



Clemson University Drought Study

Summary

Conducted by Dr. H. Liu and C.M. Baldwin,

- Objective: To Compare/Evaluate Drought Tolerance of Six Bermudagrasses: Celebration, TifSport, Aussie Green, SWI-1012, Arizona, Tif-3
- Methods:
 - 5,10, 15 Day Irrigation Intervals (Plus Control = Every Day)
 - Evaluation of Root Biomass Production (Dry Matter)
 - Evaluation of Evapotranspiration (ET) and Leaf Firing (Wilting)

Results:

- Celebration Produced 53% More Roots = Better Drought Tolerance
- Celebration Had Highest ET = More Efficient Water User
- Less Leaf Firing, Compared to Arizona Common

Drought Tolerance of Six Bermudagrass Cultivars

Current Highlights

(This is a 5-year study, currently in progress as of Fourth Quarter 2004)

- An increase in drought stress (created by lengthening the time between watering) leads to increased production of root biomass.
- Higher root biomass increases the plant's ability to find less-available water and correlates to increased drought resistance.
- Celebration produced 53% and 39% more root biomass than TifSport and Aussie Green: Celebration has better drought resistance.
- High drought tolerance means more roots using more water and producing a higher ET (drought tolerant plants are more efficient at using available water than non-tolerant varieties).
- The study is being conducted in a greenhouse environment. Even in those very warm conditions, Celebration has shown 27% and 18% better ratings for drought tolerance than Arizona Common or Tift No. 3, after 2 weeks.
- As drought stress has increased during this study, Arizona Common has demonstrated more susceptibility to leaf firing (wilting) than Celebration.

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Poster Site: Dr. H. Liu's Research Plots

As the golf industry continues to grow, drought tolerant turfgrass development is becoming an important issue in golf course management. Due to drought conditions in past years and water conservation concerns, water allocation continues to become more limited for irrigation. In response to this demand, an objective of turfgrass breeding programs is to establish drought resistant turfgrasses. Therefore, two greenhouse studies were conducted to determine the drought tolerance of six bermudagrass (*Cynodon dactylon* L.) cultivars. Cultivars selected from the National Turfgrass Evaluation Program (NTEP) included 'SWI-1012', 'Arizona Common', 'Tift No. 3', 'TifSport', 'Aussie Green', and 'Celebration'. Each turf was irrigated in five (5d), ten (10d), and fifteen day (15d) intervals, including a control (watered daily). Volumetric soil moisture content and evapotranspiration (ET) rates were recorded every three days. Turfgrass quality was observed weekly, percent brown leaf tissue recorded after each 15-day water cycle, and dry root weight was measured at the end of the study.

Celebration produced 53% and 39% greater root mass than TifSport and Aussie Green. However, as drought stress increased, 15d treatment produced 44%, 18%, and 10% greater root biomass than control, 5d, and 10d treatments.

Aussie Green and Celebration produced the highest turf quality rating of 7.37 when well watered. After four weeks of the 5d water interval, all cultivars produced unacceptable quality ratings (<7). However, Aussie Green and Celebration were able to maintain an acceptable TQ rating (>7) showing 27% and 18% higher quality rating compared to Arizona Common and Tift No. 3 at week two.

As drought intervals increased, all cultivars increased percent leaf firing. At day 30 of the 5d, 10d, and 15d treatments, Arizona Common produced 83%, 57%, and 25% greater percent leaf firing than Celebration.

While Aussie Green and Celebration had highest turf quality ratings, volumetric soil water content was 6% and 8% lower than Tift No. 3. Also, Celebration produced the highest ET rates at the 5d, 10d, and 15d treatments.