Mysteries of putting greens being explored

By MIKE KENNA

The U.S. Golf Association (USGA) will fund 10 putting green construction and maintenance projects over the next five years at a cost of $870,000. The Golf Course Superintendents Association of America (GCSAA) will co-fund five of the projects.

The goal of the new research is to identify the best combinations of construction, grow-in procedures, and post-construction maintenance practices that prevent long-term problems, reduce environmental impacts, and produce high-quality playing surfaces.

Following is a brief summary of the projects.

• **Engineering Characteristics and Maintenance of Golf Putting Greens**, *by Drs. James Crum and John "Trey" Rogers III at Michigan State University.*

Why are some sands more stable than others? This project will investigate the physical properties of sands and establish relationships between strength and stability.

The secondary objective is to evaluate the short- and long-term effects of post grow-in maintenance practices on putting greens built by three different methods: USGA recommendations, a modified loamy sand over gravel, and an unamended loam soil.

• **Methods for Classifying Sand Shape and the Effects of Sand Shape on USGA-Specification Root Zone Physical Properties**, *by Dr. Charles Mancino at Pennsylvania State University.*

How does the shape (i.e., angular or round) of the sand affect green performance? This project will first develop a simple, inexpensive and quantitative procedure to give a reliable estimate of sand shape without having to examine individual sand grains.

The effect of sand shape on the physical properties of root-zone sands and whether the particle size distribution needs modification due to differences in sand shape will then be examined.

• **Layers in Golf Green Construction**, *by Dr. Stephen Baker at Sports Turf Research Institute.*

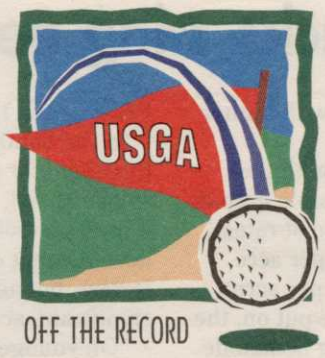
Can the conditions for the removal of the intermediate layer be less stringent?

The migration of particles and water retention will be closely examined where the root-zone layer directly overlays the gravel drainage layer. Profiles of the root zone and gravel layer will be established with different combinations of gravel size, gravel shape, root-zone mix and initial moisture content. Water retention in the root-zone layer will be examined when it is placed over intermediate layers of varying size and composition.

• **Understanding the Hydrology of Modern Putting-Green Construction Methods**, *by Dr. Edward McCoy at The Ohio State University-OARDC.*

How does the profile design, root-zone composition, slope of the green, drain spacing, profile depth, and irrigation protocol impact water movement and the extent of water perching in a USGA green?

This research project will focus on water drainage, redistribution and use by turfgrass as influenced by a variety of factors related to modern putting-green construction methods.



OFF THE RECORD

• **Assessing Differential Root-Zone Mixes for Putting Greens over Time under Two Environmental Conditions**, *by Dr. James Murphy at Rutgers/Cook College.*

How do alternative putting-green construction methods stack up to the USGA Green Section recommendations? Over a five-year period, recommendations for sand particle size distribution and the depth of the root-zone mix in response to the microenvironment will be evaluated. A variety of organic composts and inorganic additives for root-zone mixes will be compared to commonly used peat sources.

The physical, chemical and biological changes that occur as root zones mature, and the factors which contribute to the success or failure of greens will be determined.

• **Evaluation of New Technologies in Construction and Maintenance of Golf Course Greens**, *by Dr. Daniel Bowman*

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TPCs rank among Audubon elite

JACKSONVILLE, Fla. — With the recent certification of the TPC at Sawgrass here and the TPC of Scottsdale, seven facilities within the PGA Tour's network of Tournament Players Clubs have been so designated through the New York Audubon Society's Cooperative Sanctuary Program.

The TPC of Scottsdale is only the second facility in Arizona to become fully certified; Sawgrass is the first in north Florida and only the eighth out of the more than 1,100 courses in the state. "We are extremely pleased that the TPC at Sawgrass and TPC of Scottsdale have joined the other five TPCs that have fulfilled the demanding environmental requirements to become one of the 63 fully certified U.S. courses in the Audubon Cooperative Sanctuary Program," said Pete Davison, vice president of PGA Tour Golf Course Properties, Inc.

Researchers investigating putting greens

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at North Carolina State University.

This research is designed to characterize the physical, chemical and biological changes that occur in a sand-based golf course green over the first five years. It proposes a novel two-phase root-zone mix as an alternative to existing sand:organic matter mixes and questions whether the incorporation of stabilized organic material (i.e., sphagnum peat) is warranted over the long term.

The research also will address the question of the perched water table, specifically regarding changes over time, and possible deleterious effects by air injection and water evacuation.

• **Grow-in and Cultural Practice Inputs on USGA Putting Greens and Their Microbial Communities**, *by Dr. Roch Gaussoin at University of Nebraska.*

Beyond the questions dealing with the chemical and physical properties of putting green root-zone mixes, how should they be grown in and made ready for play? Are the high rates of nitrogen used to accelerate growth a short-term solution to meet opening day, but a path to long-term failures? What are the criteria for allowing play on new greens?

This project will evaluate grow-in and post-grow-in cultural practices and procedures and readiness for play criteria.

The long-term effect of these parameters on putting-green performance, depth and extent of turfgrass rooting, and root-zone hydrological, physical and chemical characteristics will be determined.

The project also will assess the influence of these procedures on the microbes found in the root zone.

• **Organic Matter Dynamics in the Surface Zone of a USGA Green: Practices To Alleviate Problems**, *by Dr. Robert Carrow at University of Georgia.*

The primary objective of this project is to determine the effectiveness of selected fall/spring-applied cultivation practices on the enhancement of bentgrass root development, water infiltration, and soil oxygen.

It will examine the effectiveness of selected summer-applied cultivation, top dressing and wetting-agent practices on bentgrass root growth, water infiltration and soil oxygen status during the summer months when root decline occurs.

• **Non-target Effects of Turfgrass Fungicides on Microbial Communities in USGA Putting-Green Profiles**, *by Drs. Gary Harmon and Eric Nelson at Cornell University.*

This research effort will investigate the non-target effects of fungicides used for disease control on golf course putting greens.

The non-target effects on greens treated with fungicides potentially include substantial changes in the soil ecosystem which may increase disease susceptibility and affect nitrogen cycling and the health of turf.

• **Bacterial Populations and Diversity within New USGA Putting Greens**, *by Drs. Monica Elliott, Elizabeth Guertal and Howard Skipper at University of Florida, Auburn University and Clemson University.*

What species of bacteria are found in new greens? Where do they come from? How do microbial populations change over time? This project will monitor the micro-organisms in newly constructed Bermudagrass and bentgrass greens on golf courses in South Carolina, Alabama and Florida.

Effects on bacterial populations will be examined based on differences among organic material, fumigation, nitrogen fertility and clay minerals.