

UCRTRAC Accumulative Research Summary
Section A: Irrigation Water Use Efficiency Including Utilization of Effluent Water
Project 6

Title: The Influence of Irrigation Frequency when Irrigating Bermudagrass and Zoysiagrass below ET_{crop} during the Warm Season.

Objective and Background Information: To determine if the warm-season performance of bermudagrass and zoysiagrass, when irrigated at 60% ET_{crop}/DU ($\approx 51\% ET_0$), can be improved by altering irrigation frequency. Note that $ET_{crop} = ET_0 \times K_c$ where ET_0 is reference evapotranspiration, K_c is crop coefficient, and DU is distribution of uniformity of the irrigation system. As a point of reference, Riverside's historical annual $ET_0 = 56.7$ inches, average annual K_c for warm-season turfgrasses = 0.6, and a typical $DU = 0.75$. Therefore, approximate annual ET_{crop} for a warm-season turfgrass in Riverside = $(56.7 \text{ inches} \times 0.6)/0.75 = 45.36 \text{ inches} = 80\% ET_0$. Note average annual rainfall = 10.0 inches = a "gift." Finally, there is an opportunity for turfgrass managers to irrigate below ET_{crop} , "deficit irrigation", and successfully maintain good turfgrass quality and function.

Location: A specially constructed irrigation plot located at the UCR Turfgrass Field Research Facility. Twelve independently-operated irrigation cells defined main plots which were split with the two warm-season turfgrass species.

Duration: One season

Funding Source: Metropolitan Water District of Southern California

Findings:

- Irrigation treatments consisted of applying the same amount of irrigation water ($\approx 51\% ET_0$) in either one, two, or three irrigation events per week. These irrigation frequency treatments were applied from May 7 through September 30 (146 days) during which time turfgrass performance and soil water tension (Watermark granular matrix sensors) and volumetric soil water content (neutron scattering method) were measured.
- The data concerning the effect of irrigation frequency was mixed. One irrigation event/week compared to three irrigation events/week resulted in: improved bermudagrass visual turfgrass color; more zoysiagrass clipping yields; and lower zoysiagrass relative leaf water content.
- Irrigation frequency did not affect: bermudagrass and zoysiagrass visual turfgrass quality; zoysiagrass visual turfgrass color; bermudagrass and zoysiagrass percent brown leaves or percent leaves rolled and wilted; and bermudagrass clipping yield and relative leaf water content.

- The data concerning the effect of turfgrass species on turfgrass performance also was mixed. Zoysiagrass had acceptable visual turfgrass quality and color and bermudagrass did not. Zoysiagrass had more leaves wilted and rolled than bermudagrass and bermudagrass had more clipping yield, higher relative leaf water content, and greater root mass density along with deeper rooting.
- Data concerning the effect of irrigation frequency on soil water tension showed that soil at the 12-inch depth was drier for the three irrigation events/week treatment than the one irrigation event/week treatment.
- Data concerning the effect of irrigation frequency on volumetric soil water content showed no effect, though the soil progressively became drier during the duration of the study. Data concerning the effect of turfgrass species on volumetric soil water content showed that the bermudagrass root-zone soil was drier than the zoysiagrass root-zone soil, especially at the 24- to 36-inch depth.
- These data show that bermudagrass possesses a better ability than zoysiagrass to extract water from the soil and maintain leaf water content. However, zoysiagrass probably possesses a greater tissue tolerance to drought.
- Sixty percent ET_{crop}/DU ($\approx 51\% ET_0$) was not enough irrigation water to maintain bermudagrass and zoysiagrass during the warm season in Riverside. Thus, we experienced a diminished ability to adequately test for the irrigation frequency effect.

Status: A one-year study has been completed. A Final Report has been prepared. A follow up study with a revised protocol probably should be completed before information concerning this study is disseminated.
