



Simulated Water Flow in Putting Greens

Putting green soil profiles are generally classified into three categories: USGA, California, and pushup. The USGA and California profiles follow written construction guidelines whereas pushup greens tend to be soil profiles that have evolved from decades of sand topdressing. While each method has a sandy root zone layer, the thickness of the sandy layers and the type of drainage used in each construction method vary. Ohio State University soil scientist, Dr. Ed McCoy, conducted computer simulations of water flow through putting greens. The simulation allowed Dr. McCoy to challenge the three root zone systems under several climatic scenarios.

Simulations generated changes in soil water content over seven days for greens with natural surface contours. The simulations also generated drainage rate and turfgrass evapotranspiration rate. Rainfall and evapotranspiration scenarios provided an appraisal of water-related turfgrass stress.

- The simulations demonstrate the utility of a deep root zone, as seen in the USGA and California greens, in providing a direct connection with subsurface drainage elements and displacing perched water below turfgrass rooting.
- Alternatively, the shallow root zone of the pushup green quickly became saturated during rain and remained nearly so for 42 hours, leading to turfgrass stress.
- During rain, the thickness of water perching above the gravel layer was consistent in the USGA profile. Water perching in the California profile formed a pattern relative to drainage spacing.
- The simulations show that perched water can form in both USGA and California greens and, in both greens, may serve as a reservoir for subsequent turfgrass water uptake.

- The perched water was short-lived in both the USGA and California profile greens, as down-slope lateral flow removed water from the crest of steeper slopes within each green.
- The first appearance of drought stress was associated with the local absence of water perching in both the USGA and California greens and appeared earlier in the California green due to lower water holding capacity of the root zone.

Source: Adapted from [Dr. Ed McCoy, Dynamics of Water Flow in Putting Greens via Computer Simulation](#)

Additional Information:

[Subsurface Drainage of Modern Putting Greens](#)

[USGA Recommendations for a Method of Putting Green Construction](#)

Davis, William B. 1990. The Sand Putting Green: Construction and Management. 22 pp. Oakland, Calif.: University of California Division of Agriculture & Natural Resources. TGIF Record: 14801

