improvement work. Bentgrass germplasm from the improvement program under the direction of Dr. Engelke (Texas A&M) and buffalograss germplasm from Dr. Riordan (University of Nebraska) also were screened using this technique to evaluate salt resistance. Promising bentgrass lines were identified, while less satisfactory results were reported for buffalograss.

University of Illinois - Dr. M.A.L. Smith

Whole Plant Microculture Selection System

A novel, highly uniform *in vivo* screening method for monitoring mature turfgrass plant response to increasing salinity levels over time was developed. Video image analysis was utilized to quantify and validate turfgrass responses, and permitted larger sample sizes and a more thorough screening of plants.

A strong linear relationship for shoot and osmotic adjustment occured between solution culture and whole plant microculture. Root growth, as measured by root length and area, was more variable in both solution and microculture. Whole plant microculture conferred additional advantages as a highly-controlled test system in terms of scale, timing, maintenance, and repeatability.

Salt tolerant lines were regenerated, adapted to the greenhouse, and reestablished in whole plant microculture. In whole plant microculture, the grass plants again were subjected to salinity stress, and the whole plant responses were non-evasively monitored over time using video image analysis. Approximately one third of the lines selected for salt tolerance at the cell level retained salt tolerance traits at the whole plant level.

Water Use

University of Georgia - Dr. Robert N. Carrow

Influence of Soil Moisture Level on Turfgrass Water Use and Growth

Reducing irrigation frequency is one means of conserving water. Of concern to the turfgrass manager is the quantity of water conserved and any adverse effects on turf quality. Evapotranspiration (ET) data obtained in arid regions is not necessarily valid for estimating turf water use in humid regions. A scale was developed to include ET and overall drought resistance criteria to rank grasses for water conservation in humid regions.

The ET ranges for 'Tifway' bermudagrass, 'Meyer' zoysiagrass, and common centipedegrass were determined under moderate stress irrigation in large field plots. The three warm-season grasses were irrigated under three irrigation regimes, i.e., well irrigated, moderate stress, and severe stress.

For the well watered irrigation regime, common for golf course tees or very high quality fairways, bermudagrass used the least water in summer and fall. Relative to Tifway bermudagrass, Meyer zoysiagrass used 10, 30, and 5% more water for July, August, and October, respectively. Common centipedegrass used 4, 23 and 13% more water than bermudagrass in July, August, and October, respectively.

In the moderate stress irrigation program, typical for many fairways, water use rates were 39 and 11% greater than bermudagrass in August for zoysiagrass and centipedegrass, respectively. Just prior to an irrigation, zoysiagrass showed slight wilt, while the other grasses did not.

Under severe moisture stress, such as for rough areas, water use rates in August were 4% lower and 43% higher than bermudagrass for zoysiagrass and centipedegrass, respectively. The zoysiagrass exhibited severe wilt and bermudagrass no symptoms. The semi-dormant state for zoysiagrass accounted for its lower water use. Zoysiagrass did not appear to develop many roots into the heavy B soil horizon and could not effectively use subsoil moisture.

A second means of reducing water use is to utilize atmospheric, soil or plant based criteria to schedule irrigation in contrast to guessing when to water. Comparative data on these methods were developed to allow turfgrass managers to select the best means of scheduling irrigation.

Entomology

Rutgers University - Dr. Peter R. Day and Dr. C. Reed Funk

Endophytes of Turfgrasses: New Tools and Approaches

The purpose of this project was to find naturally occurring endophytes within the *Poa* and *Agrostis* genera that would improve insect resistance. Endophytes are fungi which grow within the turf plant and produce chemical compounds, (i.e., Alkaloids) which make the plant less desirable to some insect pests. If naturally occurring endophytes could not be found within *Poa* and *Agrostis* species, particularly creeping bentgrass and