Buffalograss Breeding and Genetics

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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.*

Six male and 36 female buffalograss lines with exceptional seed production or turf performance characteristics were established during the summer of 2011 in separate crossing blocks. Each block consisted of one male line (pollen donor) surrounding the 36 females. Seed was harvested separately from each of the 216 female plots. Fifteen seeds representing progeny from each cross were established in field trials in 2013. Progeny were evaluated for establishment rate, canopy density, color and stolon internode length (Figure 1). Top performers were collected from the field and will be established in 2014 in replicated trials to evaluate low mowing tolerance, turf performance and production characteristics. A crossing block was established during the summer of 2013 consisting of 36 individuals that retain color late into the fall, have good seed and sod production potential, are disease resistant, and shade tolerant. Recombining favorable traits into a single genetic background is the first step towards developing superior buffalograss cultivars.

We are identifying shade and wear tolerant buffalograss through evaluation trials. Traffic was applied to 104 buffalograss genotypes weekly during the 2013 growing season with a Brinkman Traffic Simulator. Plots were rated for damage and recovery, and will be rated for long term performance over the next three years. Significant variability for wear tolerance was observed (Figure 2) and some lines were able to tolerate the stress. In a previous shade study, genotypes were identified that had improving quality over the course of the three year study when grown in dense shade. During the summer of 2013 a shade study was established with seeded and vegetative cultivars, top performing individuals from the previous shade study, individuals used in the 2013 crossing block, and other shade tolerant species for comparison (Figure 3). Results from these studies demonstrate that buffalograss may be improved for wear and shade stress.

Figure 1. Difference in stolon internode length between a traditional turf type buffalograss (top) and an experimental line selected for canopy density and shorter internode length (bottom).

Few pests pose a serious threat to buffalograss,

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however, under certain environmental conditions some pests can severely damage buffalograss. False smut is a disease that negatively impacts seed quality. Based on colony and spore morphology and DNA evidence, we determined that buffalograss false smut is not caused by *Cercospora seminalis* and this research led to the reclassification of the pathogen to *Porocercospora seminalis*. Correct identification of the pathogen will help future studies directed towards minimizing the impact of false smut in seed production fields. Field, greenhouse, and growth chamber studies are being used to identify sources of host resistance to false smut and leaf spot pathogens.

Our field program is designed to evaluate buffalograss under different management regimes, optimize performance, and maximize seed and sod production. We are also using bioinformatics approaches to expand genomic resources, develop genetic markers, characterize host–insect and host–pathogen interactions, resolve mechanisms of gender expression, and understand the evolution of buffalograss. This research will foster broader acceptance of buffalograss and further promote its use as a resource efficient turf species.

Figure 2. Variability in wear tolerance of 104 buffalograss genotypes was assessed.

Figure 3. Demonstration of buffalograss shade trial to a group of participants of the 2013 University of Nebraska Turfgrass Research Field day (shade covers removed).

Summary Points

- Shade and wear tolerant buffalograsses were identified.
- New combinations of favorable traits were identified in progeny from directed breeding efforts.
- Gained an improved understanding of important buffalograss pathogens and their interactions with the host.

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