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: 2003
Project Duration: three years
Total Funding: $90,000

The Nebraska Buffalograss Breeding and Genetics Program has developed an extensive and geographically diverse germplasm collection with ploidy levels ranging from diploids to hexaploids. In 2005, we evaluated 72 advanced lines for sex expression and seed yield potential. These lines had previously been selected for their superior turfgrass performance under low mowing (5/8 inch) and reduced irrigation input (1.0 inch per month) in trials conducted between 1998 and 2003.

Of the 72 lines, 37 were females and of these 37, 15 lines were identified as having superior seed yield potential. These 15 lines were primarily hexaploids, but several superior tetraploids were also identified. The typical range for buffalograss seed yield is 150 to 450 lbs/acre with highs report around 700 lbs/acre. High yields in this study ranged as high as 1800 lbs/acre. Since these lines have superior turfgrass performance characteristics, we plan to establish crossing blocks in 2006 of several compatible lines. Seed from these crosses will be kept as experimental lines and will be tested starting in 2007 under turfgrass maintenance conditions at several locations, ranging from the desert southwest to the cool-arid western states.

Ten experimental lines were identified from the 72 advanced lines that had superior vegetative characteristics. These lines have superior turfgrass quality and early spring green-up and fall color retention. These lines have demonstrated excellent winter survival. These lines are tetraploids, pentaploids, and hexaploids. We will be evaluating these lines for chinch bug resistance and for adaptation to locations in the southeastern and southwestern portions of the USA in 2006.

Six crossing blocks were established in the summer of 2004 and harvested in late summer of 2005. These crosses were made with germplasm that had been identified as being highly resistant to chinch bug (*Blissus occiduus*) and having superior turfgrass quality. Crosses were made for hexaploids (NE 05-2763, NE 196, NE 05-2792, NE 05-2823, and 'Legacy') and tetraploids ('Prestige', NE 46, and NE 98). A highly resistant hexaploid male (NE 05-2763) was crossed with a highly resistant hexaploid female (NE 196), and a moderately susceptible hexaploid female ('Legacy'). NE 05-2763 was also crossed with two female hexaploid lines (NE 05-2792 and NE 05-2823) that previously had been identified as having superior seed production potential. All of these lines had previously been identified as having superior turfgrass quality. 'Prestige', a highly chinch bug-resistant tetraploid female, was crossed with moderately resistant tetraploid males (NE 46 and NE 98). Seed from these crossing blocks was harvested in early fall, 2005. These materials will be grown in the field in 2006 and will be screened for chinch bug resistance, turfgrass quality, and seed production potential.

A diploid mapping population was established in 2004. cDNa libraries were constructed from the parents that constructed this population. The population was established from seed in the greenhouse and plants were space-planted in the field. The population was evaluated for sex expression, seed yield characteristics, and turfgrass quality. Diploid germplasm will not over winter in Nebraska, so these plants were cloned in the fall and taken to the greenhouse for overwintering.

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

Summary Points

- Significant progress has been made to identify germplasm that have enhanced seed yield and turfgrass quality characteristics, and vegetative types with enhance spring green-up and fall color retention.
- Crossing blocks were established and seed harvested to enhance our efforts to develop chinch bug-resistant lines.
- A mapping population has been developed and cDNA libraries established to improve our understanding of buffalograss genetics and enhance our breeding efforts.