Physiological Basis for Selection of Bentgrasses With Superior Drought Resistance

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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:

Mr. Dave Gilbert
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Creeping bentgrass provides a premier surface for golf course putting greens. A preference for this species and increasing demands by the public for quality sports turf 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.

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 and stress tolerance mechanisms are being assessed in maternal clones. Progeny were obtained and increased to assess progeny response. The population(s) used will allow determination of the heritability of the various mechanisms of turgor maintenance or drought resistance and should provide insight into several mechanisms of bentgrass summer stress

tolerance.

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 none chemical suppression treatments were also 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 pattens from samples collected from the TAMU-REC at Dallas location is providing, through close cooperation with Drs. M. C. Engelke and Ikuko Yamamoto, the necessary information to determine population changes. Current estimates of 10 to 20% contribution of CRENSHAW produced from a single spring interseeding of this PENNCROSS putting green provides the first quantified documentation that a new bentgrass cultivar can be successfully incorporated in an existing bentgrass putting green.

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. These blending experiments will provide insight into the effects of creeping bentgrass blends on overall putting green quality. This concept is extensively used for other cool-season grasses, but has not been reported for creeping bentgrasses.