



"Plants and pests tend to develop a tolerant relationship. They may not like each other, but they put up with each other."

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# The plant and the pathogen

**W**hen discussing whether golf courses are sustainable or not, the focus is almost always on the putting green. The putting green quality expected by golfers requires an intensive level of management. In temperate regions, creeping bentgrass is the putting green turfgrass of choice. It is the most intensively managed of all the turfgrass species.

Subjected to low mowing heights, frequent mowing, rolling and intensive grooming under a variety of environmental conditions, creeping bentgrass is under environmental stress for most of the growing season. Given the constant or chronic stress, creeping bentgrass is predisposed to frequent attacks by pests.

Breeding efforts have brought us creeping bentgrass cultivars that are dense, fine textured, and have greater disease resistance than the previous generations of cultivars.

Most of us would welcome a creeping bentgrass cultivar that was resistant to dollar spot. We could eliminate the need for dollar spot fungicides and enjoy a more sustainable putting green that required less chemical input. Recently, some creeping bentgrass cultivars have shown dollar spot resistance in university trials.

However, in a recent paper, University of Wisconsin turf researchers

(Koch and Kerns, 2012) reported that dollar spot-resistant cultivars exhibited partial resistance to dollar spot in comparison to older cultivars like Penncross. The authors concluded that the resistant cultivars might reduce, but not eliminate, fungicide applications.

At first glance one could dismiss the new resistant cultivars as just another folk tale, or account for the breakdown based on a wide geographical and climatic range that we are trying to grow the cultivars. I think, however, the study brings into focus what resistance and tolerance mean.

Plant resistance is defined as host traits that reduce pathogen infection, host contact with the pathogen and pathogen growth rate, in case infection occurs (Kover and Schaal, 2002). Visually, resistance would be a symptom-free turf.

Plant resistance places strong selection pressure on the pathogen. In re-

sponse to plant resistance, the pathogen will eventually evolve and use a different means to attack the plant. In response to the new and improved pathogen, we breed a cultivar that has improved plant resistance to the new or evolving pathogen.

The relationship of plant resistance to the pathogen is like an arms race. Tolerance is defined by how much the plant can endure in the face of a pathogen attack. In agricultural crops, tolerance is often defined as the level of disease the crop plant can sustain without any measurable effect on yield. In turf, since we don't measure quality in yield, tolerance is a level of disease expression somewhere between immunity and full susceptibility.

In natural systems, plants and pests tend to develop a tolerant relationship. They may not like each other, but they put up with each other. Tolerance should be an important aspect of achieving the goal of sustainability.

From a management perspective, the introduction of a creeping bentgrass cultivar that is tolerant of dollar spot would likely maintain the desirable cultivar characteristics along with a certain level of disease. The impact, too, would reduce the genetic pressure on the plant and pathogen. We would avoid an arms race between the plant and the pathogen.

If tolerance exists in the turf community, management practices could be used to reduce the level of disease, too. Management practices could be timed along with an appropriate fungicide treatment when needed to maintain the acceptable threshold of putting green quality with minimal disturbance to the plant/pathogen relationship. Bottom line, we need more tolerant turfgrass cultivars to address a wide range of stresses.

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