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. Finer sand grains can produce favorable playing properties of the surface, but they can also produce unfavorable properties with excessive use, such as those problems associated with excess water retention and reduced aeration. To develop recommendations for acceptable properties and application rates of topdressing sand, this project seeks to characterize the interaction of physical properties of finer topdressing sand with sand used to backfill after aeration, and the consequential effects on putting green surfaces. A range of golf courses with ultradwarf bermudagrass greens is currently being identified. For each course, topdressing sand, sand picked up by mowers, and sand used to manage organic matter and to aerate will be examined. Cumulative annual amounts of sands used and geometries of placement will be estimated from measurements and management records. The information below was developed during the first 6 months of the 3-year project.

To develop sampling protocols for sands that we might collect from courses, we requested samples of ultradwarf topdressing sands from some of the major suppliers in the Southeast. These sands are being analyzed for particle size distribution and water retention as would be produced at the surface of a putting green. Two sands received from one supplier, one reported to be widely used on a routine basis and the other on occasions of a major events in Georgia and the Carolinas were analyzed for particle size distribution using a standard sieve stack on a Ro-Tap shaker. Both showed particle size distributions that were appreciably finer than the fine side of the USGA recommendation for sands used for greens construction (Fig. 1). Both sands had no particles larger than 1 mm and less than 4% between 0.5 and 1 mm diameter. Water retentions (capillary porosities) of both sands were greater and air-filled porosities were less than that recommended by the USGA for greens construction (Fig. 2).

Topdressing with finer sand than used in construction of a green will likely reduce infiltration rate and increase surface water content. With the expectation of being able to measure these effects, a 15-cm diameter permeameter was constructed to test in situ infiltration rates and near-surface water retentions in putting greens (Fig. 3). The permeameter setup includes a water depth sensor to measure infiltration rate (Fig. 4) and dielectric-based water content sensors to measure near-surface water retention (0 to 5-cm volumetric water content) with time after irrigation.

Summary Points

- Topdressing sands tested have been appreciably finer than that recommended by the USGA for putting greens construction.

- Capillary porosity of topdressing sands tested have been appreciably greater than that recommended for putting greens construction.

- Air-filled porosity of topdressing sands tested have been appreciably less than that recommended for putting greens construction.

- A device to quantify in situ saturated hydraulic conductivities and surface water contents of putting greens has been constructed and tested.

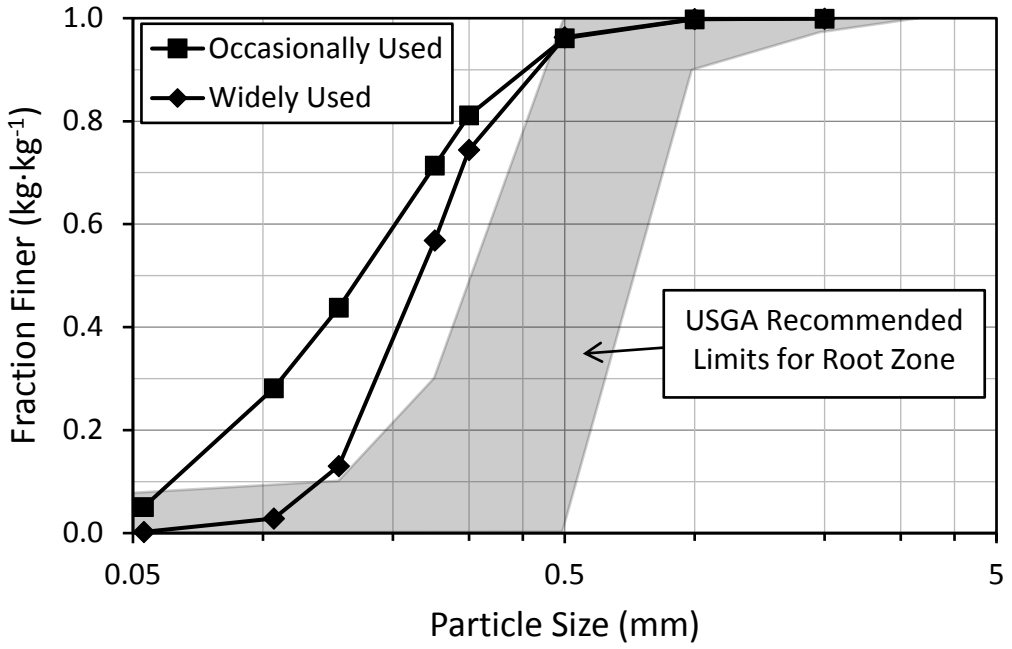

Figure 1. Particle size distribution of sand recommended to be used for putting green construction (shaded area) along with the distributions of sand grains in a widely used and occasionally used topdressing sand on ultradwarf putting greens.

