Buffalograss Germplasm Improvement and Management

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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: Continuous
Total Funding: $30,000 annually

Bur yield is a limiting factor to more widespread availability of seeded buffalograss. Buffalograss is dioecious having separate male and female plants. Increasing the ratio of females to males in production fields will significantly improve bur yields. In 2008, breeder fields were established with a seed mixture from a polycross. In these breeder fields and in natural populations, gender expression segregates approximately one to one. In 2010, a breeder field was established vegetatively, maintaining a ratio of eight females to two males. During the 2011 harvest, the vegetatively planted field yielded 2.5 times more burs per acre.

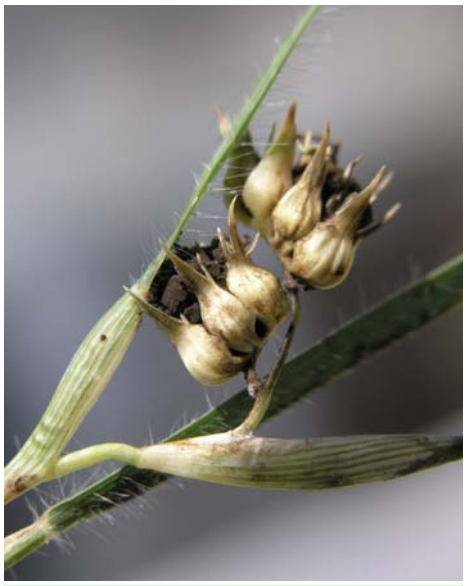
False smut, caused by the imperfect fungus *Cercospora seminalis*, inhibits seed production by infecting the unfertilized female flowers and preventing seed development. During the 2011 growing season, *C. seminalis* was cultured from infected burs isolated from 4 distinct seed production fields. Sixty female plants with promising turf quality and seed production characteristics were collected from genotypic evaluation plots. A suspension culture of *C. seminalis* will be applied to these plants over the winter in the greenhouse to determine host-resistance levels. The same plants will be evaluated under field conditions to identify resistant germplasm. Sources of host resistance will be incorporated into future cultivars.

Controlling gender expression in breeder fields through vegetative establishment.

Seed dormancy is an issue in buffalograss production and is typically broken by a KNO_3 treatment. This practice adds an estimated $0.50 per pound of seed. Eight distinct seed lots were screened for genotypes that germinate in the absence of a seed treatment. Germination percentage was determined 21 days after sowing 500 seeds from each seed lot. The germination percentage ranged from 0.8 to 17.4. Early germinating genotypes will be inter-mated following a recurrent selection breeding strategy in an attempt to overcome seed dormancy.

Progeny used in the development of a diploid genetic linkage map have been screened for western chinch bug resistance. Of the 94 progeny tested, one was considered highly resistant, 78 were moderately resistant, 13 were moderately susceptible, and two were highly susceptible. The variation in the progeny suggests improvements can be made through genotypic selection.

Using Next Generation Sequence data generated as part of the USGA supported project Molecular Characterization of Chinch Bug-Resistant Buffalograss, more than 28,000 EST sequences from the cultivar 'Prestige' were identified having simple sequence repeats (SSRs). Enough sequence information was available to design flanking PCR primers to 6,286 SSRs. A subset of these EST-SSRs along with amplified fragment length polymorphic (AFLP) markers will be used to increase the marker density and expand the coverage of the diploid buffalograss genetic linkage map. These SSRs are a valuable tool for studying the buffalograss genome.



Cercospora seminalis, *causing false smut was cultured from infected burs.*

A major and ongoing focus of our research is in collecting new material and evaluating our buffalograss germplasm collection for biotic and abiotic stress tolerance, timing of spring green-up and fall dormancy, density, quality, genetic color, mowing tolerance, sod characteristics, production traits, and mating compatibility. The genetic resources developed by this research complement our germplasm evaluation efforts and improve the efficiency of selecting new buffalograss germplasm with desirable traits.

Summary Points

- Vegetatively planted breeder fields produced significantly more seed than seeded fields.
- Cultures of *C. seminalis* were made to identify sources of host resistance.
- Started research to address seed dormancy of buffalograss
- Phenotypic evaluations for western chinch bug in an experimental mapping population segregated for resistance.