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

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Goals:

- *Improve recommendations for sand particle size distribution and the depth of the root zone by consideration of the microenvironment.*
- *Evaluate composts as organic additives and inorganic products for root zone mixes compared to peat sources*
- *Assess the potential of various root zone mixes to reduce management and resource inputs*
- *Monitor the physical, chemical, and biological changes that occur in root zones as greens mature for understanding factors that contribute to the success or failure of greens.*

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This project is designed to i) improve recommendations for sand particle size distribution and the depth of the root zone by consideration of the microenvironment, ii) evaluate composts as organic additives and inorganic products for root zone mixes compared to peat sources, iii) assess the potential of various root zone mixes to reduce management and resource inputs, and iv) monitor the physical, chemical, and biological changes that occur in root zones as greens mature for understanding factors that contribute to the success or failure of greens.

Packed cores of various sands, differing in particle size distribution, but falling within USGA specifications for greens mixes, have been characterized in terms of physical properties in the laboratory. A large number of organic and inorganic amendments added to sand mixes at various rates have been tested as to their effects on the physical properties of the sands. Organic amendments evaluated in the laboratory included Dakota peat, sphagnum peat, Irish peat, AllGro compost, Fertl-soil, sewage sludge compost, and leaf compost. Inorganic amendments evaluated in the laboratory included Greenschoice, Profile, Isolite, Axis, Zeopro, and soil.

Physical properties were frequently affected by the interaction between amendment and amendment rate. Total porosity was usually increased by amendment, and the sand size distribution and the type of amendment determined whether the increase occurred primarily in

the air-filled porosity or the capillary porosity. Increases in air filled porosity did not always correspond with increased saturated hydraulic conductivity.

Root zone mixes having a range of characteristics were identified for study in the two microenvironments of the field research facility at North Brunswick, NJ. Putting green construction was begun in the spring of 1997 and completed in the late fall 1997. Organic amendments being evaluated in field plots include Dakota peat, sphagnum peat, Irish peat, AllGro compost, and Fertl-soil. Inorganic amendments being evaluated in fields trials include Axis, Greenschoice, Isolite, Kaofin, Profile, Soil, and Zeopro. Seven sands differing in particle size distribution were established in fields trials; three of the sands fell within USGA guidelines and the remaining four sands varied in the fine or very fine sand size ranges. Plots of various root zone depths were constructed using the three sands meeting USGA guidelines. The construction depths selected for each sand were based on water release curves in the laboratory. It is anticipated that the field plots will be seeded in the early spring of 1998 as weather permits.

The microbial ecology aspect of the project has progressed in a lab study and in a survey of golf greens varying in age. Differences in various microbial parameters were characterized in soil and sand amended with sphagnum moss peat, and the changes were monitored over time. The parameters used were dehydrogenase activity (which is associated with microbial respiration), estimation of viable bacteria, and metabolic diversity of the microbial population. Sand had much less microbial activity than soil. The effect of sphagnum moss peat added to soil was generally negative in terms of microbial activity, but sometimes increased activity in sand. Field samples taken from greens of different maturity and from neighboring fairways are being assessed in terms of the microbiological parameters. In 1998, the development of the micro-biological community in the constructed root zone plots will be monitored.