



Prescription Disease Management

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When trying to improve ideas within your own profession, it is often advantageous to research the successes and failures of others. One innovative philosophy that has been receiving attention in other crop management systems is precision farming (PF). Superintendents could use this philosophy to reduce the reliance on energy intensive management practices and improve current turfgrass disease management strategies. If we take the basic philosophy of PF and mix it in with current integrated disease management philosophies we can get a hybrid philosophy that could be beneficial to superintendents. To clearly describe this philosophy, I will refer to the hybrid of PF and integrated disease management as "prescription disease management." The success of prescription disease management depends on the manager's knowledge of his/her golf course and of pathogen personalities.

First of all, what is precision farming? Precision farming is an information and technology based crop management system that row crop managers have recently been using. It is intended to assure profitability, agricultural sustainability and environmental and human protection. PF uses cultural practices specific to the needs of crops in small areas or parts of a field, and is based on the fact that there are variations within a field since soil and other characteristics are not identical. With this in mind, the application of identical treatments to an entire field seems wasteful. Large areas can be divided into mini-fields based on important site characteristics, such as water holding capacity and fertility of the soil. Mini-fields can be divided into grids measuring a few square feet for analysis and application of fertilizer and other plant health inputs. PF is

used to manage fertilizing, planting, tilling, disease management and harvesting including yield mapping. It involves mapping these mini-fields and applying fertilizer and other inputs on the basis of need.

Can precision farming be used in a golf course situation? Let's take a look. Golf courses can be divided into fairways, tees, greens, roughs etc. These turf areas are separated and managed accordingly. However, are all the greens treated the same? And the fairways, tees and roughs? The number of baskets collected when mowing would equal the yield of your crop and the color and playability would equal the value of your crop. Root depth and color can also be used as a quality measurement. These measurements can be used to evaluate the amount of fertilizer or aerification needed on this particular turfgrass sward. It sounds easy to separate the whole course according to what is needed, but the leg work that is required to determine the turfgrass's need could overwhelm most managers. Nonetheless, the precision farming philosophy can be used to improve your holistic approach to managing the health of your turfgrass.

Can precision farming be used in turfgrass disease management? Current disease management strategies can be improved by integrating the PF philosophy. Again, I am calling the hybrid between PF and integrated disease management "prescription turf disease management," which I define as the judicious application of turfgrass disease management tactics in a conservatively planned and integrated manner only to the area affected by the target

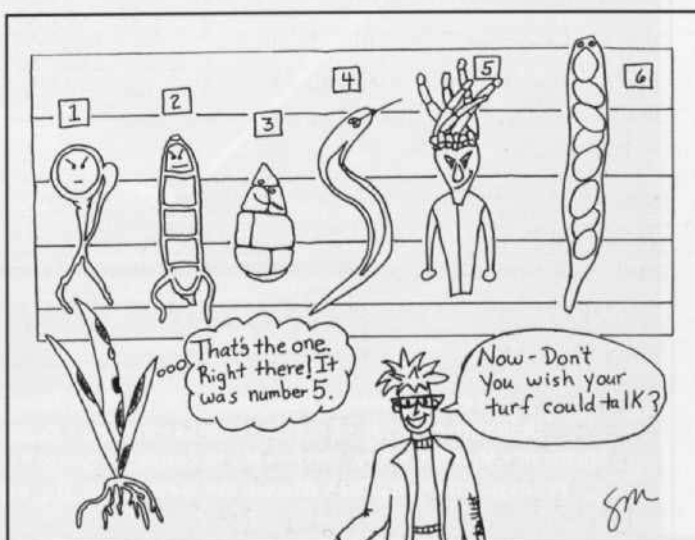
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disease. I can illustrate this philosophy by describing a human scenario. When you go to a doctor with a rash, he/she diagnoses the problem and writes out a prescription for an ointment. You wouldn't rush home from the pharmacy and apply the cream to your whole body. You would apply the cream only to the affected area.

To parallel this scenario with turfgrass disease management is simple. When a patch develops on one green and not the others, the prescription fungicide should be applied sparingly and judiciously to the affected area. This sounds like common sense doesn't it?

