Anthracnose: Terrorizing Turfgrass

By Dr. Tom Hsiang

The word "anthracnose" sounds frightening, probably because the name is rooted in the word "anthrax," the deadly ailment that has been linked to bioterrorism incidents in recent years. Anthrax itself is caused by the soil-dwelling bacterium *Bacillus anthracnis*, and infection can cause serious disease in cattle, sheep and, in rare cases, humans. Fortunately, anthracnose of turfgrass does not infect humans—but it can wreak havoc on turfgrass.

Anthracnose of turfgrass is caused by a fungus known as *Colletotrichum graminicola*, more recently referred to as *Colletotrichum cereale*. Early in 2006, a group of scientists at Rutgers University in New Jersey proposed the name change, based on data that suggested the organism is quite different from the original *C. graminicola*, a pathogen that attacks corn (Crouch et al. 2006). Both scientific names will likely appear in popular and scientific literature for years to come, since scientific name changes take time to become accepted.

Anthracnose diseases are common on foliage of many different plants, ranging from deciduous tree species to grasses. Each fungus is generally specific to the host plants or group of related plants it affects. Anthracnose is defined by the production of spore-bearing bodies called acervuli, which usually look like tiny black spots on the leaf surface.

Photos courtesy Dr. Tom Hsiang.

Figure 1. Spores (top) of the anthracnose fungus are generally crescent shaped and have more than one cell (the cell wall is visible across the centre of each spore).

Anthracnose can be found on all northern turfgrasses and causes a severe disease of Annual Bluegrass (*Poa annua*) called anthracnose foliar blight (AFB). Conditions associated with outbreaks of AFB include severe stresses, such as drought, heat—specifically, temperatures higher than 25 C (77 F)—or compacted soils, as well as unbalanced fertility.

Disease cycle

Spores (Figure 1) are produced in acervuli (Figure 2) and are water-splashed (via rain or irrigation) onto crowns and foliage. The spores germinate and produce dark, bulbous structures called appressoria (Figure 1). These directly penetrate the plant's epidermal cells. Initially, the fungus feeds without visible damage, but cells eventually start to collapse and die as the fungus spreads from cell to cell (Figure 3). The fungus will then produce acervuli on the surface of the infected area (Figure 4) from which spores are released (Figure 5) to start the cycle again.

This infection cycle is complicated, and the fungus requires free water during the pre-penetration phase in order for the spore to germinate and form an appressorium. The fungus is most vulnerable at this stage, as it moves its living cytoplasm from the spore into the appressorium and then into vesicles in the host plant cell. Unfortunately, no symptoms can be observed on the plant at this stage, so turf managers would

be unaware an infection is occurring. When disease breaks out, it can occur very quickly—seemingly overnight—over a wide area. This only happens when the plant is under other severe stresses, such as cyclical (*i.e.* daily) drought stress, heat stress and wear stress, making it unable to respond to the infection quickly and outgrow the fungus.

The fungus is able to survive saprophytically on dead plant tissues, so it is present all year. There is probably a chronic, low-level of infection all the time, but the disease does not break out unless severe plant stresses are involved. This fungus is also able to cause anthracnose basal rot (ABR) that attacks the crowns and even roots of turfgrasses, particularly creeping bentgrass (*Agrostis stolonifera*). ABR occurs over a much wider range of climatic conditions from cool, wet springs to hot, humid summers to warm, wet autumns. Common to ABR outbreaks are long periods of wetness associated with stressful or injurious conditions to the plants such as topdressing, core aeration and other such cultural operations. For more information on anthracnose basal rot, see *GM*, vol. 34, issue 3, pgs 38-42.

Disease management

Recommendations for the control of AFB include stress reduction (heat and drought especially), administration of low doses of nitrogen at frequent intervals (as opposed to less frequent large doses), dethatching to promote vigour, and avoiding night watering during periods conducive to outbreaks. Fungicides registered in Canada for the control of anthracnose contain the active ingredients azoxystrobin, propiconazole and chlorothalonil. Consult local provincial publications for details on fungicide usage.

