

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

Bernd Leinauer and Jose Makk
New Mexico State University

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 4,000 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 a 100% 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 and 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 (toe-slope). 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 June to September 2007 each green was irrigated at approxi-



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 (toe-slope).

mately 120% potential evapotranspiration (FAO 24) using a pop-up sprinkler system installed along the perimeter of the turf areas. Greens were evaluated for overall turfgrass quality, drainage losses, water repellency, and localized dry spots.

Overall statistical analysis of the data revealed significant differences in turf quality and incidence of localized dry spot between the two construction types. From June until September, USGA built greens rated consistently higher than California greens for quality at the slope location. At the summit and toeslope location, USGA-built greens exhibited higher quality in July and August than California greens and exhibited significantly less localized dry spots in June, July, and August than California style greens.

Hydrophobicity in the top 3.5 cm of the rootzone on any of the three locations did not differ significantly between the two construction types. Drainage losses were significantly different between the two construction types: sprinkler irrigated

USGA plots drained less water than sprinkler irrigated California plots. 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 2007.
- There were 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.