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Assessment of Topdressing Sands and Associated Cultural Practices used to Manage Ultradwarf Bermudagrass Greens

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Ultradwarf bermudagrasses on golf greens produce a dense canopy that traps some topdressed sand particles. Larger sand grains appear to be more resistant to falling or being worked through the canopy than are finer grains. Sand trapped in the canopy can produce a less desirable playing surface and can be picked up by and damage mowers. Given such, it is becoming common practice to topdress ultradwarf bermudagrass greens with sand having finer particles (i.e., with less fraction of large particles) than those of the sand that the green was originally constructed. We are investigating the consequences of using finer sand. Co-Investigator Dr. Casey Reynolds left the project on taking the executive directorship of Turfgrass Producers International. Dr. Manuel Sanchez joined the program August 1, 2017 as a postdoctoral research associate.

Putting greens on four courses in southeast Texas have been sampled for particle size distributions of sands in putting greens, sands used for topdressing, and sands picked up with grass clippings on mowing after topdressing. Infiltration rates, apparent total porosity, and apparent capillary porosity of the putting greens also were measured.

Particle size distribution of sand in the surface of the putting greens have been found to be on finer side of the USGA recommendations for sand used to construct greens (Figure 1). This occurs from either use of a finer sand for topdressing or from removal of coarser sand with mower clippings (Figure 2), or a combination of the two. The course with the finest sand in the surface has been allowing the depth of sand (surface to the gravel drainage) to increase with time by not aggressively removing sand with cultural practices such as hollow-tine aerification (Figure 3). The course with the coarsest sand at the surface had the poorest performing greens.

A 15-cm diameter permeameter was used to test in situ infiltration rates and near-surface water retentions of the putting greens. The permeameter is 30 cm in total height and is inserted into a green so that half is below the surface. In operation, fifteen cm of water is added to the permeameter and allowed to infiltrate then second 15 cm of water is added and allowed to infiltrate. During the second run, infiltration rate is determined from the recorded change in depth of water in the permeameter with time (Figure 4). After this second aliquot has infiltrated, the surface water content is measured for one hour to estimate the effective capillary porosity (Figure 4).

The majority (71%) of the variability in infiltration rate on greens could be explained by a linear model with particle size (using the d50, particle diameter with 50% larger and 50% smaller) and organic matter content as variables. The majority (94%) of the variability in apparent total porosity in the top 2 inches of the greens (maximum observed surface water content) could be explained by a linear model with particle size (d50) as the sole variable. Greens with finer particles had greater maximum water contents.

Scheduled sampling of additional courses in the Houston area has been delayed as a consequence of flooding from Hurricane Harvey.

Summary Points

- Particle size distribution of sand in the surface of putting greens tested are on the finer side of USGA recommendations for sand used in construction of putting greens.

- Particle size distribution of sand removed with mower clippings is on the coarser side of USGA recommendations for sand used in construction of putting greens.

- Particle size distribution in putting green surface is consistent with finer sand being used for topdressing and with the coarser fraction of topdressing sand being removed with mower clippings.

- Seventy-one percent of the variability in infiltration rate on greens could be explained by a linear model with particle size and organic matter content as variables.

- Ninety-four percent of the variability in apparent total porosity (maximum observed surface water content) could be explained by a linear model with particle size as the sole variable.

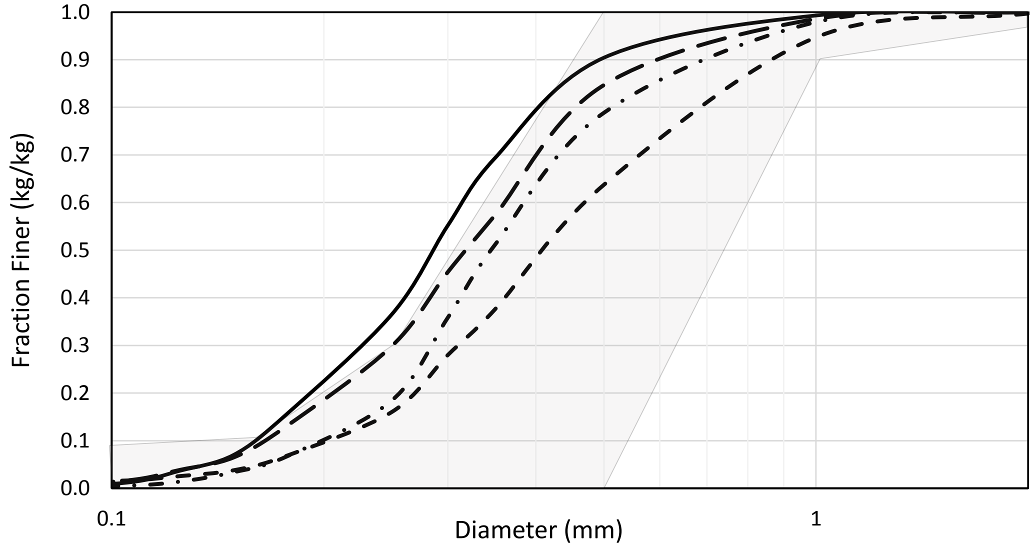

Figure 1. Particle size distributions of surface 1 inch of sand in putting greens sampled. Shaded area represents USGA recommendation for sand used to construct a putting green.

