The Five "W's" of Precision Turf Management

Five basics everyone ought to know about this emerging technology.

BY CHRIS HARTWIGER

The first component of Precision Turf Management is to understand the components of the golf course property. A portable mobile mapping system is the first step conducted to map the property and to collect data and identify different soil types on the golf course.

Anytime something is brand new in an industry, questions start flying. What is it? Where do I get it? How does it work? Why should I use it? Where does it go? These questions and more are being asked about the emerging field of Precision Turf Management (PTM). This article will answer five of the most common questions and provide links to more-in-depth information.

WHAT IS PRECISION TURF MANAGEMENT?

Golf course superintendents regularly ask three questions about the use of inputs such as water, fertility, and cultivation: where, when, and how much? Precision Turf Management (PTM) involves the integration of four technologies to be mentioned later to more precisely answer these questions. In other words, PTM will allow superintendents to micro-manage much larger portions of the golf course. Irrigation scheduling and water conservation will be an initial focus of PTM, with potential for more precise management of fertility, soil salinity management, and cultivation.

Lest anyone be confused, it should be stated what PTM is not. It is not push-button agronomy, soil sensor use only, or a means to limit the value of a superintendent. Instead, it is a powerful tool that will help even the best superintendent.

WHY IS PRECISION TURF MANAGEMENT AN EMERGING FIELD?

PTM is emerging because it is offers at least three primary benefits. First, long-term application of PTM will be beneficial for the business of golf because the use of inputs will decrease while keeping the course conditions the same. The recent recession has created momentum for finding ways to conserve resources without compromising the end product for golfers, and PTM supports this trend. Second, societal pressure points toward finding ways to conserve resources. PTM offers a science-based approach to resource conservation. Finally, local, state, and national government regulations are increasing each year. The principles of PTM demonstrate that the golf turf management industry takes its stewardship role seriously, and PTM takes stewardship to another level.

As with any emerging technology, there are questions about the types of courses where PTM will be adopted. Mid- to upper-end private clubs are likely to be the first adopters, but as implementation grows, start-up costs will decrease. How the technology evolves is anyone's guess, but it is not unreasonable to think that at some point in the future the mapping, sensor placement, and sensors themselves will be a standard part of a new irrigation system. It may be possible that fertilizer distributors will offer mapping services and site-specific fertilization as a way to attract and retain customers.

WHERE ON THE COURSE WILL PRECISION TURF MANAGEMENT BE USED?

Precision Turf Management will be used on the large-acreage areas of the golf course, specifically the fairways and the rough. Due to their size, these areas require the most water, fertilizer, herbicides, cultivation, etc.

HOW DOES PRECISION TURF MANAGEMENT WORK?

The foundation of PTM is the integration of four technologies: GPS, mobile mapping technology, GIS (Geographical Information Systems), and soil sensor technology. With these technologies in place, the process occurs in three steps. The application in this example will be water conservation. The first step is to map the entire property and gather information, such as volumetric water content, topography (slope and aspect), soil penetrometer resistance, and turf quality through NDVI (normalized difference vegetative index).

The second step is to make sense of the millions of data points collected through the use of GIS software. The data are sorted and areas of similar soil types are mapped into what are

The recent economic challenges have created even more momentum for finding ways to conserve resources without compromising the end product. As superintendents have more precise information on which to base irrigation decisions, water applications can be fine-tuned. PTM enables superintendents to apply less water without diminished turf quality.

called Site Specific Management Units (SSMUs). Generally, a golf course will have four or five different SSMUs.

The third step is to place one or two soil-moisture sensors in each SSMU. These sensors will regularly report back to the central irrigation computer. The superintendent will have more precise information on which to base irrigation decisions, specifically when to apply irrigation and how much to apply in each SSMU.

As one can see, there is extensive background work that needs to be done to put the sensors in the correct location. But once the sensors are in place, true precision management can occur because the superintendent has additional detailed information for the first time ever to answer the important questions of where to apply water, how much to apply, and when it should be applied.

WHEN WILL PTM BE AVAILABLE?

This is an emerging field with new developments happening annually. Irrigation audits and ongoing water management will be the first uses. Salinity management will not be far behind. In the future, expect GPS-based cultivation and fertilizer applications.

CONCLUSION

Superintendents and course officials would be wise to investigate how Precision Turf Management may fit at their golf course. There remains a financial incentive to implement PTM and the financial rewards are reaped each and every year. Societal pressure will lead a course towards the improved resource conservation associated with PTM, but ultimately more government regulation regarding resource use is going to become a reality. PTM puts a course ahead of this curve and places them in a position of strength. This article answered a few questions, but many more will be brought forth in the years to come. One thing is for sure; all roads are pointing toward improved stewardship through Precision Turf Management.

MORE-IN-DEPTH INFORMATION

There is much to learn about PTM. The following links have more information.

"Specifics Please" by Chris Hartwiger
http://turf.lib.msu.edu/2000s/2009/090914.pdf

"Precision Turf Management: A New Concept for Efficient Application of Inputs" by Dr. Bob Carrow, Joseph Crum, and Chris Hartwiger.
http://usgatero.msu.edu/v08/n13.pdf

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PTM-generated maps identify the most heavily compacted areas in the fairways. Once these areas are pinpointed, the ability to aerate for compaction relief is more efficient and ultimately improves the water infiltration.