Buffalograss Germplasm Improvement and Management

Robert (Bob) C. Shearman and Bekele G. Abeyo
University of Nebraska

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: Continuous
Total Funding: $30,000 annually

We evaluated 1,629 selections obtained from hybridization and plant collection were evaluated for turfgrass quality, gender, and inflorescence height.

A study of advanced lines and standard entries was evaluated for spring green-up, stand density, and turfgrass color and quality in 2010. Differences among genotypes were observed for all of these traits. Similarly, 1,629 selections that were obtained from hybridization and plant collection were evaluated for turfgrass quality, gender, and inflorescence height. Differences were observed among these selections for these characteristics. Evaluation of these selections will continue in an effort to identify and promote genotypes with superior turfgrass performance characteristics for future advanced-line replicated trials.

Selected genotypes (54) were placed in a shade evaluation trial. These selections were found growing in light-limiting conditions and were selected for their potential adaptation to shade. The trial includes the selections and standards, which are replicated under 30% and 60% shading and compared to the same entries growing in open sunlight. The trial was initiated in 2009 and repeated in 2010. Entries are being evaluated for establishment, lateral spread, turfgrass quality, color, and density. In addition, NDVI and chlorophyll meter readings are being made on a regular basis. Genotypes have demonstrated differences in establishment and lateral spread under shaded conditions.

Ninety-four F_1 progeny generated by crossing two heterozygous diploid parents were genotyped using polymorphic SRAP and SSR markers for the parents.

Application of molecular tools, such as marker-assisted selection (MAS), is of considerable interest to enhance our breeding program's progress for turfgrass quality and chinch bug resistance. This study was conducted to a framework genetic linkage map of diploid buffalograsses as a prelude for the application of MAS, and to study the organization of the buffalograss genome. Ninety-four F_1 progeny generated by crossing two heterozygous diploid parents were genotyped using polymorphic SRAP and SSR markers for the parents. Co-segregation analysis placed 42 markers into nine discrete linkage groups covering 355.10 cM, with linkage group sizes ranging from 10 cM to 119.78 cM.

A range of 2 to 18 loci per linkage group were mapped with an average map distance between two consecutive markers of 12.68 cM. This is the first linkage map of buffalograss and would be a logical starting point for further delineation of the buffalograss linkage map with more markers. Results from this study provide a foundation for a new direction for our buffalograss breeding research that will aid further study and improvement of turfgrass quality and pest resistance.

A study was conducted to determine the impact of sprig type and node age on root initiation from buffalograss sprigs. Sprig types consisted of intact stolons and single node sprigs. Node age was based on phenological observations of the nodes and classifying them as juvenile, mature, and post-mature nodes. Sprigs of 'Prestige' buffalograss were planted in a clay loam soil (fine smectitic mesic Pachic Agriudolls), and roots were collected at 10 and 20 days after planting (DAP).

Days after planting, sprig type, and node age influenced root mass. Root mass increased 40% from 10 to 20 DAP. Whole stolons produced 24% more root mass than single-node sprigs. Juvenile and mature nodes produced 22% and 20% more root mass than post-mature nodes, respectively. Results from this study indicate that using multiple-node sprigs and sprigs with juvenile to mature nodes for buffalograss sprig establishment are more effective than single-node sprigs.

Summary Points

- Advance lines and selections differed for stand density, turfgrass color and quality, and spring green-up.
- Selected genotypes demonstrated differences in establishment and lateral spread under light-limiting conditions.
- Initiated the first framework genetic linkage map for buffalograss.
- Buffalograss sprig establishment can be enhanced by using sprigs with multiple nodes and sprigs with juvenile to mature nodes.