LOW-WATER-USE TURFGRASSES

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WATER USE RATE is the total amount of water required for turfgrass growth plus the quantity transpired from the grass plant and evaporated from associated soil surfaces. It is typically measured as evapotranspiration, and expressed as ET in millimeters per day.

The comparative water use rates of turfgrass species are distinctly different from the relative drought resistances, because each is a distinctly different physiological phenomenon. For example, tall fescue is one of the more drought-resistant cool-season turfgrasses, but it possesses a very high water use rate. Reducing the turfgrass water use rate is a strategy associated with irrigated grasses. The goal is to select turfgrasses that require the least possible supplemental irrigation.

TABLE 1.
Relative ranking of evapotranspiration rates for the most commonly used cultivars of the major cool- and warm-season turfgrasses.*

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Relative Ranking	ET Rate (mm/day)	Turfgrass	
		Cool-season	Warm-season
Very low	< 6		Buffalograss
Low	6 -7		Bermudagrass hybrids Centipedegrass Bermudagrass Zoysiagrass Blue Grama
Medium	7 - 8.5	Hard fescue Chewings fescue Red fescue	Bahiagrass Seashore paspalum St. Augustinegrass Zoysiagrass, Emerald
High	8.5 - 10	Perennial ryegrass	
Very high	> 10	Tall fescue Creeping bentgrass Annual bluegrass Kentucky bluegrass Italian ryegrass	

*Grown in their respective climatic regions of adaptation and optimum culture regime. Cultural or environmental factors that cause a drastic change in leaf area or shoot density of a given species may result in a significant shift in its relative ranking compared to the other species.

Research at Texas A&M University conducted under a United States Golf Association grant has delineated the comparative water use rates among 19 turfgrass species used throughout North America (Table 1). The differences are substantial. Extensive research has been done with the warm-season turfgrasses — those species adapted to soil temperatures in the 80° to 95° F range, and commonly grown in the southern part of the United States. As a group, the warm-season turfgrasses have a lower evapotranspiration (ET) rate than the cool-season species. These evapotranspiration comparisons represent the rates that occur under non-limiting soil moisture conditions. The range in ET rates for the warm-season turfgrasses is 5.5 to 8.5 mm per day. The high-density, low-growing turfgrasses, such as buffalograss, centipedegrass, and hybrid bermudagrass, exhibited low water use rates. Other warm-season species, such as St. Augustinegrass, seashore paspalum, and bahiagrass, have exhibited medium water use rates.

Among the cool-season species, which grow best at soil temperatures in the 60° to 75° F range, comparative information is more limited. However, recently completed investigations at Texas A&M University have shown that the fine-leafed fescues rank medium in water use rate, while Kentucky bluegrass, annual bluegrass, and creeping bentgrass have exhibited very high water use rates when grown under non-limiting moisture conditions. These cool-season grasses have evapotranspiration rates ranging from 7.5 to 12 mm per day under high evaporative demand.

Mechanistic studies at Texas A&M University have revealed that certain specific types of plant morphology affect the resistance to evapotranspiration, and the surface area from which it occurs. The major factors are a low leaf area and a high canopy resistance, whose components are as follows:

High Canopy Resistance to ET	Low Leaf Blade Area for ET
High shoot density	Slow vertical leaf extension rate
High leaf number	
More horizontal leaf orientation	Narrow leaf

The professional turf manager should be aware of these particular plant characteristics that contribute to a low water use rate. These characteristics can be used as guidelines in selecting cultivars possessing a low water use rate. Furthermore, these same morphological traits can be used by turfgrass breeders to conduct rapid field selections of plants that are most likely to possess a low water use rate.

REFERENCES

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