Assessing Maturation of Putting Green Rootzone Mixes Under Two Microenvironments

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Objectives:

1. To identify characteristics that have the potential to reduce inputs and costs associated with construction and/or maintenance of putting green turf.

Start Date: 2004 (current cycle)
Project Duration: three years
Total Funding: $75,000

A three-year investigation (6th through the 8th post grow-in years of research plots) was initiated to identify factors that contribute to the success or failure of putting greens. Longer-term evaluation of the physical, chemical, and biological characteristics of the rootzone mixes in this project is critical to ensure that recommendations generated from the research represent what can be expected over the life span of a typical putting green. This report summarizes rootzone treatments that were built in two microenvironments to assess acceptable ranges of sand particle size distribution of the rootzone.

The methodology of measuring physical properties of the rootzones with different sand sizes was altered in 2004 by sampling two separate layers at the surface of each rootzone. The surface mat layer (~ 25 to 44 mm thick) and the underlying rootzone surface to a 76 mm depth were sampled individually to provide a clearer description of the behavior of these two layers. The K_{sat} of rootzones at the 0- to 76-mm depth (without mat layer) has not changed in finer sand mixes while a higher K_{sat} has been observed in coarser sand mixes over time. K_{sat} through the mat layer above each sand mix was dramatically lower than the rootzone mix itself, especially for the coarser sand mixes in 2004. While the minimum K_{sat} observed for the mat layers was low relative to the rootzone, the values fell within or above the accelerated range (30 to 60 cm h^{-1}) described by the 1993 United States Golf Association guidelines.

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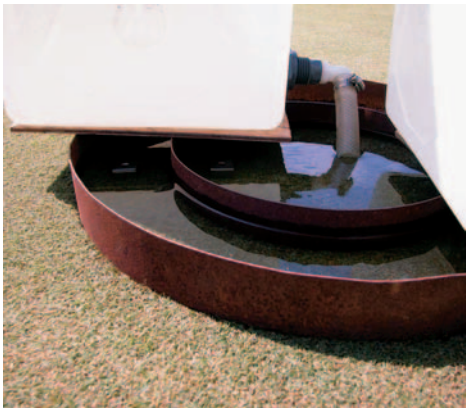
The medium sized sand meeting USGA size guidelines had similar air-filled porosities in the mat and rootzone layers. Over time, air-filled porosity of coarser sand rootzones did not change dramatically; however, air-filled porosity decreased considerably in the finer sand mixes. The mat layer over all sand mixes had much greater potential to retain water than the respective rootzone mixes. The capillary porosity of each rootzone has not changed substantially over time.

Therefore, the biomass accumulation layer (mat) above the sand-based rootzone of a putting green will have a greater influence on surface water retention and infiltration over time than the physical properties of the rootzone below. The physical properties that develop at the surface of the putting green in the mat layer can be affected by the topdressing material used. The importance of this mat layer difference is unclear because of the probable confounding effects caused by the underlying differences among the sand size rootzone mixes. Future research should address the potential impact of sand size for topdressing on rootzones with the same underlying physical and chemical properties.



The K_{sat} of rootzones at the 0- to 76-mm depth (without mat layer) has not changed in finer sand mixes while a higher K_{sat} has been observed in coarser sand mixes over time.

Summary Points

- The K_{sat} of rootzones at the 0- to 76-mm depth (without mat layer) has not changed in finer sand mixes while a higher K_{sat} has been observed in coarser sand mixes over time.
- Field water infiltration rates were considerably lower than what might be anticipated based on K_{sat} values, and sand size had a significant effect on infiltration with coarser sand mixes having higher infiltration rates than finer sand mixes.
- The biomass accumulation layer (mat) above the sand-based rootzone of a putting green will have a greater influence on surface water retention and infiltration over time than the physical properties of the rootzone below.