

# Evaluation of Water Use Rates Among Bermudagrass Cultivars



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## Objective:

*The objective of this research is to evaluate and explain any differences in water use rates among several bermudagrass cultivars and OSU experimental bermudagrass selections.*

Water conservation is important for golf courses across the southern United States and bermudagrass (*Cynodon dactylon*) is the most widely used species for golf course turf in the region. Bermudagrass is generally considered a drought resistant grass, but differences in water use rate likely exist among cultivars that are widely used in the industry. The goal of this research is to identify and promote the use of more drought resistant bermudagrasses for golf courses in the southern United States. The objective of this research is to evaluate and explain any differences in water use rates among several bermudagrass cultivars and OSU experimental selections.

This research was conducted at the Oklahoma State University Turfgrass Research Center in Stillwater, OK. Lysimeters were constructed in 2008 using a design developed by researchers at the University of Arizona and were placed into bermudagrass plots (2.4 x 2.4 m) that were established in 2002. The lysimeters were made from 15.2 cm diameter polyvinyl chloride pipe that were cut 35.6 cm long with an effective root zone depth of 30.5 cm. The lysimeters had an extra 5.1 cm of length below the root zone to accommodate a drain valve. The rooting medium was a calcined clay product and the inside of the lysimeter was filled with a geotextile porous sheet to prevent any loss of the rooting medium. The calcined clay was screened using sieves to a particle size range from 1 mm to 2 mm. A preliminary field experiment was conducted in 2010 and 2011 using five bermudagrass cultivars: 'Patriot', 'Riviera', 'Tifsport', 'Tifway', and 'U3' and results indicated that the method was effective for field evaluation of water use rates among bermudagrass. In late 2012 and early 2013, additional plots were sprayed with glyphosate and planted to include 3 replications of



**Water use of commercial and experimental bermudagrass cultivars is evaluated using small lysimeters in each plot. Immediately after irrigation, the lysimeters are weighed. The plots are allowed to dry down for several days, and then, the lysimeters are weighed again. The difference in weight is an estimate of the amount of water used by each cultivar.**

the following bermudagrass cultivars and experimental selections: Tifway, U-3 (Tulsa Grass and Sod), Celebration, Premier, NorthBridge, Latitude 36, DT-1, OKC1302, and OKC1163 and OKC1131. The field experiment was designed as a randomized complete block with 3 replications and a single lysimeter was located in the middle of each field plot. The lysimeters were fit into PVC plastic pot sheaths in the ground and leveled with pea gravel to assure appropriate lysimeter height relative to the field plot. The plots and lysimeters were mowed 3–4 days per week at 5.1 cm. During the



**Lysimeters are used to estimate water use of turfgrass cultivars. The lysimeter fits into the center of each bermudagrass plot.**

data collection period, lysimeters were saturated and allowed to drain to field capacity before being weighed pre-dawn and placed into the ground on the first day. The lysimeters were pulled out of the plots and weighed every morning prior to sunrise for the following two days. Daily water use was determined by the loss in weight of water every 24 hours. The lysimeters were watered again on day three and placed back into the field plot until the next data collection cycle occurred. This cycle was repeated during August to September 2013 for a total of 10 evaluation dates. Due to unhealthy plants, the OKC1131 entry was not included in the 2013 analysis. Water use measurements were analyzed using Statistical Analysis Systems, SAS 9.1 software. The Proc Mixed procedure was used to test the Date, Cultivar and Date x Cultivar interaction. Cultivar mean ET values were separated by T test at  $p = 0.05$ . There were significant date and cultivar effects. However, the cultivar x date interaction was not significant. The significant date effect is likely due to the day to day changes in weather including solar radiation, temperature, humidity, and wind speed. Therefore, only the cultivar effect will be discussed. Under non-limiting conditions, the bermudagrasses used an average of 4.86 to 5.50 mm water/d during August and September 2013 in Oklahoma. The cultivars Tifway and Latitude 36 used less water than all other cultivars. The experimental selections OKC1302 and OKC 1163 used less water the cultivars U-3, Premier, and DT-1. The cultivar Celebration used less water than U-3, was not different from Premier, DT-1, NorthBridge, OKC1302 and OKC1161, and used more water than Tifway and Latitude 36. This work will continue through the growing seasons of 2014–2015 to obtain water use measurements from the spring, summer, and fall seasons.

### Summary Points

- Preliminary work showed that the field lysimeter method was effective for determining water use rate differences among bermudagrass cultivars in Oklahoma.
- The cultivars Tifway and Latitude 36 used less water than all other entries during August and September in Oklahoma.
- This work will continue through the growing seasons of 2014–2015 to obtain bermudagrass water use measurements from the spring, summer, and fall seasons.

**Table 1. Comparison of mean daily water use rates of nine bermudagrasses in Oklahoma field conditions under non-limiting conditions.**

Cultivar	Water Use Rate
	mm d <sup>-1</sup>
U-3 (Tulsa Grass and Sod)	5.50 a
Premier	5.45 ab
DT-1	5.44 ab
NorthBridge	5.33 abc
Celebration	5.28 bc
OKC1302	5.22 c
OKC1163	5.19 c
Latitude36	4.98 d
Tifway	4.86 d