

Keystone Diseases for Wisconsin Golf Courses

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According to one Dr. R. T. Paine from the University of Washington, a keystone species is one that “exerts(s) influences on the associated assemblage, often including numerous indirect effects, out of proportion to the keystone’s abundance or biomass.” In simpler terms, these keystone species have a much larger effect on their ecosystem than their population level or size suggests they should. Examples abound in the natural world. Sea otters act as a keystone species by feeding on sea urchins, which feed on kelp and when unchecked can decimate the kelp forests that provide shelter and nutrients to hundreds of organisms. Similarly, grizzly bears act as a keystone species by transferring nutrients from their salmon catch into nutrients on the forest floor. Removal of these keystone species from the ecosystem wreaks havoc and oftentimes leads to local extinction of several other species that would have been difficult to predict.

Conservation biologists would likely cringe at my extrapolation of this term for use in turfgrass pathology, but there are keystone diseases on golf course turfgrass. Removal of these diseases from the “ecosystem” through proper control results in great upheaval in the golf course maintenance operation. The direct financial costs and benefits of proper control are usually clearly evident and easy to define. What about indirect benefits and savings to the superintendent? How are they defined and more importantly how are they affected by the removal of these important diseases?

These so called keystone diseases will differ depending on your geographical location. In Wisconsin and the Upper Midwest I would argue the keystone diseases are *Typhula* snow molds and dollar spot. While this may seem obvious because they are the two most common diseases in most years, it is the hidden costs and lost opportunities that are often overlooked that cement their status as Wisconsin’s keystone turfgrass diseases.

Both dollar spot (*Sclerotinia homoeocarpa*) and snow molds (*Typhula incarnata*, *Typhula ishikariensis*) are turfgrass diseases in Wisconsin that require chemical applications for effective control. Cultural control options such as fertility management, cultivar selection, and irrigation play an important role in disease control but do not reduce the disease to acceptable levels. Fungicides are applied once or twice in the fall for control of snow molds, and 6-10 times throughout the growing season to control dollar spot.

The direct cost of these applications to the golf facility is the substantial sum of money they cost to purchase and apply. Indirect costs to the facility are harder to define, but may include environmental effects of misapplied fungicides and use of resources that could be directed elsewhere such as labor and fuel. The direct benefit of these fungicide ap-

plications are the acceptable control of dollar spot and snow molds that can devastate a golf course when left unchecked.

What about the indirect, or hidden, benefits of not allowing these diseases to reenter the ecosystem? First the indirect financial benefits. Dollar spot and snow molds can be unsightly and even disrupt the play of the golf course. Discerning golfers will hence take their business elsewhere, and likely tell their friends as well. What about the indirect agronomic benefits?

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Turf that is heavily affected by snow molds or dollar spot often result in small or large patches of dead turf, which in Wisconsin is often then colonized by annual bluegrass (*Poa annua*). This separates snow mold and dollar spot from other turfgrass diseases in Wisconsin, which rarely result in widespread turf death. The continued failure to control these two diseases will result in a much more rapid conversion from bentgrass to bluegrass than would naturally happen, and at older, established courses can convert the perennial annual bluegrass types to the more susceptible annual annual bluegrass types.

Those that managed annual bluegrass in the summer of 2010 can recite the increased care and finances required to manage it during a hot, stressful period when compared to creeping bentgrass. Increased nitrogen fertility is required to keep it growing effectively. Increased irrigation frequency is required because of its shallow root system. Growth regulators are required in the spring to prevent seed head formation, and they also help in the summer to mitigate some stress on the plants. Replacing annual bluegrass that is inevitably lost to summer or winter stresses can exponentially increase costs depending on the severity of the damage.

There are certainly many other ways that annual bluegrass can move in to a creeping bentgrass stand, but dollar spot and snow mold remain one of the most important. When snow mold and dollar spot are removed from the equation in Wisconsin the landscape for managing high quality turfgrass becomes vastly different. So when the board approaches you to ask if we can really afford to

continue or implement an effective snow mold or dollar spot control program, the most viable answer might just be "can we afford not to?"

References:

Paine, R. T. 1995. A conversation on refining the concept of key-stone species. *Conservation Biology* 9 (4): 962-964.

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