TURFGRASS TRENDS

IRRIGATION

Water-Saving Turf

It's important to select varieties to reduce irrigation inputs

By Leah Brilman

Turfgrasses provide many benefits to the environment including carbon dioxide sequestering, reduction of wind and water erosion, and cooling of the environment. In spite of these documented benefits, there is increasing pressure to reduce the use of grasses — primarily to reduce the water requirements of urban areas. In many settings, turfgrass is watered much more than is required to maintain turf quality, often because of older irrigation systems or failure to understand how to water the grass. However, there are choices that can be made in species and cultivars to reduce water usage.

In areas where they are adapted, warm-season grasses require less water than cool-season grasses. This is due to their different leaf structure and method of carbon capture. Even within these species, however, it has been shown the improved seeded bermudagrasses, such as Yukon and Princess 77, can use 25 percent less water than the hybrid bermudagrasses. If you're in an area that requires green turf during the winter, the overseeded cool-season grasses can add to the water utilization of these species. In general these species also do not do as well in shady sites.

In areas where cool-season species are utilized, selecting a water-saving grass may depend on whether you're looking for drought avoidance, the ability to survive short periods without irrigation or the ability to perform with less water. In many areas of the West, irrigation is required for survival. The dry summers, with low humidity, make for higher water-use rates. The depth of the soil, the type, the slope and level of compaction all influence the availability of water to the turfgrass system.

As golf course superintendents study many trials looking at drought tolerance, they'll find some measure evapotranspiration (ET) rates under non-limiting water conditions, which can be very different than ET rates with limited water. Other trials just limit water availability. Some trials are outside while others are in greenhouses or controlled environments. The other difficulty in evaluating trials is variation in species or cultivars in these trials making cross comparisons difficult.

Kentucky bluegrass has the reputation of being a high water user. If you examine the trial performed at Kansas State by Bremer et al in 2007 and to be repeated in 2009 (http://turf.lib.msu.edu/ressum/2007/8.pdf), the common Kentucky bluegrasses, which are the cheapest seed and are often used in consumer blends, used 22 inches of water over the summer when irrigated at 50 percent wilt, while the Compact-America types and Mid-Atlantic-types of bluegrass had excellent performance at 8 inches of water over the same period. So changes in the cultivars of Kentucky bluegrass could greatly reduce the water requirements in even a hot environment for this species. These are measurements of the water required to keep the turfgrass looking acceptable to the average homeowner using an end point they can understand.

Continued on page 46

IN THIS ISSUE

OUR SPONSORS

Sometimes cultivars that wilt first under drought conditions maintain green color longer.

Continued from page 45

Often, we read studies where it's decided to irrigate at a set percentage of evapotranspiration. These may be set to 100 percent, 80 percent, 60 percent and 40 percent of evapotranspiration. Ebdon et al (1998) examined the evapotranspiration, water loss of different bluegrass cultivars in high (arid) and low (humid) evapotranspiration environments. Some cultivars had uniform high or low water use in all environments while others varied depending on the environment. Again, in this trial, Mid-Atlantic cultivars had low water use and the common types, such as Kenblue, had very high water use. In general, these types of trials looking at water use are under well-watered conditions.

Richardson et al (2008) did dry-down cycles for extreme drought on Kentucky bluegrass. Again, America-types such as Mallard, SR 2284, and Compact-type such as Diva and Midnight stayed green the longest. Although variation can occur, examination of the NTEP (National Type Evaluation Program) drought trials or drought cycles in other trials can help find lower water-use Kentucky bluegrasses.

Tall fescues are excellent drought avoiders because of their deep root system, as long as you have adequate, non-compacted soil with good water-holding capacity. They are actually higher water users than most Kentucky bluegrasses, but they can stay green all year long without supplemental irrigation in areas with summer rainfall or good soils.

Advances in tall fescues make them finer textured and denser than old cultivars, but most of them maintain good drought tolerance.

A study by Karcher et al (2008) comparing tall fescues with Texas hybrid bluegrass and Kentucky bluegrasses shows that variation in drought resistance does occur in tall fescue, with some new cultivars equivalent to the old, low-density cultivar KY-31.

One feature you can find from NTEP data and other trials is sometimes the cultivars that wilt first under drought conditions actually maintain green color longer. The wilting process may potentially close down the stomates and prevent further water loss. These cultivars may actually use more water initially. Mowing height influences both drought resistance and water usage.

The final set of species to consider for reduced-water use are the fine fescues, which have low water requirements and do well under reduced maintenance. New cultivars have high quality not just in shade but also in full sun. They can be used for golf course fairways and roughs, as well as parks and home lawns.

The photo above shows performance of fine fescues compared to bluegrasses and tall fescues in a low-maintenance unirrigated trial at Rutgers University in New Jersey. Typically, the hard fescue and sheep fescues have done best under these circumstances, but newer chewings slender and strong creeping red fescues show improved performance. The hard fescues transpire less than other species to contribute to drought tolerance and reduced-water usage.

Aronson et al (1987) documented that chewings and hard fescues could maintain their leaf-water potential at lower soil water content than Kentucky bluegrass or perennial ryegrass.

Leah A. Brilman, Ph.D., director of research and technical services for Seed Research of Oregon, can be reached at www.sroseed.com

PHOTO COURTESY: SEED RESEARCH OF OREGON

REFERENCES

Aronson, L.J., R.J. Gold and R.J. Hull. 1987. Cool-season turfgrass response to drought stress. Crop Sci.27:1261-1267.

Ebdon, J. S. A. M. Petrovic, and R. W. Zobel. 1998. Stability of Evapotranspiration Rates in Kentucky Bluegrass Cultivars across Low and High Evaporative Environments. Crop Sci. 38:135-142.

Karcher,D., M.Richardson and J.Landreth.2008.Drought tolerance of tall fescue and bluegrass cultivars. Arkansas Turfgrass Report 2007,Ark. Ag.Exp.Stn.Res. Ser.557:17-20.

Richardson, M. R., D. E. Karcher, K. Hignight, and D. Rush. 2008. Drought Tolerance and Rooting Capacity of Kentucky Bluegrass Cultivars. Crop Sci. 48:2429–2436.