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Agricultural water management
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Agricultural Water Management 80 (2006) 117–131
www.elsevier.com/locate/agwat

Can we maintain turf to customers' satisfaction with less water?

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Available online 15 August 2005

Abstract

Science-based, holistic, site-specific water conservation practices can reduce water use on turfgrass sites without adversely affecting turfgrass performance. However, when water use is decreased below a certain threshold, performance declines. Water conservation measures that reduce turfgrass performance essentially decrease its economic, environmental, recreational, and aesthetic values, which can in turn adversely impact many 'stakeholders', including the local economy and those affected by increased wind erosion, water erosion, or fire hazard. On larger turfgrass sites, considerable costs are associated with some water conservation strategies, especially when the quality of an alternative irrigation water source is poor or redesign of the landscape and/or irrigation system is involved.

Keywords: Turfgrass; Drought resistance; Water conservation; Best management practices for water conservation; Water management

1. The question

The question ''Can we maintain turf to customers' satisfaction with less water?'' suggests several points:

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0378-3774/$ – see front matter
doi:10.1016/j.agwat.2005.07.008

(a) That less water can be used on turf sites in many situations.
(b) That turf performance or quality could potentially be affected in a manner that would reduce its value to the customer.
(c) There are 'customers' who derive benefits from turfgrass.
(d) The issue of water conservation as a 'benefit' should be addressed in the context of other changes (environmental, economic, recreational, etc.) that may be 'costs' to customers.

In the midst of a water crisis, the general public, politicians, and water regulatory agencies may focus only on water savings that can be achieved by implementing immediate water saving measures without regard to potential short or long term consequences to all that may be affected. However, if water conservation measures are severe enough to compromise turf recreational use, economic impact, environmental/functional benefits, or aesthetics, then more than the perceived direct 'customer' may be adversely affected (Beard and Green, 1994; Gibeault, 2002; Cathy, 2003). The focus of this paper is to address the points posed by the question in the title.

2. Sound water conservation strategies can result in less water used on turf sites

In recent papers (Balogh and Watson, 1992; Ervin and Koski, 1998; Richie et al., 2002; Bastug and Buyuktas, 2003), the relationships between turfgrass evapotranspiration (ETc) and turf quality were explored along with the discussion of past research as reviewed by Kneebone et al. (1992) and Kenna and Horst (1993). Several conclusions can be reached based on the various studies relating ETc versus turf performance:

(1) In general, the landscape coefficients (K_L), for cool-season grasses (0.70–0.95) are higher than for warm-season turfgrasses (0.65–0.85) when the irrigation regime is at 3–7+ days between events, which would allow moisture stress within the surface zone. At these K_L values, the turf could maintain acceptable quality and growth, but as the K_L value was decreased below these general ranges using a similar irrigation schedule, turf performance rapidly declined (Meyer and Gibeault, 1987; Carrow, 1995).
(2) Irrigation scheduling can influence the K_L value versus turf performance. When a grass was irrigated more heavily (K_L 0.75–1.00 for tall fescue, *Festuca arundinacea* Shreb., 7 day schedule), the irrigation frequency could be extended; but with a 2–3 day schedule, a K_L of 0.50 maintained good quality (Richie et al., 2002). The concept of deep, infrequent irrigation scheduling is limited by the surface drying versus turf performance relationship, especially in arid regions. In arid regions, where most water addition is by irrigation, it is important to determine the deepest and least frequent irrigation schedule that will allow maximum water conservation without an unacceptable decline in turf quality resulting from too severe drying at the surface (Brede, 2000). Extending the irrigation interval too long will result in more water application to maintain the same turf quality level compared to a less frequent irrigation using less water. In a semi-arid or humid climate, deep rooting is important to take advantage of natural precipitation events. However, in an arid climate, rooting to a