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Take-all patch (caused by *Gaeumannomyces graminis* var. *avenae*) is often found on putting greens in the Northeast United States. The disease is most common on creeping or velvet bentgrass and is rarely seen on *Poa* or *Festuca* species. The disease usually appears in the spring and is most severe following prolonged periods of rain. It can also appear in late summer as the plants succumb to heat stress but this is often secondary as most of root-related damage usually occurs in the spring. Damage that is observed in the spring usually continues into the summer, leaving large dead patches or weak and unsightly turf. *Poa annua* will frequently colonize these areas after the bentgrass has been killed.



Figure 1. Take-all patch can be very damaging on poorly drained and perennially wet fairways. The resulting disease is often apparent as orange and sunken patches that can be both unsightly and disruptive to play. Photo courtesy of Dr. Noel Jackson, Emeritus Professor of Turfgrass Pathology at the University of Rhode Island.

The disease frequently attacks new sand-based bentgrass greens built in areas that have previously been forested. There is often a lag-time between the establishment of grass on new sand greens and disease expression of about 3-4 years (although I have seen the disease emerge during grow-in on greens that were only a few months old).

Once the pathogen does initiate disease, it will peak in severity 5-7 years after turf establishment and then abate somewhat. The pathogen does not disappear, however, and disease can resurge when environmental conditions become favorable again. The disease is also more common on greens that have been rebuilt following fumigation. Take-all is not limited to sand-based greens. Once again, under significant and prolonged rainfall it can occur on push-up greens (but tends to be less severe). It can be very damaging on poorly drained and perennially wet fairways. It can also appear in home lawns, however, because bentgrass is not a primary lawn grass, it may actually reduce weedy bentgrass in these situations.



Figure 2. The disease continually kills bentgrass as it grows outward. Sunken dead patches of turf will frequently be colonized by *P. annua* on greens and *P. pratensis* or fescue species in lawns and fairways. Broadleaf weeds are also commonly found where bentgrass has been killed by *G. graminis*.

The pathogen is typically soil borne and lives on plant roots. Diagnosis requires microscopic inspection of the roots and the confirmation of the presence of black or brown runner-hyphae. When the pathogen is active, roots will often decay rapidly and should be visually observed for mortality and

decline. Because the pathogen spreads through the soil, it tends to move slowly with patches growing larger by 6-12 inches each year unless controlled.



Figure 3. The presence of *G. graminis* can be confirmed by observing brown or black runner hyphae along the length of infected roots. Similar hyphae are also produced by *Magnaporthe poae*, the causal agent of summer patch.

Although it can be very destructive, the disease can be managed quite effectively on golf courses. A take-all management program requires three parts: 1. pH modification, 2. supplemental manganese and 3. fungicide application.

The pathogen is much more successful when soil pH is high. Consequently, keeping the pH below 6.0 through the use of ammonium sulfate or elemental sulfur can go a long way towards slowing disease spread. Obviously, liming will increase the pH of the soil, which will make the soil more conducive to disease. If liming must be undertaken, it should be done to minimize dramatic swings in soil pH by using products that release slowly or by using small amounts of liming agent in multiple applications. In general, any practice that will raise pH should be avoided.

Although the mechanism is not understood, the disease is also more prevalent when manganese levels in the soil are low. Consequently, making regular applications of manganese at 1-2 lbs/acre,

multiple times per year, can also mitigate disease. It should be noted that reducing pH and increasing manganese will not generally give 100% control. In addition to these approaches, fungicides are required to control the disease.



Figure 4. Lawn turf can also suffer from take-all patch. Here, a bentgrass lawn (left) is slowly consumed by a 30 foot wide swath of *G. graminis* that has left broadleaf weeds and *P. annua* in its wake.

Decades ago, DMI's were typically recommended for take-all patch but results from these applications could be highly variable. Today, the strobilurin fungicides provide extremely reliable control. Of the available chemicals, Heritage (azoxystrobin), Insignia (pyraclostrobin) or Disarm (fluoxastrobin) are the most effective. Either one can be used and should be watered lightly into the turf at highest labeled rates for take-all control. Often a single application will stop disease spread and allow for significant recovery. On occasion, 2-3 applications may be required, especially in overly wet soils.

In locations where the disease has been observed in previous growing seasons, preventative spring and fall applications should be made.

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PESTICIDES ARE POISONOUS! Read and follow all safety precautions and all labeled directions. The label is the law. Handle carefully and store in original containers out of reach of children, pets or livestock. Dispose of empty containers immediately, in a safe manner and place. Pesticides should never be stored with foods or in areas where people eat.

When trade names are used for identification, no product endorsement is implied, nor is discrimination intended against similar materials. Be sure that the pesticide you wish to use is registered for the state of use.

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