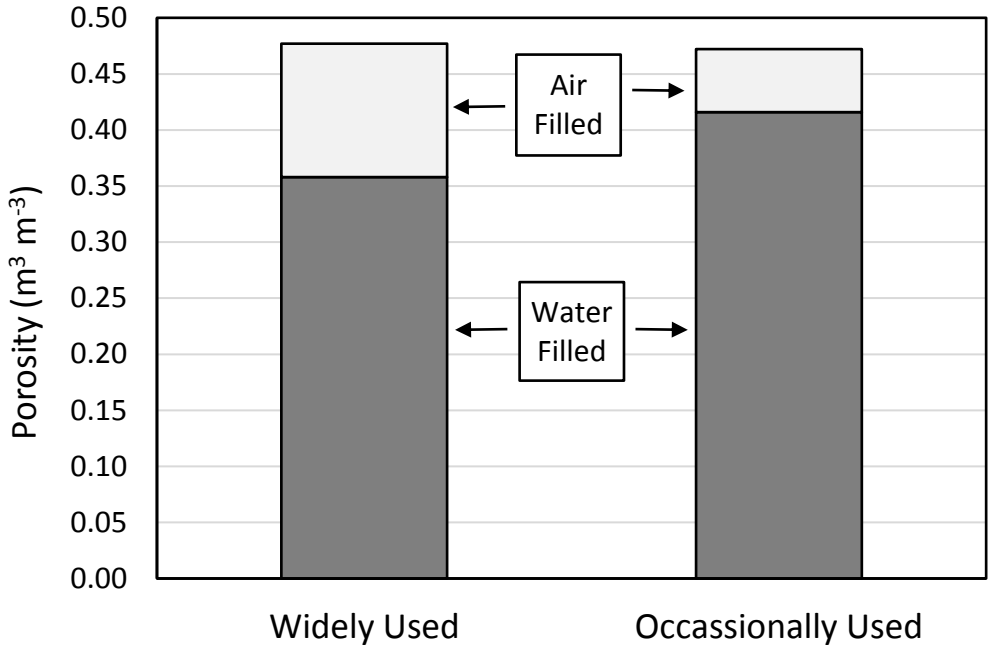

Figure 2. Water retentions in 5-cm deep columns of sand where the surface was at 30 cm water tension. Sands are the same as those whose particle size distributions are shown in Fig. 1.

Figure 3. Permeameter to test in situ infiltration rates and near-surface water retention in putting greens.

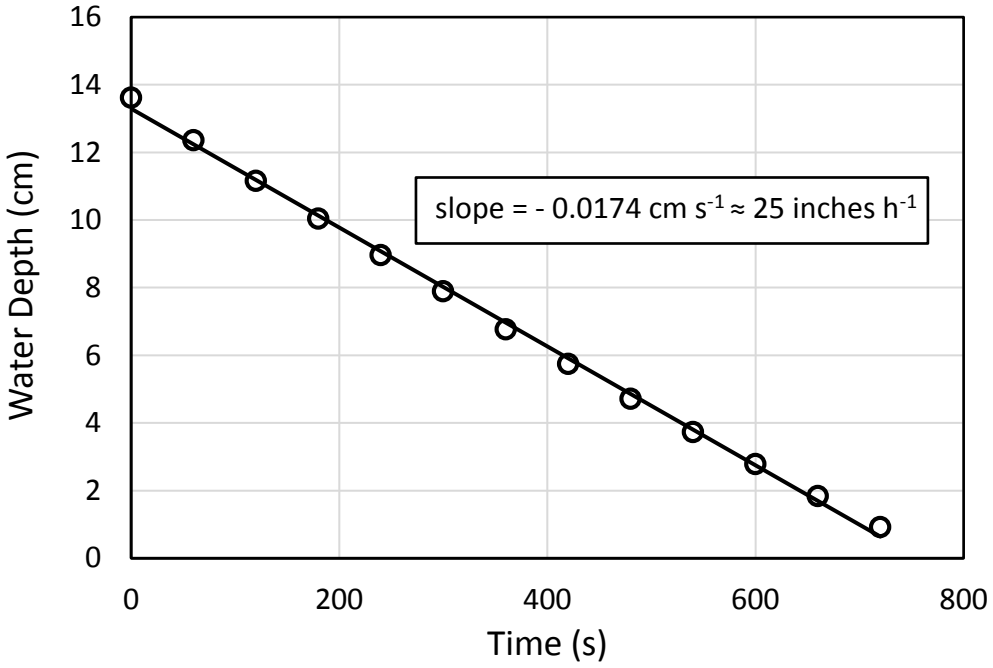

Figure 4. Water depth within the permeameter on a test putting green vs. time. Circles indicate measured data and the line represents a linear regression of depth with time. Slope indicates infiltration rate or saturated hydraulic conductivity of the putting green surface.