

Turfgrass Disease Profiles

Take All Patch

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Take all patch is a disease of creeping bentgrass that can occur on golf course greens, tees, and fairways. Severe outbreaks of take all patch may damage large areas of turf, effectively ruining the appearance and playability of the stand. The disease is caused by a root-infecting, soilborne fungus, *Gaeumannomyces graminis* f.sp. *avenae*. The fungus inhabits almost all soils, but causes disease under very narrowly defined conditions.

Disease Characteristics

Take all patch symptoms may be evident from April through October in the lower Midwest. Initial symptoms are the result of extensive infection in creeping bentgrass roots when soils are cool (less than 65°F) and wet. Patches normally expand in early spring as infected plants wilt, collapse, die, and turn orange-tan. Figure 1 shows an active take all patch, orange-tan in the center with wilted gray-green leaf blades along the perimeter.

Generally, patches are circular because the fungus grows outward in a radial fashion from the initial site of establishment. Patches range in diameter from 8 to 24 inches and usually occur in clusters (Figures 2 and 3).

In stands with deep and extensive root systems, plants will recover and patch symptoms may disappear as soil temperatures increase and pathogen activity becomes limited. However, symptoms may remain through the summer where there are shallow or sparse root systems partially impaired by infection that are unable to recover. Patches do not expand during the summer and the orange color fades to tan. Take all patch symptoms that remain through the summer often are clustered in areas that are compacted, drought stressed, or have a thick thatch layer.



Figure 1



Figure 2



Figure 3

- Gray Snow Mold
- Pink Snow Mold
- Leaf Spot/Melting Out
- Red Thread
- Dollar Spot
- Brown Patch
- Gray Leaf Spot
- Anthracoze
- Pythium Blight
- Leaf Rust
- Powdery Mildew
- Slime Mold
- Fairy Ring
- Take All Patch**
- Summer Patch
- Necrotic Ring Spot
- Rhizoctonia Large Patch

The take all patch pathogen is active when soil temperatures are cool and wet. Most new infections occur during early spring, when soil temperatures range between 55°F and 65°F. Dry spring conditions often reduce take all patch development in areas where the disease is established. Most take all patch development occurs on less mature creeping bentgrass stands, whether on newly constructed golf courses or in areas that have been fumigated prior to renovation.

The disease also is influenced by soil pH. Pathogen development is significantly suppressed in acidic soils ($\text{pH} \leq 6.0$), while alkaline soils ($\text{pH} \geq 7.5$) are much more prone to infection. Because sand-based greens constructed to USGA specifications are generally more alkaline (due to the calcareous sand used for construction and topdressing), they may be more prone to take all patch outbreaks. However, such sand-based greens also tend to be deep-rooted, allowing plants to compensate for slight to moderate amounts of infection.

Summer stresses associated with heat, drought, compaction, and thatch contribute to symptom expression but will not promote pathogen activity.

Disease Management Options

Resistance to Disease

All creeping bentgrass varieties appear to be equally susceptible to take all patch infection. Other turfgrass species, including *Poa annua* (annual bluegrass) are not affected by the pathogen.

Cultural Options

Because take all patch infection is favored by alkaline ($\text{pH} \geq 7.5$) root zone soils, acidifying treatments may be effective in limiting the severity of patch development. These treatments involve using ammonium sulfate as a nitrogen source (when appropriate) during periods of pathogen activity. Since the pathogen is active when soil temperatures range between 55°F and 65°F, ammonium sulfate applications are most appropriate in fall and spring.

At lower soil pH levels there is more available manganese, an element vital to plant defense mechanisms. Research results on the effects of acidifying treatments (whether they involve ammonium sulfate or direct manganese sulfate application) are mixed. Under the best circumstances, acidification treatments alone will not control the disease, but can measurably contribute to limiting patch development.

Other non-chemical options involve relieving stress on infection-impaired root systems to prevent the permanent wilting and death of affected plants. In the spring and fall, such practices include aeration and topdressing to promote healthy root growth and development. During the summer, careful attention should be given to:

- Irrigating to relieve drought stress.
- Syringing to relieve heat stress.
- Redirecting traffic to reduce compaction.

Chemical Control

Certain acropetal penetrant (formerly systemic) fungicides may be used to suppress take all patch outbreaks. These include DMI products (BannerMaxx®, Bayleton®, Eagle®) and one strobilurin (Heritage®). Check product labels to be sure which fungicides are registered for take all patch control.

Timing of the fungicide application and delivery of the product will influence the performance of whichever fungicide is selected. Applications should be made when the pathogen is active. Research shows that applications in early to mid-spring (April, May), and perhaps early fall (September) are most effective. Sprays during summer months intended for take all patch control will not be effective. Efforts to deliver fungicides to turfgrass roots may improve performance. It is likely that best results will be achieved by following a four-step procedure that includes irrigation, aeration (even solid tine), fungicide application, and irrigation again. Fungicide labels specify application with four gallons of water per 1,000 square feet (known as drench treatment).

Take all patch occurs much less frequently on creeping bentgrass stands that are more than 10 years old because of a phenomenon called take all decline. This phenomenon occurs when pathogen activity and symptom expression decline because the fungus is unable to compete and flourish in a naturally diverse soil microbial environment. Normally, it takes about 10 years after a golf course is built (or after certain areas are fumigated and reconstructed) before this balance in the populations of numerous soil fungi and bacteria is reached.

Preventative chemical control of take all patch on new creeping bentgrass fairways is very expensive and perhaps unnecessary. Many superintendents avoid the disease through sound maintenance practices that promote healthy root development. When symptoms are expressed, they

usually occur in clusters in certain locations. Seldom are large areas killed by take all patch outbreaks. Therefore, it is most economical to monitor fairways for disease symptoms during the spring and fall. Once the affected areas have been identified, they can be targeted for spot treatment with fungicides.

Because of the low (near zero) tolerance to damage on greens, a preventative approach on greens (especially newly constructed or renovated greens) may be warranted. As expected, fungicide performance will improve if root zone pH is less than 7, plants are deep rooted, and efforts are made to reduce thatch and relieve stresses associated with heat, drought, and compaction.

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