Soil Physical Characterization of Aging Golf Greens

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Objectives:

1. Determine temporal term effects of a USGA specification rootzone mix with and without soil on physical and chemical factors

Start Date: 2001
Project Duration: five years
Total Funding: $109,285

The five-year project is a focused extension of the previous USGA project-Grow-in and Cultural Impacts on USGA Putting Greens and their Microbial Communities. Emphasis is being placed on characterization of the long-term effects of rootzone mix on soil physical parameters, specifically saturated hydraulic conductivity, total and air-filled porosity, and bulk density.

Data have been collected for more than eight years on this project. Results to date indicate that as green matures, soil infiltration is not affected in the first two years after grow-in, decreases significantly in the third year after grow-in, and this trend continues for up to eight years after construction regardless of rootzone.

Initial data indicated that the light, frequent topdressing program results in an accumulation of approximately 0.25" of material per year and that this material is significantly higher in organic matter than the original rootzone.

In the lab, this apparatus is used to measure the infiltration rate of cores collected in the field.

Turfgrass lateral shear strength follows a seasonal trend where spring data has the highest strength of the growing year, followed by the lowest root strength in the summer. Root strength recovers in the fall, but is not as high as in the spring. Surface hardness on the sand-peat-soil mix was significantly lower after the second year.

In an effort to explain these responses, extensive sampling was done in 2004 of the accumulated topdressing layer (i.e. the mat layer) on the surface of the rootzones and the original rootzone. In previous years, these visually different profiles were analyzed together. Initial data indicated that the light, frequent topdressing program results in an accumulation of approximately 0.25" of material per year and that this material is significantly higher in organic matter than the original rootzone.

These data are currently being analyzed with other data to better explain the change in rootzone physical properties over time. Research is also being conducted to compare and contrast the organic matter present in the original rootzone versus that of the accumulated mat layer.

Summary Points

- University of Nebraska researchers are characterizing the long-term effects of rootzone mix on soil physical parameters, specifically saturated hydraulic conductivity, total and air-filled porosity, and bulk density.
- Results to date indicate that as green matures, soil infiltration is not affected in the first two years after grow-in, decreases significantly in the third year after grow-in, and this trend continues for up to eight years after construction regardless of rootzone.
- Turfgrass lateral shear strength follows a seasonal trend where spring data has the highest strength of the growing year, followed by the lowest root strength in the summer.
- Initial data indicated that the light, frequent topdressing program results in an accumulation of approximately 0.25" of material per year and that this material is significantly higher in organic matter than the original rootzone.
- Research is being conducted to compare and contrast the organic matter present in the original rootzone versus. that of the accumulated mat layer.