USGA
Green Section
RESEARCH YOU SHOULD KNOW
July 6, 2018

COOLING CREEPING BENTGRASS PUTTING GREENS

BY USGA GREEN SECTION

- USGA funding supports the development of low-water use grasses.
- Warm-season grasses such as bermudagrass, zoysiagrass and buffalograss need less water to provide optimal playing conditions than cool-season grasses such as perenniel ryegrass, kentucky bluegrass or creeping bentgrass.
- Newer warm-season cultivars with improved cold tolerance are available and perform better farther north than previous cultivars.
- Deficit and wilt-based irrigation reduce golf course water consumption without sacrificing playing conditions.

The best way to reduce water use and maintain quality playing conditions is to establish grasses that use less water. Warm-season grasses such as bermudagrass or zoysiagrass naturally use less water than cool-season grasses. In the past, these grasses were only used in warmer climates because high-quality cultivars lacked cold tolerance. Over the years, the USGA has supported the development of many warm-season cultivars with improved cold tolerance. These cultivars produce high-quality playing surfaces, withstand winter conditions in colder climates and help conserve water.

Compared to perennial ryegrass – a commonly used cool-season turf that uses approximately 0.4 inches of water per day during the growing season when well-watered – newer bermudagrass cultivars such as 'Latitude 36', 'NorthBridge'and 'TifTuf' use less than 0.2 inches of water per day under well-watered conditions. For one month during the growing season, this means 12 acre-inches (325,829 gallons) of water are needed to irrigate 1 acre of perennial ryegrass fairway whereas only 6 acre-inches (162,914 gallons) of water are needed to irrigate 1 acre of bermudagrass fairway. This potential 50-percent reduction in water use can simply be achieved through turf selection. Irrigation volume can be further reduced by using deficit irrigation – i.e., replacing less water than was used by the turf. Warm-season grasses often will maintain better quality under greater irrigation deficits than cool-season grasses, but using deficit irrigation is possible with all grasses.

Buffalograss is a warm-season grass native to the Great Plains region of the U.S., but it is not commonly used for fairways. A current USGA-funded project at the University of Nebraska–Lincoln, is comparing 'Prestige' buffalograss to cultivars of Kentucky bluegrass and creeping bentgrass under a spectrum of fairway management regimes. In addition to various fertilizer and pesticide programs, the researchers are evaluating each grass under unirrigated and standard irrigation treatments. Unirrigated plots only receive natural rainfall, whereas the plots under standard irrigation are irrigated weekly to supplement rainfall if needed. Following standard strategies, the researchers irrigated buffalograss with 6.8 acre-inches of water (183,997 gallons per acre) during the 90-day evaluation period during summer 2017, whereas Kentucky bluegrass and creeping bentgrass received 9.6 acre-inches of water (259,705 gallons per acre) during the same study period. Cool-season grasses provided the best quality when irrigated, but buffalograss (irrigated or unirrigated) was not far behind. Further, the cool-season grasses had poor visual quality when left to survive with only natural rainfall.

In areas where conversion to a warm-season grass is not feasible because of expectations, climate, or economics, there are other options. The USGA also supports the development of improved cool-season grasses, and water-use-efficiency is among the most important traits that researchers target. Researchers also have extensively evaluated the performance of cool-season grasses under deficit and wilt-based irrigation strategies. A USGA-funded study at Kansas State University explored the minimum water requirement for 28 Kentucky bluegrass cultivars and two hybrid bluegrass cultivars to maintain visual quality between irrigation cycles. The research was conducted under a rainout shelter to exclude natural rainfall, and each cultivar was irrigated with 1 inch of water whenever 50 percent of a research plot was wilted.

Kentucky bluegrass cultivar performance varied widely throughout the study. The total irrigation applied among cultivars over the approximate 110-day evaluation period ranged from 9.2 to 17.7 inches. These figures correspond to a range of 0.6 to 1.2 inches of irrigation per week (0.09 to 0.17 inches per day), which is

approximately 78 to 58 percent less than the commonly cited water use rate for Kentucky bluegrass. Since all cultivars received 1 inch of water whenever wilted, water savings in low-water-use cultivars resulted from the longer durations between irrigation cycles – i.e., low-water-use cultivars staved off wilt symptoms longer. In fact, days to wilt among all cultivars ranged from 6 to 13 days. While no cultivar maintained acceptable quality under experimental conditions, the best-performing cultivars averaged both higher quality and lower water-use rates than other cultivars.

The researchers concluded that golf course superintendents who require greater visual quality during drought should use a more sensitive threshold and irrigate sooner during visible wilt. Even though water savings would be less with a lower threshold, it is apparent that visual quality can be maintained while greatly reducing annual irrigation. A simple adjustment in irrigation strategy, regardless of the turf managed, can result in significant water conservation for a golf course. For best results, establish a low-water-use cultivar and irrigate sparingly with 1 inch of water or less, depending on soil type and rooting depth, when symptoms of wilt appear.

Additional Information:

Evaluation of Water Use Rates Among Bermudagrass Cultivars - (http://usgatero.msu.edu/v13/n2-10.pdf)

Buffalograss Fairways - (http://archive.lib.msu.edu/tic/usgamisc/resup/2017-09-01.pdf)

Thirsty But Green - (http://gsrpdf.lib.msu.edu/ticpdf.py?file=/article/nus-thirsty-7-6-12.pdf)

Effects of Wilt-Based Irrigation on Visual Quality and Seasonal Water Applications on 30 Bluegrasses in the Transition Zone - (http://usgatero.msu.edu/v11/n06.pdf)