

Longer Term Assessment of the Effects of Greens Construction and Irrigation Systems on Greens Performance, Turf Quality, and Water Conservation

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Objectives:

1. To study the effects of California and USGA greens construction systems on irrigation water use efficiency.
2. To study the effects of green construction systems on turf performance and water repellency in a sloping design in the desert Southwest.

Start Date: 2006

Project Duration: three years

Total Funding: \$90,000

Two sets of guidelines are commonly followed for the construction of golf greens and tees in the US, but their impact on turfgrass performance and water use efficiency in a southwestern environment has not been investigated. A 4000 m² (43,000 ft²) research area was built in 2002 and established in 2003 at the Fabian Garcia Research Center at New Mexico State University. The research greens have been used to study the impact of construction type (USGA with sand/peat rootzone vs. California with straight sand rootzone) on turfgrass performance and water use efficiency.

California style greens have a 30-cm (12-inch) deep straight sand rootzone on top of drainage trenches filled with gravel. United States Golf Association (USGA) specifications include a stratified coarse-textured sandy rootzone with a 30-cm (12-inch) deep rootzone overlaying a 10-cm (4-inch) deep gravel blanket. Because of the coarse nature of both rootzones, they resist compaction, provide high air-filled porosity, but lack adequate water retention.

Research greens were established in 2003 with 'Bengal' creeping bentgrass and mowed at 3.2 mm (0.125"). Each of the 17 m x 17 m (55' x 55') research greens includes a 4 m (12') long horizontal portion (summit), followed by a 9 m (27') south facing downhill slope (slope), followed by a 4 m (12') long horizontal portion (toeslope). Each construction type was replicated three times. Barriers in the form of PVC liners were placed between plots to prevent lateral movement of water between plots.

From January to November 2006 each green was irrigated at approximately



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100% potential evapotranspiration using a pop-up sprinkler system installed in the perimeter of the turf areas. Greens were evaluated for overall turfgrass quality, volumetric soil moisture content, drainage losses, water repellency, localized dry spots, black layer formation, and rooting.

Overall statistical analysis of the data revealed significant differences in turfgrass quality, volumetric soil moisture, water repellency, and localized dry spot formation between the two construction types. From June until November, USGA built greens rated significantly higher for quality than California greens and exhibited significantly less localized dry spot than California style greens.

At a depth of 10 to 20 cm (4 to 8 inches), the USGA greens showed significantly higher soil moisture in May, July, and August compared to California style greens. Hydrophobicity in the top 3.5 cm of the rootzone on the slope was significantly greater in California greens in early June, July, August, and end of September compared to the USGA greens. Data for drainage losses, hydraulic conductivity

and black layer formation were not significantly different between the two construction types.

Based on the data available, USGA style greens showed greater irrigation water use efficiency in a southwestern environment than California style greens.

Summary Points

- Studies are underway at New Mexico State University to compare California versus USGA type greens construction systems in a research area with a sloping design.
- 'Bengal' creeping bentgrass on USGA type greens was of significantly higher quality than on California greens throughout the summer of 2006.
- There was significantly lower water repellency and significantly fewer localized dry spots on USGA greens than on California greens.
- There was greater irrigation use efficiency on USGA greens compared to California greens as evidenced by higher quality returns for the same amount of water used.