Low Temperature and Drought Regulated Gene Expression in Bermudagrass

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Goals:

- Isolate cDNA clones of genes preferentially transcribed under conditions of low temperature or related water stress.
- Characterize their stress-specific expression.
- Determine the primary molecular structure of these clones.
- Isolate the corresponding genomic clones that contain the inducible response element(s).

Nuclear DNA samples have been isolated from three cultivars of bermudagrass (MIDIRON, TIFWAY, and TIFGREEN). 'U-3' also will be included in these studies. The DNA preparations are of sufficient quality (high molecular weight, and free of contaminating proteins and polysaccharides) and quantity that restriction endonuclease digestion can readily be performed. The digested DNA was used in differential hybridization analysis (Southern blots) of the bermudagrass nuclear genome.

Heterologous gene probes for nuclear sequences correlated with induction at low-temperatures or by exposure to conditions of water deficit, originally isolated from dicotyledonous species, will be used to screen these membrane blots. Initial surveys by dot and slot-blot analysis, using undigested genomic DNA and entire plasmid clones as gene probes, indicate that many of these genes will likely detect related sequences in these cultivars, and these may prove to be evolutionarily conserved in bermudagrass.

Institutional support for the purchase of additional growth chambers has been acquired. These chambers will be utilized in establishing standard conditions of temperature, light and humidity to reproduce the environmental parameters necessary for low-temperature acclimation. Characterizing the expression of sequences related to the heterologous gene probes under these standardized environmental conditions is the next objective of this project.