buffalograss mixtures have given the best turfgrass color and quality. Overseeding in the fall resulted in better turfgrass color, cover, and quality than similar attempts done in the spring. Overseeding with fine-leaved fescue to enhance fall and spring color retention appears to be promising. Color retention of mixtures was extended by three months when compared with buffalograss growing alone.

Summary Points

- Significant progress has been made to identify germplasm that have enhanced color retention in the spring and fall.
- Two new crossing blocks were established to create germplasm with enhanced resistance to biotic and abiotic stress and improved seed production characteristics.
- A base population representing a diverse origin and ploidy levels has been established using molecular marker approaches.