Water Conservation for Turfgrass: An Historical Review of Research and Extension Contributions

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Abstract

Water use is a nearly constant concern in turfgrass management. Even though water requirements of turfgrass species are well known, water distribution authorities mandate additional reductions of water use. Cooperative Extension has always played an important role in educating clientele groups about turfgrass water conservation. Results from applied research in topics such as turfgrass water use, turfgrass response to applied water, irrigation scheduling based upon weather conditions, and specialized cultural management techniques have been made available to turf managers and policymakers alike. This information is part of the overall Extension mission to conduct research and transfer technology to conserve water in the landscape.

The Issues

In order to determine water amounts for turfgrass irrigation, a logical process to follow is to: (1) determine water use by different grasses; (2) express water use in relation to weather conditions; (3) assess the response of turfs to applied water levels; and (4) investigate alternative grasses for either salt or drought conditions.

1. Water use of turf in Arizona was initially determined from soil moisture profile measurements by Erie, French and Harris (1963).

Bermudagrass water use = 43.5 in./yr

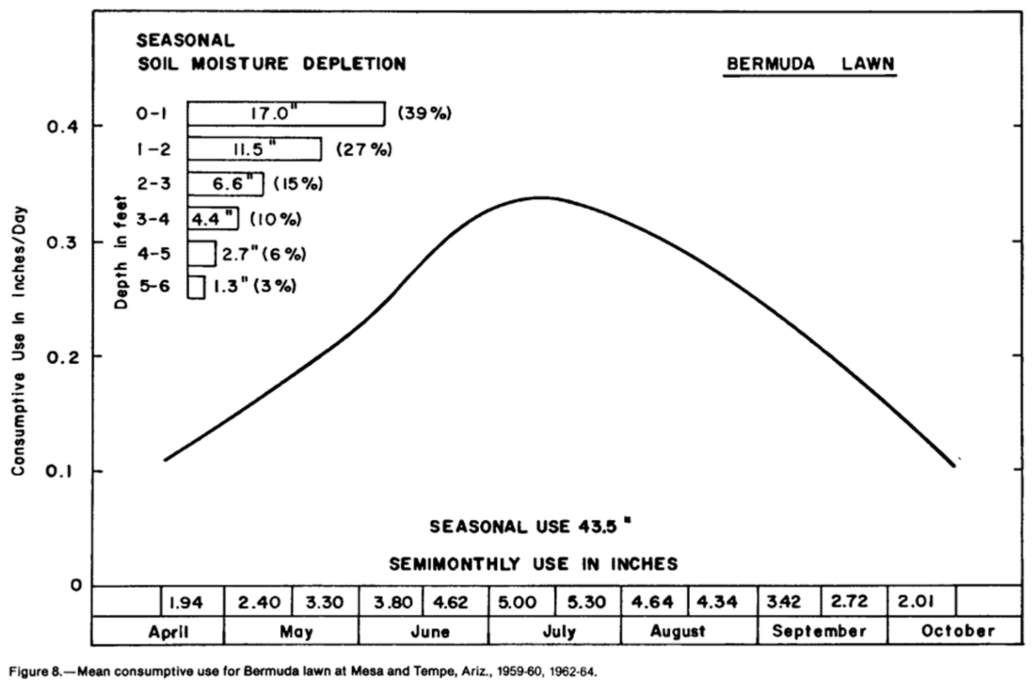


Figure 8.—Mean consumptive use for Bermuda lawn at Mesa and Tempe, Ariz., 1959-60, 1962-64.

