Assessing Differential Root Zone Mixes for Putting Greens Over Time Under Two Environmental Conditions

Rutgers / Cook College

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Number of Years: 5
Total Funding: $100,000 (Co-funded with the GCSAA)

Objectives:

1. *Evaluate grow-in procedure effects on putting green establishment and performance, and develop criteria and recommendations for new putting green readiness for play.*
2. *Determine grow-in procedure impacts on root zone physical and chemical propeties.*
3. *Evaluate post grow-in cultural practice effects on putting green long-term performance.*

The USGA guidelines for construction of golf putting greens are often difficult and expensive to achieve due mainly to limited availability and relatively high cost of suitable materials. As a result, there is a need to understand the consequences of implementing various construction specifications that may or may not conform to USGA guidelines. Moreover, the microenvironment in which a putting green is constructed is likely to affect turf performance. This research project was designed to increase our understanding of these issues by assessing the changes that occur in root zone performance over time. A better understanding of root zone performance also will provide the information needed to develop future studies of management practices directed towards minimizing resource and maintenance inputs.

Purpose. To investigate aspects of root zone construction affecting putting green performance in two microenvironments including:

- pore size distribution (sand particle size distribution) and depth of root zone mix
- organic (peats, composts), inorganic, soil and other additives for amending sand
- The potential of various root zone mixes to reduce management and resource inputs will be assessed through the monitoring of physical, chemical, and biological changes that occur as root zones (greens) mature.

Methods. Plots were constructed in two locations (microenvironments) in 1997 (4 reps per location). Six sand sizes, conforming to and finer than USGA guidelines, were amended with sphagnum peat at 9:1 volume ratio, a seventh sand was used unamended. The three coarsest sands were used to construct root zone plots with depths less than 12inches. A silt loam, two organic, and two inorganic materials were used to amend a USGA-sized sand, at varying volume ratios in the both microenvironments.

All plots were seeded were on 31 May 1998. A mowing height of 1/8-inch (0.125-inch) was achieved on 25 May 1999. Irrigation was applied based on Class A pan evaporation and root zone water content. Curative applications of pesticides allowed evaluation of moderate pest activity. Data was collected for visual quality, disease activity, root zone

fertility, clipping nutrient content, rootzone physical properties, and irrigation requirements.

Results and Discussion. Monitoring of wind velocity, humidity, soil temperature and evaporation from a Class A pan indicate substantial environmental differences between the lower and upper site. Plots in the lower (poor air circulation) site had better turf quality than the upper site in May and June. This response was reversed in August and September. The initial decline in quality in the lower site, relative to the upper site, was observed in late-July when the effects of poor air circulation would be expected.

Pest activity was affected by location and root zone treatment. Further evaluation is needed over time to understand the relative importance (consistency) of the interactions observed.

Quality data indicated that the two finest sands in the sand-size distribution study had the best performance during 1999. These finer sands do not conform to the size guidelines of the USGA Green Section. The more coarse sand-size distribution treatments usually resulted in poorer turf performance.

Reduced root zone depth generally improved turf performance; this response was evident, as the sand size distribution became coarser. There was a significant interaction between location and root zone treatment throughout the season in the amendment study. Identification of the ability to maintain good performance in both microenvironments is important because putting greens are built in widely varying microenvironments. Variable turf performance over location is not desired because it creates consistency issues that challenge both turf managers and golfers.

Root zones amended with 20%-soil and 10%-Profile in the lower site had the poorest turf performance by the end of the 1999 season.

Inorganic amendments, ZeoPro and Profile, did not produce a performance advantage over organic amendments in 1999. In fact, when differences were evident these amendments had lower turf quality than other amendments.

Plan of Work for 2000. Clipping, root and soil samples were collected for assessment of rooting and soil physical and chemical properties in 1999. Samples are currently being processed and analyzed. Sampling of clippings, roots and soil will be continued in 2000. Monitoring of humidity, wind velocity, air and soil temperatures will be continued in 2000. Turf performance data for quality, disease, stress and other characteristics will continue in 2000.