Longer Term Assessment of Putting Green Rootzone Mixes Under Two Microencironments

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Objectives:

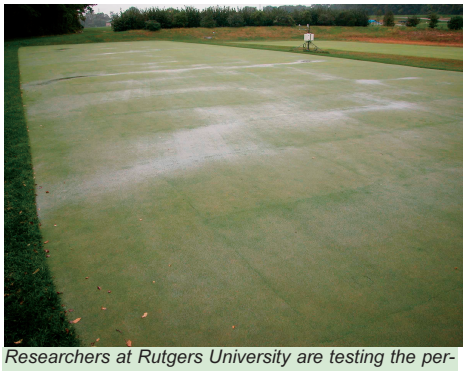
1. To assess acceptable ranges of sand particle size distribution and depth of the rootzone.
2) To assess the utility of various composts, peats and inorganic materials as amendments for mixes.
3) To measure the physical, chemical, and biological changes that occur as greens mature.
4) To evaluate the potential to reduce inputs for managing putting greens.

Start Date: 2001
Project Duration: 4 years
Total Funding: $120,000

The second year of a three-year investigation is being conducted to identify factors that contribute to the success or failure of putting greens that were constructed in 1997 and seeded May, 1998. Physical, chemical, and biological characteristics of the more than 30 rootzone mixes are being assessed in this project. Rootzone treatments were built in two microenvironments to assess 1) acceptable ranges of sand particle size distribution and depth of the rootzone, 2) utility of various composts, peats and inorganic materials as amendments for mixes, 3) physical, chemical, and biological changes that occur as greens mature, and 4) the potential to reduce inputs.

Data was collected in 2002 for turf quality, soil and clipping nutrient content, clipping yield, irrigation requirement, soil hardness, field water infiltration rate, and physical properties at the surface 0- to 2-inch depth zone.

Intact soil cores collected from the 0- to 3-inch) depth zone indicate that physical properties of the rootzone mixes have changed. Air-filled porosity of the field plots decreased, whereas capillary porosity increased compared to initial laboratory values. Changes in physical properties of the rootzone, however, do not appear sufficient to fully explain the reduced water infiltration characteristics observed empirically during hand watering of plots. Thus, a constant head, double-ring water infiltration system was built to assess field water infiltration rates. Preliminary data indicates that water infiltration rate is lower in the enclosed microenvironment than the open microenvironment. It appears that over time, accumulating thatch/mat layer above the rootzone becomes the limiting feature of the putting green profile that dominates the water infiltration characteristics more than the underlying rootzone material. Moreover, the physical quality of the thatch/mat layer developing above the rootzone may be affecting water infiltration more than the total quantity of accumulated organic matter in the thatch/mat layer. Both organic matter accumulation and water infiltration rate are greater on plots growing in the open environment than plots in the enclosed site.



Researchers at Rutgers University are testing the performance of more than 30 putting green rootzone mixes in both an open microenvironment (top) and an enclosed microenvironment (bottom) to better understand the interactive effects of microenvironment and rootzone characteristics on putting green quality.

Organic matter content and thickness measurements of thatch/mat layer samples are underway. Visual observations of samples indicate that rootzone treatments producing better turf quality are accumulating more organic matter above the rootzone (thatch/mat layer) than plots than are not performing as well. The enclosed microenvironment reduced rooting in all rootzone mixes within two growing seasons. The lower root mass in the enclosed microenvironment appeared congruent with the greater bulk density rootzones in that microenvironment.

Irrigation requirements of each plot were assessed; hand watering of individual plots based on soil water content were monitored throughout 2002. Although data is still being summarized, it is apparent the 2002 dataset will substantiate the differences in irrigation amounts found among rootzones in 2001, where the driest rootzones required three times as much hand watering as plots that retained the greatest quantity of water. Rootzones with a capillary porosity of 30% had the lowest irrigation requirements under the climatic conditions of New Jersey.

Summary Points

- Over time, the accumulated thatch/mat layer above the rootzone has become the limiting feature of the putting green profile that dominates the water infiltration characteristics rather than the underlying rootzone material.
- The physical quality of the thatch/mat layer developing above the rootzone may be affecting water infiltration more than the total quantity of accumulated organic matter in the thatch/mat layer.
- The driest rootzones required approximately three times as much hand watering as plots that retained the greatest quantity of water.