I know of one superintendent who successfully used this "prescription disease management" on take-all which was affecting three of his greens. When I diagnosed his patches as take-all, he winced, because he knew that the fungicides that worked well on take-all were expensive. So we worked out a plan of attack that involved raising the mowing height, fungicide drenching, take-all resistance deployment and soil acidifying fertilizers. The patches were spot treated by mixing the labeled rate of fungicide in a watering can and drenching the patches. He didn't treat the whole green nor did he treat all of his greens.

Furthermore, the patches were slit seeded with "Putter" creeping bentgrass which has been reported as resistant to take-all. He also cautiously applied ammonium sulfate as a fertilizer because the acidifying affects can reduce the activity of the disease. He called me this fall to report that his greens were healthy, green and free of take-all patches. I don't get very many calls from superintendents that tell me that their greens are healthy, and when I made an early winter visit to see for myself, I was very excited to see the success of this prescription attack.

Please keep in mind that the prescription disease management approach may not work for every disease. One exception that springs to mind would be pythium blight, which can destroy a green practically overnight.

Prescription turfgrass disease management can work if you are aware of the personalities of the pathogens that cause diseases. Yes, plant pathogens have personalities. Certain pathogens prefer eating certain turfgrasses and only under specific weather conditions. Table 1 illustrates the pathogen personalities of common turfgrass diseases in Wisconsin.

Examples of pathogen personalities include necrotic ring spot, common on 1 to 3 year old sodded Kentucky bluegrass; take-all, common on adolescent (1 to 5 years old) creeping bentgrass growing in neutral to alkaline soil pH; summer patch, common on annual bluegrass that has just survived elevated soil temperatures, followed by heavy precipitation; dollar spot and rust, common on low fertility and moisture stressed turfgrass. These diseases show up on a routine schedule according to their personalities. Once you know the strengths and the personalities of the pathogens, you will be successful in managing them.

The bottom line is that superintendents can learn from other agricultural professions. An understanding of precision farming can be used to improve current turfgrass management strategies. Prescription turfgrass disease management combines the neat approach of precision farming with integrated disease management. Success depends on the manager's knowledge of the course and awareness of pathogen personalities.

Prescription management is not a new way of managing turfgrass diseases. It is just a term that accurately describes the fusion of these two philosophies. This hybrid could best be described as a unique paint brush stroke that the turfgrass artist can utilize when painting the beautiful living canvas. It is a creative technique that can be used in the art of turfgrass management. In the next issue I will elaborate on the borderline personality disorders of common turfgrass pathogens found in Wisconsin. ♣

Table 1. Personalities of common turfgrass pathogens in Wisconsin.

<u>Disease</u>	<u>Fungal Pathogen</u>	<u>Main* Hosts</u>	<u>Environment Conditions</u>	<u>Temp.** Range °F</u>	<u>Months Most Active</u>
Necrotic Ring Spot	<i>Leptosphaeria korrae</i>	KYB	cool, wet	50-86°	April to Oct.
Summer Patch	<i>Magnaporthe poa</i>	AB	hot, wet	70-105°	July to Aug.
Brown Patch	<i>Rhizoctonia solani</i>	all	hot, wet	68-105°	June to Sept.
Pythium Blight	<i>Pythium spp.</i>	all	hot, wet	70-95°	June to Aug.
Bipolaris Leaf Spot	<i>Bipolaris spp.</i>	KYB	hot, wet	68-95°	June to Aug.
Dreschlera Leaf Spot	<i>Dreschlera spp.</i>	all	cool, wet	43-81°	March to April Aug. to Oct.
Typhula Snow Mold	<i>Typhula spp.</i>	CB	cold, snow	32-50°	Dec. to March
Pink Snow Mold	<i>Microdochium nivale</i>	CB,AB	cold, wet	32-86°	Feb. to April Oct. to Dec.
Dollar Spot	<i>Sclerotinia homoeocarpa</i>	all	warm, wet	59-86°	May to Nov.
Take-all	<i>Gaeumannomyces graminis</i>	CB	cool, wet	68-75°	April to Oct.

*KYB=Kentucky bluegrass, AB=annual bluegrass, CB=creeping bentgrass.

** Sources:

Smith, Jackson, Woolhouse. 1989. Fungal Diseases of Amenity Turfgrasses. E.&F.N. Spon Vargas. 1994. Management of Turfgrass Diseases. Lewis Publishers.