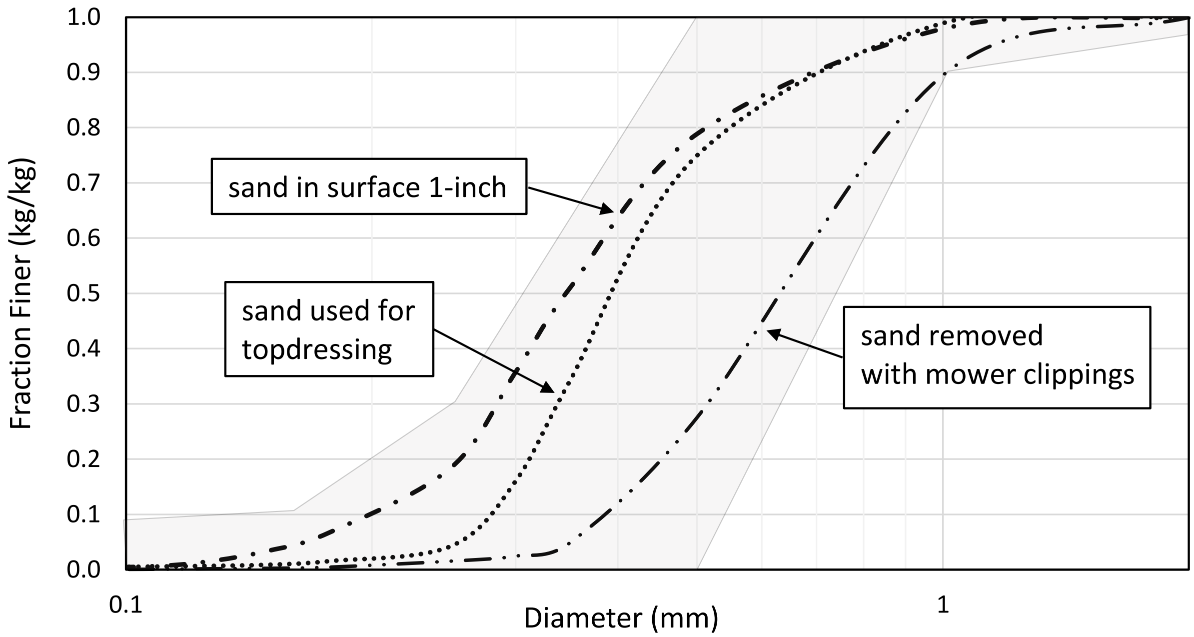

Figure 2. Particle size distributions of sand in a putting green surface along with that used for topdressing and that removed with mower clippings. Shaded area represents USGA recommendation for sand used to construct a putting green.

Figure 3. Increase in sand profile depth on a course using fine topdressing sand not removing sand with time via cultural practices.

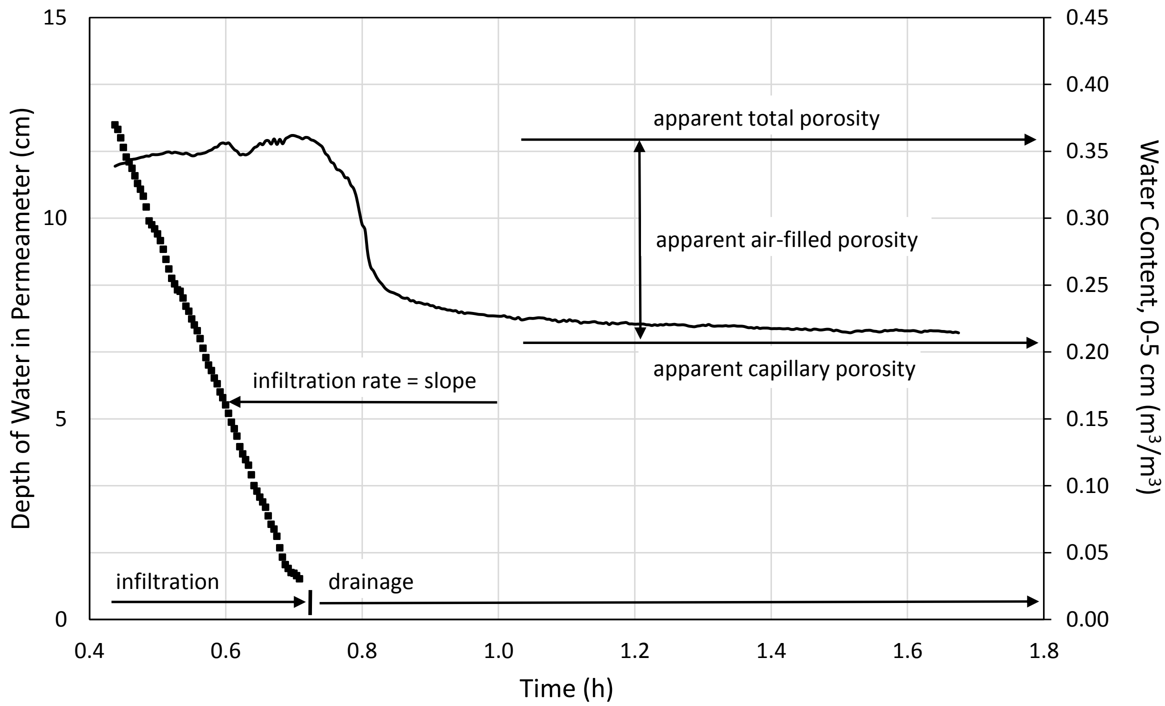

Figure 4. Data from permeameter used to measure infiltration rate and water holding capacity of a putting green.