

The Plant Doctor

Take-All Disease of Turfgrasses



Take-All Disease

Common during
June to October

Weather

Temperatures in the 80s,
often with daily rains.

Turf types affected

Mostly St. Augustinegrass,
but also affects bermuda-
grass, zoysiagrass, and
centipedegrass.

Quick symptoms

Spreading dead areas, often
starting near sidewalks
or driveways. The first
aboveground symptoms are
irregularly shaped patches
of slightly yellow turf. The
color becomes more notice-
able until the turf browns
and dies in the heat. If you
grasp the aboveground parts
of the plants in your hand
and pull upward, stolons or
rhizomes will break off in
the soil, leaving you holding
some nodes with leaves and
dead roots.

Ectotrophic root-infecting (ERI) fungi live on the outside of the underground parts of plants. They form thick, dark, thread-like strands (hyphae) on the outside of roots, stolons, and rhizomes. We use the term “ERI” to describe these fungi because they are hard to tell apart, even though they belong to very different groups. ERI fungi attack food crops, such as rice and wheat, as well as turf.

One ERI fungus causes take-all disease of St. Augustinegrass, centipedegrass, and zoysiagrass. Other ERI pathogens may also be associated with the disease, but this is not yet clear. The same fungus also causes a disease of bermudagrass called bermudagrass decline.

There are no published studies on how to help a yard recover from take-all disease. This publication provides practices that have worked for others or are inferred from other crops the pathogen infects. The information will change as we learn more.

To manage the disease, we first need to understand its cause. The fungus grows along the length of the outside of roots, stolons, and rhizomes. The hyphal strands are dark and form thick runners. As long as the plant stays healthy, the fungus stays on the outside of the plant and doesn't cause much damage. When the plant is stressed, though, its defenses are weakened, and it can no longer keep the fungus out.

The fungus forms specialized structures to invade the plant. Once inside, the fungus slowly consumes the supporting tissue of the plant. Affected tissue first turns yellow, then dark brown or black, depending on the stage of infection. Roots, crowns, stolons, and rhizomes all may be infected.

The fungus may spread to other areas by contaminated equipment, sod, or rice stalks used for mulch. On rice, the fungus produces sexual spores, which may be spread by wind. You seldom see this stage in turfgrasses.

The fungus grows best at soil pHs higher than 6.0. Soil water levels near field capacity seem to stimulate fungal growth and development but not disease severity. You usually see take-all decline begin after wet periods or after some stress factor has affected the turf.

Symptoms

Symptoms are most common in the summer and fall. Usually, temperatures are in the 80s, and daily rains are common. Often the first symptom you notice is irregularly shaped patches of off-colored or slightly yellow turf. The color becomes more noticeable until the turf starts to brown and die. This happens faster in hot, dry weather than in cooler weather. The dead patches start small and enlarge greatly over a few years so that after 3 years, much of the lawn may be affected.

By the time you see the first yellowing symptoms in the turf, the fungus has consumed most roots. So, the first true symptom of take-all disease is root decay. Roots affected by the disease appear dark, usually black, and rotted. As the disease progresses, stolons also rot, and turf fully affected by the disease does not hold onto the ground. If you grab a handful of the turf and pull on it, it comes out of the ground easily, with only a few blackened roots clinging to the nodes.

Structures called lobed hyphopodia are diagnostic of the disease. You must see them to be sure the disease is take-all and not something else. Black hyphae alone are not enough for diagnosis. Lobed hyphopodia look like a cartoonist's drawing of an amoeba, a deeply scalloped circle—like a large cookie with bites taken from around the edges. You can see them with 20× or higher magnification (hand lens/microscopes) on washed stolons and rhizomes. They are most apparent on St. Augustinegrass stolons.

You can have the disease professionally diagnosed and receive a full report and recommendation from the Mississippi State University Extension Service Plant Diagnostic Laboratory (see M1230 *Plant Disease and Nematode Diagnostic Services*). Collect a 4-by-4-inch sample, including 2 inches of soil and roots, from the edge of the disease area where it fades to the healthy turf. Wrap the sample in dry newspaper, place it in a plastic bag, box it, and send the box to 190 Bost North, Room 9, Mississippi State, MS 39762-9612. Make the check payable to Mississippi State University. Results are usually available within 3 to 7 days of receiving the sample.

Management

Since the fungus apparently does not become pathogenic until the host plant is under stress, eliminating stress on the turf plants is an important part of turf recovery. You should do a complete survey of all cultural practices that cause stress and change any practices that are not best for the turf.

Some common turf stress factors are mowing height, mowing frequency, pH, fertility, herbicides, watering, compaction, and thatch. Only brief summaries of these stress factors are provided here, but proper practices for warm-season turfgrasses are outlined in

Extension Publication 1322 *Establish and Manage Your Home Lawn*.

The first step in managing the disease is to have a soil test done for each major section of your turf area or lawn. Take your soil samples from the top 4 inches because this is where most of the plant lives and is the most important soil layer for pH adjustment.

Manage the pH as acidic as possible for the turf you are growing (see **Table 1**). All but one centipede-grass sample with take-all disease that has come through the MSU Plant Diagnostic Lab has had a soil pH very near 6.0. The adaptive pH range for centipede-grass is 4.5–6.0. The one exception had low levels of potassium and high levels of other nutrients.

