Physiological Basis for Selection of Bentgrasses With Superior Drought Resistance

Dr. Richard White

Texas A&M University

Goals:

- *Determine the water balance in creeping bentgrasses with performance in adverse environments.*
- *Assess management systems for the incorporation of diverse bentgrass germplasm into existing bentgrass putting greens to improve their stress resistance and functional quality.*

Cooperators:

Dave Gilbert
Gene Taylor

Creeping bentgrass provides a premier surface for golf course putting greens. A preference for this species and increasing demands by the public for quality putting surfaces have fueled the expansion of bentgrass use throughout the deep South, well beyond the area of adaptation for this species. The expansion of bentgrasses throughout this environmentally stressful area has out-paced development of stress tolerant bentgrass cultivars.

Irrigation and syringing are used on bentgrasses throughout the South to prevent moisture and heat stress. Golf course superintendents pay close attention to soil conditions to ensure adequate soil moisture levels. However, shallow root systems and high evaporative demand frequently expose bentgrass putting greens to physiological drought when atmospheric demand exceeds the turgor maintenance capability of bentgrass. This in turn predisposes bentgrass to heat stress by limiting or even terminating the normal dissipation of thermal energy by evapotranspirational cooling.

Three experimental sites were selected for interseeding CRENSHAW creeping bentgrass into existing PENNCROSS putting greens, including the Texas A&M University Research and Extension Center at Dallas, Brookhaven Country Club, and Dallas Country Club. Mechanical disruption and chemical suppression treatments were employed in a multiple strip-split plot design. The most vigorous chemical suppressant was glyphosate, which was used to allow easy visual determination

of seedling emergence in dead bentgrass sod.

Cimectacarb (Primo) and no chemical suppression treatments also were used. Mechanical disruption treatments were none, vertical mowing, core aerification, and star-tine aerification. Interseeding was accomplished during April 1 through 15, 1995. Visual observations within the glyphosate treatments indicate that vertical mowing may be the most effective means of mechanical disruption. However, overall seedling emergence was less than expected at all sites. This experiment was planted again in October 1995 at the Dallas Country Club.

Electrophoretic analysis of isozyme banding patterns from samples collected from two inter-seeding locations is providing necessary information to determine population changes. Analysis of samples collected from the TAMU at Dallas location 6 and 14 months after inter-seeding indicate that Crenshaw contributed from about 1 0 to 95% of the plant population.

Analysis of samples collected from the Dallas Country Club location 4 weeks after interseeding indicated, based on plant density counts, successful emergence of CRENSHAW in an existing PENNCROSS bentgrass putting green and was superior to emergence observed in spring 1995 inter-seeding at the TAMU at Dallas location. Mechanical treatments had minimal effect on seedling emergence. However, isozyme analysis of samples collected from the Dallas Country Club location 6 months after inter-seeding indicate that, overall, CRENSHAW contributed less than 10% of the plant population. Water management during the extremely dry fall and winter of 1995 and 1996 probably contributed to very low percentages of CRENSHAW in the population at the Dallas Country Club location.

Selection of maternal clones and populations to assess mechanisms of stress resistance has progressed with the assistance and close cooperation of Dr. Milt Engelke. Initial stress tolerance of maternal clones was completed in fall 1995. Progeny were obtained and increased to assess progeny response and established in parent progeny tests in January 1996. Disease problems occurred in the initial parent/progeny plantings and through the summer of 1996. Parent progeny tests were re-established during fall 1996 and are progressing but behind schedule.

Studies to determine the effects of blending bentgrass cultivars on bentgrass putting green turf quality, disease resistance, and performance were established at the Turfgrass Field Laboratory in College Station, Texas during the fall 1995. A severe thunderstorm caused soil and seed movement and cross-contamination of treatments. These blending experiments are being reestablished on a newly constructed 25,000 square foot golf green in College Station. This concept is extensively used for other cool-season grasses, but has not been reported for creeping bentgrasses.