Cultural Management Can Limit Damage From Disease

By Paul Vincelli

Turfgrass diseases can create many headaches for golf course superintendents, and it is tempting to rely on magic bullets to cure them. However, cultural practices are really the foundation of a turfgrass disease control program.

It might surprise you to learn that natural biological control of turfgrass diseases is actually the norm in turfgrass ecosystems. Natural field soils commonly show some degree of disease suppressiveness; this is easy to demonstrate experimentally. However, the problem is that this natural biological control is usually insufficient for complete disease control, so turfgrass managers still must contend with disease outbreaks. Maybe as we learn more about the complex world of natural biological control, we'll be able to recommend ways to consistently treat turfgrass disease.

The use of commercial biological products for controlling diseases is increasing in turfgrass management. This is a wonderful development, but unbiased research shows that the efficacy of the current generation of biological control products is typically not as consistent as inert fungicides. Compost teas — room-temperature water extracts of composts — are being increasingly used for turfgrass management, but to my knowledge there is not yet been any published research on the effectiveness of these against turfgrass diseases.

With commercial biological control agents, expect variability in performance from site to site and from year to year. Furthermore, don't expect good results under high disease pressure. And exercise some healthy skepticism of exciting claims of disease control. Rely on cultural practices and resistant varieties as the foundation of your disease control program, and don't expect the application of biological control products and compost teas to substitute for good agronomics.

Variety selection

If you are seeding or re-seeding, selecting a variety resistant to important turfgrass diseases is

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PHOTO 1

Differences in susceptibility to summer patch and necrotic ring spot among Kentucky bluegrass cultivars.

PHOTO 2

Daily irrigation in evening | Daily irrigation in early morning

Identical amounts of daily irrigation were applied to these plots of fairway-height creeping bentgrass.

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among your most potent tools for reducing disease pressure (Photo 1, p. 64). If you managed a variety highly susceptible to the patch diseases pictured there, you could likely never use enough fungicide to completely control these soil-borne diseases. However, by choosing a variety with a high level of resistance, you can see you would be able to avoid the use of fungicides for patch diseases.

It is sometimes tempting to ignore disease resistance when selecting varieties. For example, some practitioners are unconcerned about the high susceptibility to dollar spot in some creeping bentgrass varieties, pointing out that fungicides can be used to control this disease. But not only does this lock you into a fungicide dependency, it increases the risk of fungicide resistance by increasing overall pathogen activity, possibly creating a situation where fungicides become less and less useful for the very disease you are trying to control.

Incidentally, excellent information on disease reactions of varieties is available through the National Turfgrass Evaluation Program (http://www.ntep.org/).

Leaf wetness management

With few exceptions, fungi need moisture in order to penetrate and infect plant tissues. Thus, any practice that reduces the duration of leaf wetness periods also reduces pressure from foliar diseases. Mowing at sunrise is a highly effective practice for breaking up leaf wetness as well as for disrupting fungal mycelium. Other useful techniques include dragging the turf using coupled hoses, syringing at sunrise or poling. The foliar application of surfactants can be useful, but our research reveals that these need to be applied too often to achieve disease control.

Timing of irrigation can have a substantial impact on disease development. In a University of Kentucky study, irrigation at sunrise substantially reduced disease pressure compared to applying the same amount of irrigation during the evening (Photo 2). Morning irrigation results in shorter leaf wetness periods than evening irrigation. This is because irrigation at sunrise knocks off most of the moisture on leaf surfaces, permitting faster drying.

In contrast, evening irrigation creates leaf surface wetness that doesn't have time to dry by nightfall, resulting in long leaf wetness periods.