References

Crouch JA, Clarke BB and Hillman BI. 2006. Unraveling evolutionary relationships among the divergent lineages of Colletotrichum causing anthracnose disease in turfgrass and corn. Phytopathology 96:46-60.

Dr. Tom Hsiang is a professor in the department of environmental biology at the University of Guelph in Guelph, Ont. He can be reached via e-mail at thsiang@uoguelph.ca.

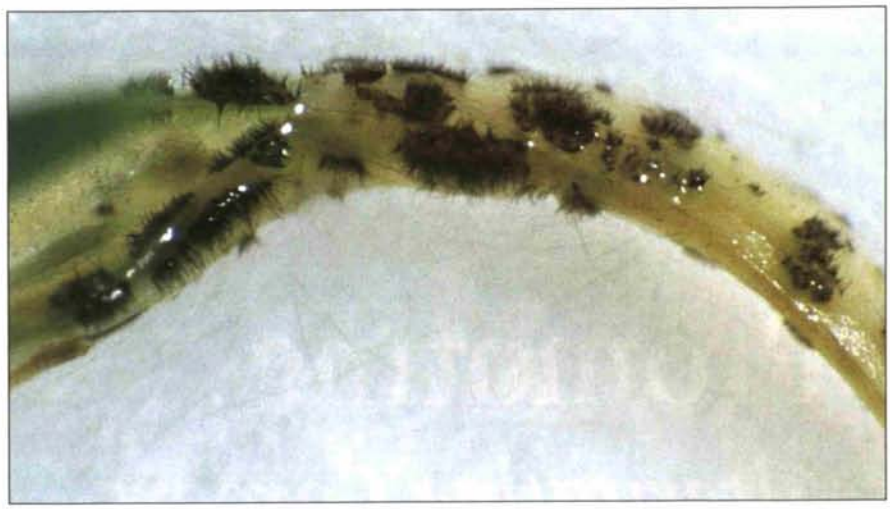

Figure 2. Acervuli of the anthracnose fungus, found here on the stem of a creeping bentgrass plant, look like eyelashes, each one producing thousands of spores.

Figure 3. Fungal growth (thread-like hyphae) in epidermal cells of annual bluegrass stained with a blue dye, growing from cell to cell.

Figure 4. An acervulus of the anthracnose fungi, as seen through a microscope with dark hairs called setae (which give it a "spiked" appearance).

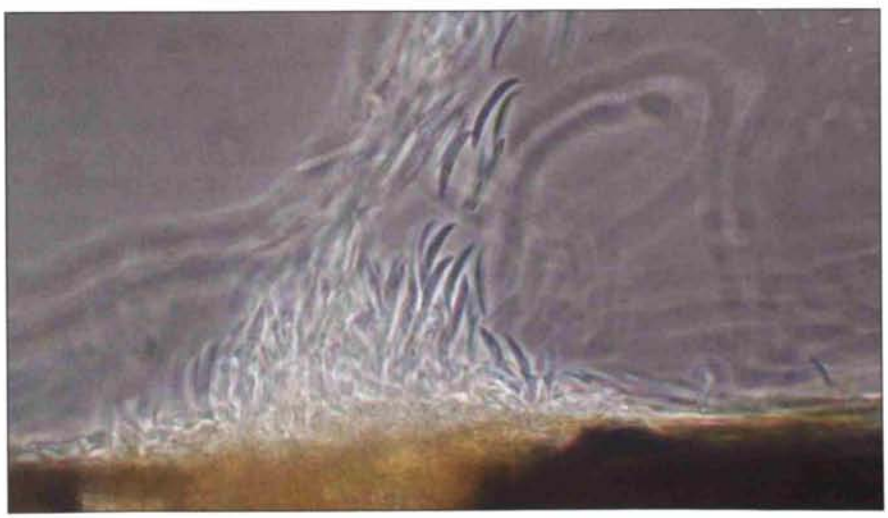

Figure 5. Spores seen here are being released from the surface of a leaf blade to initiate new infections and cause more anthracnose disease.