2. Water use of multiple grass species was measured using sub-surface irrigation by Kneebone and Pepper (1982).

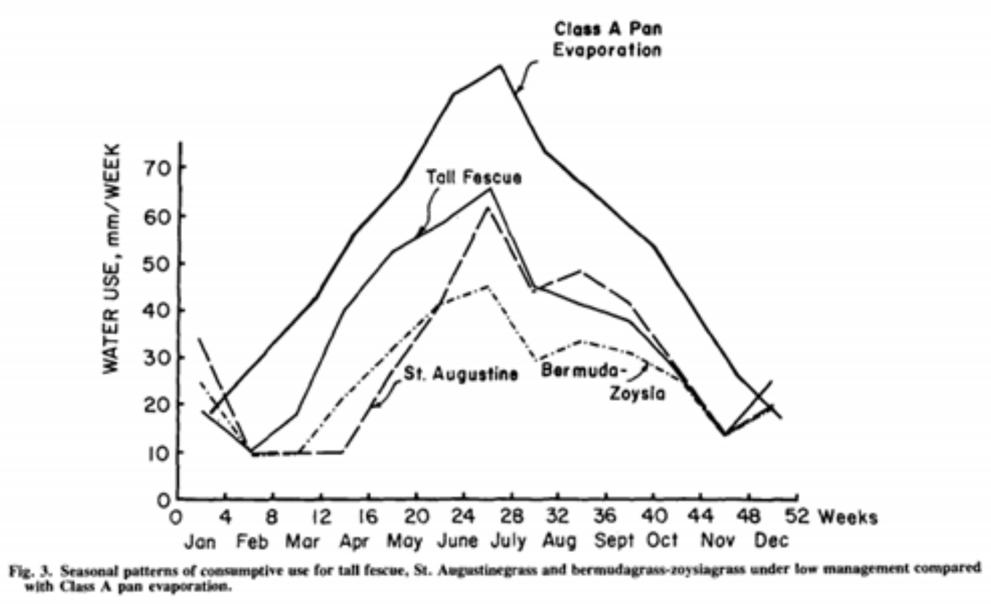


Fig. 3. Seasonal patterns of consumptive use for tall fescue, St. Augustinegrass and bermudagrass-zoysiagrass under low management compared with Class A pan evaporation.

Bermuda / Zoysia water use = 51.5 in./yr
St. Augustine water use = 65 in./yr
Tall fescue water use = 71.5 in./yr

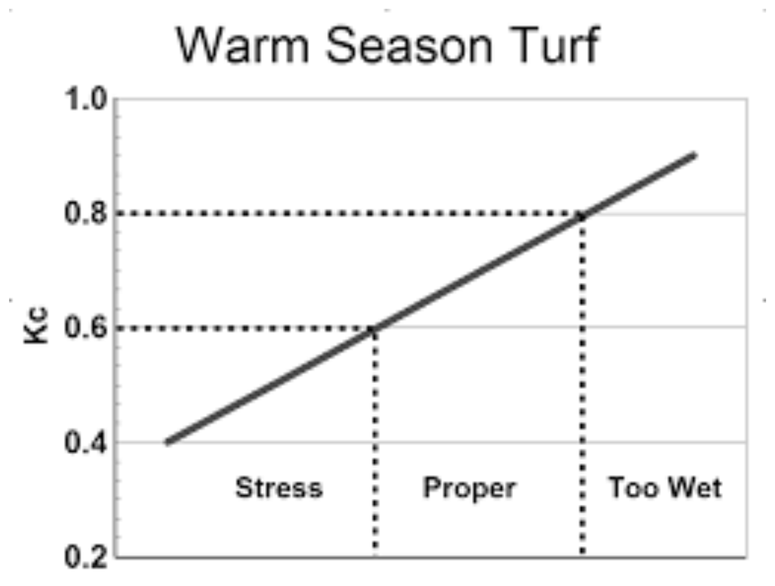
3. *Summer Lawn Watering Guide* (also known as the "water wheel") University of Arizona & Arizona Municipal Water Users Association (Kopec, 1987).

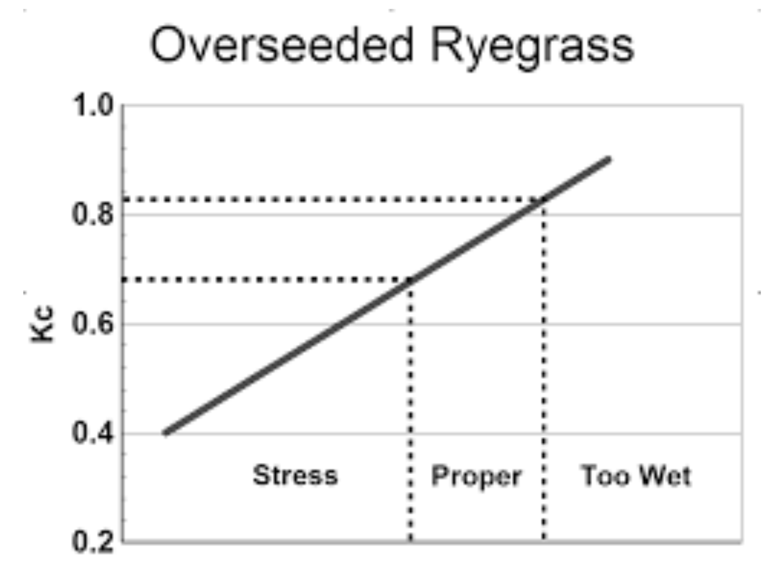
A homeowner guide for estimating irrigation run times based on daytime high temperature and on-site lawn sprinkler head output.

