Soil Physical Characterization of Aging Golf Greens

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Objectives:

1. Determine long-term effects of a USGA-specification rootzone mix with and without soil on physical, chemical, and microbiological 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 and grow-in procedures on soil physical parameters.

Results to date indicate that after the first year, grow-in procedure does not influence subsequent years. Data also indicates that as a green matures, soil infiltration is not affected in the first two years after grow-in, but decreases significantly in the third year. Water movement through the green profile continues to decrease significantly as the green ages.

Lateral Shear Strength, as measured by the Turfgrass Shear Tester, follows a seasonal trend where spring data consistently has the highest shear strength, followed by a significant decrease in the summer, and then a slight rebound in the fall. Shear strength also appears to decrease as a green matures.

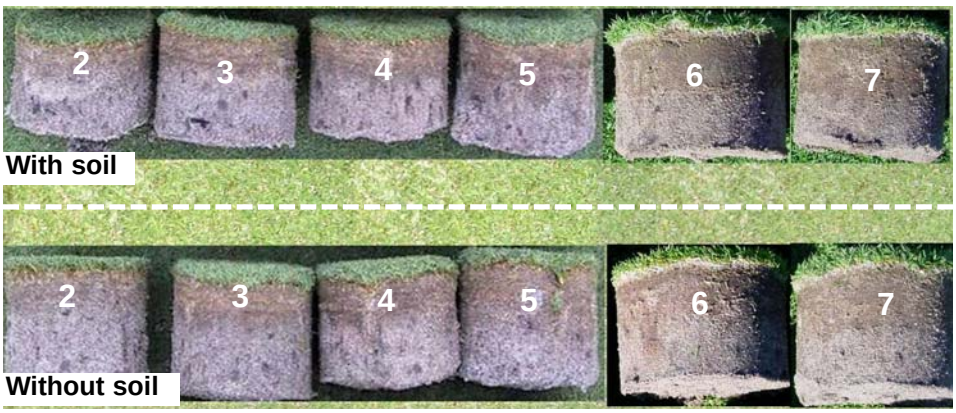
Characterization of three rootzone mixes at Arbor Links Golf Course near Nebraska City, in southeast Nebraska, is new to the project this year. Built in 2001-2002, Arbor Links was constructed with three different rootzone profiles (USGA specification two-tier greens with and without organic matter, and a single-tier California green) on 18 holes (six holes per rootzone).

Results to date indicate that the California single-tier green is harder than the USGA two-tier profile greens. This may be due to the lack of organic matter and its cushioning effect in the mix profile. Rooting strength is stronger on the USGA profile greens than the California greens. Infiltration rates were the highest in the California green and lowest in the USGA green with organic matter.

Total porosity was highest in the USGA with organic matter, and lowest in the California greens. Bulk density followed the opposite trend with the California green having the highest bulk density.

Digital images of green profiles are being captured periodically to document changes in green layering. Future plans include continued measurements of soil physical parameters from the University of Nebraska site and the Arbor Links location.

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



Soil cores show the visible accumulation of organic matter over seven years

Summary Points

- Soil infiltration was not affected in the first two years after grow-in, but decreased significantly in the third year after grow-in and continues to decrease as the green matures.
- As a green matures, it appears that the depth of organic matter accumulation increased over time. Greens that are more than four years have a visible organic matter accumulation three to four times thicker than a green that is less than two years old.
- Infiltration of a rootzone mix containing soil, however, does not decrease more, or at a faster rate than a rootzone mix which does not contain soil.
- Characterization of three rootzone mixes at Arbor Links Golf Course near Nebraska City, in southeast Nebraska, is new to the project this year. Results to date indicate that the California single-tier green is harder than the USGA two-tier profile greens.