Two different techniques have been used to adjust pH: top-dressing with peat moss and using elemental sulfur to drive down the soil pH.

- Sphagnum peat moss is used to top-dress areas of lawn where the disease is active. Cover the stolons and any exposed roots. The sphagnum peat moss probably lowers the pH in the immediate area of the stolons and plant crowns so that the disease is suppressed.
- Elemental sulfur (flowers of sulfur or ground sulfur, such as Southern Ag Black Snake Sulfur) is used in two applications 3–4 months apart to drive down the pH of the soil.

Consult the soil test results to determine the fertility balance and potassium levels. Make sure the nitrogen, potassium, and phosphorous levels are balanced. Lack of potassium makes bermudagrass decline more severe. If you must add a fertilizer, use an acidifying form, such as ammonium sulfate, to keep an acid pH. Avoid nitrate nitrogen. (See Extension Information Sheet 1668 *The Plant Doctor: Plant Disease and Fertilization*.)

Also consult the soil test for calcium levels. In general, plants lacking calcium are more susceptible to disease than plants with enough calcium.

The fungus immobilizes soil manganese, so spray applications of manganese solutions may help. We don't yet know the best formulation and how often to use these sprays.

Excessive fertility may also trigger this disease, but this is unproven. St. Augustine and centipede-grass were originally selected to thrive in low-fertility areas, and some publicized (high) fertility programs may contribute to this disease.

Mowing height differs with turf type (see **Table 1**). Besides mowing at the correct height, you should think about how often you mow. Don't remove more than one-third of the length of the turf leaf in any one mowing. This means you should mow shorter turf areas more often than long areas. Low mowing heights often trigger bermudagrass decline, and sometimes just raising the mowing height will greatly reduce symptoms. Frequent mowing at the proper height may very well improve the turf.

Table 1. Mow height and soil pH range for common turfgrasses used in home lawns.

| Turfgrass | Inches | Acceptable pH range |
|--------------------|---------------|----------------------------|
| St. Augustinegrass | 2.5–3.0 | 5.0–6.5 |
| Centipedegrass | 1.5–2.5 | 4.5–6.0 |
| Zoysiagrass | 1.0–2.0 | 6.0–6.5 |

Soil compaction limits movement of air into the soil, increases the level of carbon dioxide, reduces soil moisture, and increases runoff. It is harder for turf plants to grow roots in compacted soil. Aerate the turf as vigorously as the roots will allow. The best way is to use a hollow core aerifier. Remove and destroy the cores, and do not fill in the holes. If you apply a topdressing, use a light one that is high in acid organic matter, say 3 percent peat. Some reports say activated composts are beneficial, but others have seen no extra benefit from them. If you apply a fungicide, this is a good time to do so.

Thatch is an intermingled layer of dead grass stems, leaves, and roots between the soil surface and the green turf. It occurs when the turf decays slowly before dying. A thatch layer deeper than about three-fourths of an inch tends to raise the turf crowns and roots out of the soil, exposing them to high and low temperatures and drought. Many harmful fungi also survive in the thatch layer. You should work to lessen thatch.

Since the fungus infects stolons, rhizomes, and crowns, most of the fungus population is in the upper turf layer. If you are going to replace the lawn, removing the upper several inches of matted turf debris and soil will eliminate most of the fungus that may infect the next turfgrass planting.

Most warm-season lawn grasses are sensitive to different kinds and rates of herbicides. For instance, only a few can be used safely on centipedegrass (consult Extension Publication 1322 *Establish and Manage Your Home Lawn*). Poorly timed applications, or even rates of a safe material applied to a lawn that is already stressed from other causes, such as by moisture, may result in weakened turf, which is more susceptible to disease. Earlier herbicide burns have been associated with lawns suffering from take-all disease later.

Watering is critical to the lawn's health. Proper watering prevents stress, whereas over- and under-watering cause stress. Overwatering also encourages growth of the pathogen. Water deeply so that water penetrates about 4 inches. Do not water again until the soil starts to dry at this depth—unless your roots are so badly diseased that they do not reach this depth. If this is the case, water again when the soil moisture starts to dry around the root tips. You can push an unpainted wooden dowel into the soil to determine the depth of the soil moisture. Moist soil crumbs stick to the dowel, but dry soil won't. See Extension Information Sheet 1670 *The Plant Doctor: Watering and Plant Disease* for more watering information.

Fungicides don't control this disease. The most effective fungicides are members of the strobilurin group whose common names end with "strobil." "

An example of such a fungicide is azoxystrobin, sold under the trade name of Heritage G. Heritage G can be purchased and used by residential owners (it is not a restricted-use fungicide, nor is it only for professional use), but it is used by professionals. Because this product is mostly used by professionals, it is not generally carried by garden stores and must be ordered. You will need to ask your garden center to purchase this for you from a vendor such as BWI or John Deere.

Heritage G comes in 30-pound bags. According to the label, you should apply 2–4 pounds of the product per 1,000 square feet. The label recommends applying twice in the spring, 28 days apart, and twice again in the fall. It is not cheap, and if you have not reduced the stress to your turf, it will probably do no good.

The information given here is for educational purposes only. References to commercial products, trade names, or suppliers are made with the understanding that no endorsement is implied and that no discrimination against other products or suppliers is intended. Always read and follow current label directions of any pesticide you use.

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