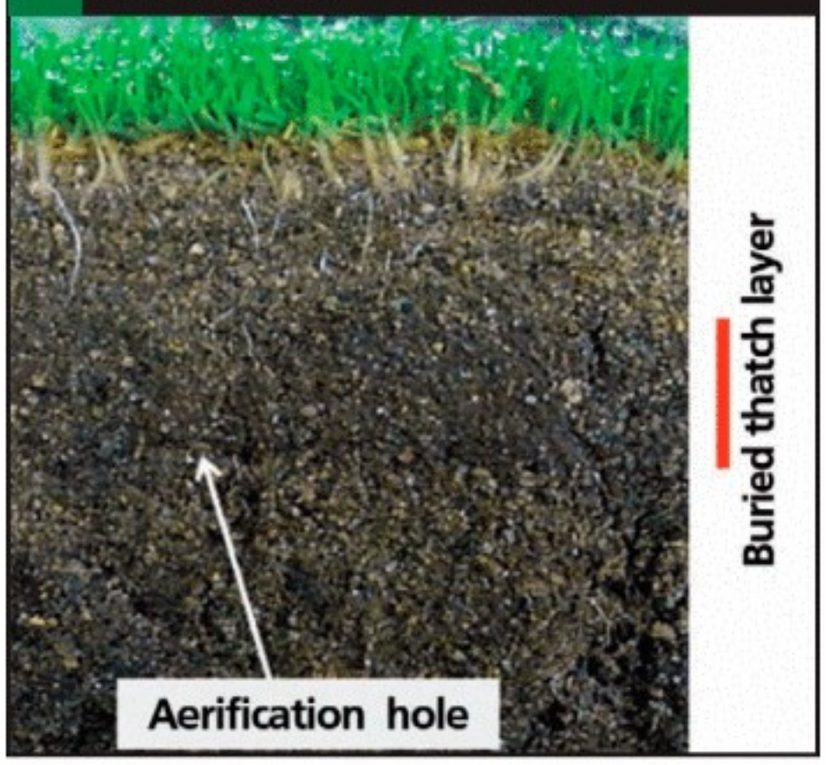
Fertility

Nitrogen fertility can have a substantial impact on disease development. Overfertilization with nitrogen is known to favor *Pythium* blight, brown patch and gray leaf spot, whereas underfertilization favors dollar spot, leaf rusts, anthracnose and red thread.

The form of nitrogen applied can also affect disease development. The best example of this is seen with summer patch and take-all patch. These diseases are less severe in turf regularly fertilized with ammonium forms of N, whereas they are made worse where turf is regularly fertilized with nitrate. Over time, the ammonium causes an increase in acidity around the root (called the rhizosphere), whereas nitrate reduces acidity in the rhizosphere. The benefit from ammonium is not due to the acidity being poisonous to the fungi; they grow quite well under reasonably acid conditions. But the increase in acidity seems to increase turfgrass resistance to infection.

Turfgrass managers should be cautious when applying heavy rates of DMI fungicides with paclobutrazole and flurprimidol.

PHOTO 3



Buried thatch layer in a sand-based putting green.

Mowing practices

Shorter mowing heights commonly increase disease pressure, especially from root-infecting fungi. Turfgrass responds to shorter mowing heights by producing shorter root systems, resulting in greater vulnerability to root infections. Given an equal amount of root infection in two swards, the sward with the higher mowing height is less likely to show foliar symptoms because the plants are more tolerant to the root infection and resulting root rot. Even differences of a few thousandths of an inch can help a putting green limp through a root rot situation or a period of stressful weather.

Organic matter management

A thick thatch layer holds moisture, favoring fungal activity. It also may limit rooting depth, leaving the turf more vulnerable to root infections. A buried thatch layer (Photo 3) develops when thatch is covered by repeated topdressing without thorough incorporation into the thatch layer. A buried thatch layer creates a ponding effect in the root zone with every irrigation or rainfall because water will not percolate uniformly through these soil layers of differing textural class. A problem like this must be corrected in order to reduce activity of fungal pathogens in the root zone.

Turf growth regulators

Trimmet (paclobutrazole) and Cutless (flurprimidol) are both are well-known growth regulators, but they are also weak fungicides. Apply these products to turf and you can often see some weak but measurable reduction in dollar spot pressure. Because these growth regulators have identical modes of action to demethylation inhibitor (DMI) fungicides, one has to be cautious about applying heavy rates of DMI fungicides in conjunction with these growth regulators on putting green turfgrass during stressful periods in summer.

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REFERENCES

Information used in preparation of this article is based on work done for the "Rutgers Turf Proceedings," New Brunswick, N.J., 2008 and used with their kind permission.