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### **Title**

Evaluation of Management Strategies and Physiological Mechanisms of Agrostis Species for Reduced Irrigation Environments

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## Abstract

Water is a basic necessity for turfgrass growth and metabolic processes, with optimal levels required for the maintenance of turf quality and function. As water restrictions for irrigation of landscapes become more widespread across the United States, turfgrass managers will need to rely on management strategies to improve the performance of turfgrasses under reduced irrigation environments. Therefore, the objectives of the research were to (i) compare the performance of different *Agrostis* species and cultivars under reduced irrigation, (ii) evaluate the use of wetting agents for maintaining turf quality under reduced irrigation, (iii) and examine the physiological mechanisms associated with improved drought resistance traits of *Agrostis* species. To address our primary objectives, we conducted a two-year field study comparing cultivars of three bentgrass species, including 'Revere' and 'Tiger II' colonial bentgrasses (*Agrostis capillaris*), 'Legendary' and 'Greenwich' velvet bentgrasses (*A. canina*), and '13M', 'T-1', 'L-93', and 'Penncross' creeping bentgrasses (*A. stolonifera*) in response to reduced irrigation with and without the use of a wetting agent. In general, the use of a wetting agent did not result in any significant differences in turf quality or soil moisture content among treatments. There were significant differences in turf quality among bentgrass species and cultivars under reduced irrigation. Colonial bentgrass cultivars maintained high turf quality, and were found to be well suited for fairways under reduced irrigation. Due to excessive thatch accumulation in our study, velvet bentgrass cultivars exhibited significant declines in quality regardless of irrigation level. Among creeping bentgrass cultivars, T-1 exhibited improved drought tolerance compared to the older cultivars of creeping bentgrass. Based on results from the field study, we further evaluated the drought resistance and recovery characteristics among five cultivars of colonial bentgrass ('Barking', 'Tiger II', 'Revere', 'Capri', and 'Greentime'). Under moderate drought stress, Barking, Tiger II, and Revere all exhibited lower leaf relative water content levels compared to Capri and Greentime, although no significant differences in turf quality or soil water content were observed during the drought period. Following re-watering, Barking and Tiger II exhibited the most rapid recovery from drought (as measured by percent green cover), while Capri and Greentime exhibited delayed recovery. Therefore, although significant differences in turf performance during drought stress were not observed, recovery potential seems to vary among the different cultivars of colonial bentgrass.

## First Advisor

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