Evapotranspiration in an arid environment

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Evapotranspiration is an important process in the water cycle because it is responsible for 15% of the atmosphere's water vapor. Without that input of water vapor, clouds could not form, and precipitation would never fall. It is the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants.

Now, in an era when impending water scarcity has become a legitimate concern, irrigating to meet evapotranspiration while avoiding overirrigation with precious available water will take informed judgement.

Researchers Tamara Wynne and Dale Devitt of the University of Nevada, Las Vegas, conducted a study designed to quantify water usage of landscape plants while irrigating to meet evapotranspiration to avoid a drainage component.

Their findings are in the article "Evapotranspiration of Urban Landscape Trees and Turfgrass in an Arid Environment: Potential Trade-offs in the Landscape" published in *HortScience*.

As Wynne and Devitt point out, irrigation in arid urban landscapes can use significant amounts of water. Water conservation must be based on plant species and the ability to meet plant water requirements while minimizing overirrigation. However, actual evapotranspiration estimates for landscape trees and turfgrass in arid environments such as the Mojave Desert are poorly documented.

Continued population growth in the arid southwestern United States is placing greater demand on available water resources. Much of this growth is in sprawling metropolises where water is used outdoors to support urban landscapes. The overall driving force of evapotranspiration of landscape vegetation in arid environments is mostly contingent on the amount of water made available to plants.

One of the objectives of this study was to quantify the evapotranspiration of 10 landscape trees and two turfgrass species using a soil-water balance approach to determine tree grass water use ratios and what this might mean in terms of water use trade-offs in the landscape.

The trees were grown in a plot with a high-density planting. A complete morphological assessment was made on each tree, and monitoring of plant water status was conducted weekly. A water balance was maintained on each tree by quantifying irrigation input, drainage output and change in soil water storage.

In addition, the researchers quantified transpiration using sap-flow sensors, allowing them to indirectly estimate evaporation. The research was conducted at the University of Nevada Las Vegas Center for Urban Water Conservation in North Las Vegas.

Wynne and Devitt reported that, as trees grow, their water use requirements increase, but their water use on a basal canopy area may actually decrease, meaning that greatest water savings in urban landscapes with mature trees would occur by removing the turfgrass, not the trees—especially cool-season grasses.

The researchers submit their findings as a benchmark for further study and understanding, indicating the importance of honing irrigation practices concerning landscape plants in arid environments, demonstrating good stewardship of water storage.

Wynne notes, "Previous research by Dr. Devitt revealed young trees used more water than turfgrass, and it was interesting to see mature landscape trees become more water efficient over time and use less water per area than turfgrass."

More information: Tamara Wynne et al, Evapotranspiration of Urban Landscape Trees and Turfgrass in an Arid Environment: Potential Trade-offs in the Landscape, *HortScience* (2020). DOI: 10.21273/HORTSCI15027-20

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