4. Water use of turf in relation to Reference Evapotranspiration (ETo)

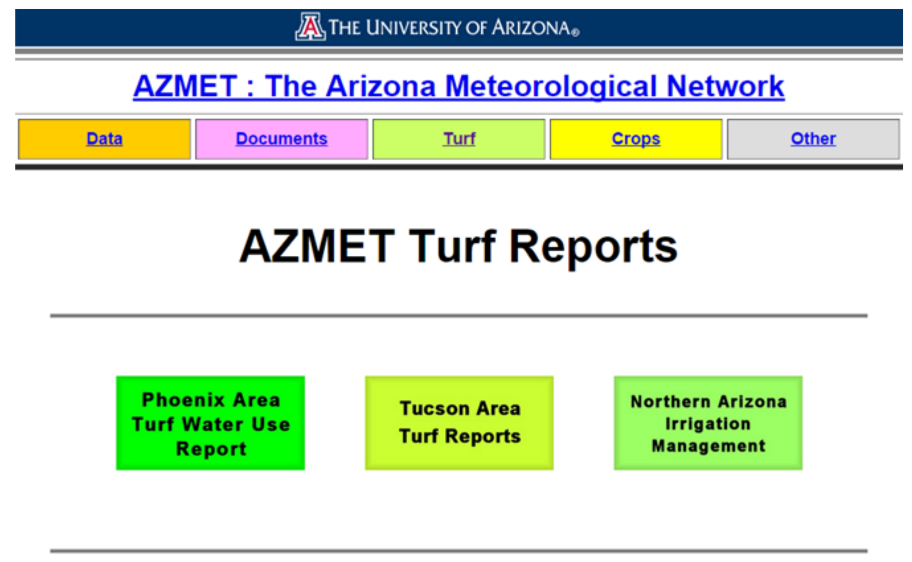
Crop coefficients (Kc) calculated for turf as ET grass / ETo. Best estimate for turfgrass water use replacement values is based on current weather.

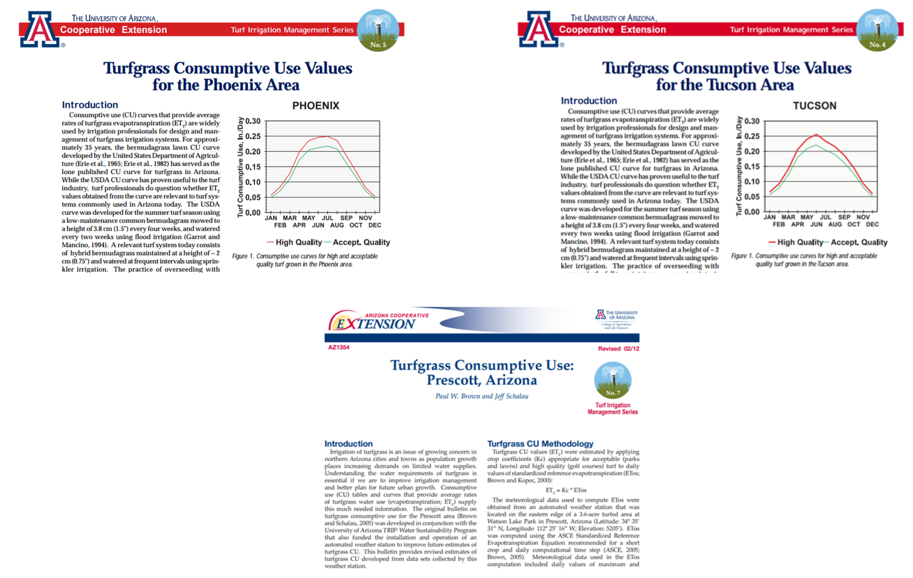
Widespread industry adoption for modern computer driven irrigation systems and "smart controllers" for turf irrigation purposes. This major milestone is a widely accepted practice. (Brown, 1993-99)





5. AZMET (Arizona Meteorological Network): Water use *(irrigation replacement values)* for turfgrass available for multiple locations online. County based publications by Brown (1993).

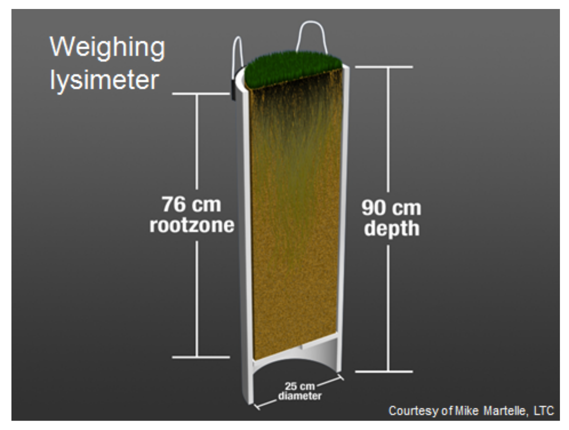




6. Applying less water than standard turfgrass water use (deficit irrigation).

Applying water consistently at percentage amounts less than ETo have shown that bermudagrass cultivars (*Midiron*) tolerate chronic drought more than others (*Tifway 419*). Seashore paspalum does not tolerate chronic drought. (Banuelos et.al., 2011)

7. Determining water use and stress points of turfgrass species after a single irrigation event.



The halophytes, seashore paspalum and inland saltgrass, have higher initial ET rates compared to bermudagrass. Saltgrass can go nearly 3 times longer than bermudagrass with a single, deep irrigation event. Seashore paspalum is intermediate. (Henry, 2008).

8. Evaluate native grass species endemic to areas receiving less rainfall than that required by bermudagrass. Intended use as ground covers and for low traffic areas. (Smith and Kopec, current)

9. Outreach. http:/turf.arizona.edu