FEATURE ARTICLE

Late Autumn Weather Brings on Yellow Patch and Red Thread: Diseases that are Likely to Recur in the Spring

Peter H. Dernoeden

Cool-humid climatic regions of the United States experienced a mild and dry autumn in 2001. **In late November and December, more seasonal temperatures and rainfall returned. These cool and moist conditions resulted in unusually high levels of red thread (*Laetisaria fuciformis*)** in fine-leaf fescues (*Festuca rubra* and other *Festuca* spp.) and perennial ryegrass (*Lolium perenne*). **Similarly, yellow patch (*Rhizoctonia cerealis*) was commonplace** in annual bluegrass (*Poa annua*) and creeping bentgrass (*Agrostis stolonifera*), particularly on greens. Both diseases are favored by cool, wet weather, and generally are more common in the spring than autumn. These diseases cease to be active after the advent of cold weather and the freezing of the soil surface. **The build-up of inoculum** (i.e., plant infecting propagules like sclerotia, dormant mycelium in dead tissue, and spores) **in late autumn will likely contribute to a more severe recurrence of these diseases in the spring.**

Yellow Patch

Yellow patch, sometimes called cool-temperature brown patch, **develops during prolonged cool (50–65°F; 10–18°C), overcast, and moist periods from late autumn to early spring**. Yellow patch is a disease of bentgrass and annual bluegrass, and sometimes perennial ryegrass and Kentucky bluegrass (*Poa pratensis*) turf. **The disease may develop in late autumn or winter, but in many regions it is most prevalent in early spring**. This disease has received very little study and not much is known about the nature of *R. cerealis* in turf or the management of yellow patch.

Symptoms. Yellow patch is most frequently observed on bentgrass or annual bluegrass putting greens, tees, and fairways where **it produces yellow or reddish-brown rings, or circular yellow patches a few inches (8 cm) to one or more feet (>30 cm) in diameter**. A grayish smoke ring may appear at the periphery of yellow patches. Smoke rings, however, are uncommon and generally only develop during extended rainy periods when putting greens have not been mown for two or three days. **The yellow or reddish-brown rings can interloop** like rings on the Olympic flag, and over 100 rings or yellow patches can develop on a single green. When weather conditions shift to sunny and dry periods, blighted turf at the edge of patches or rings may develop a brown or tan color. These brown rings or arcs are disfiguring and can remain evident for many weeks. Oftentimes, however, the rings and patches fade during sunny and dry periods causing little apparent damage if temperatures are warm enough to promote foliar growth. This disease can be confused with Microdochium patch (*Microdochium nivale*), take-all patch (*Gaeumannomyces graminis* var. *avenae*), or fairy ring, and diagnosis should be confirmed if in doubt. Damage is generally superficial, but significant thinning of turf may occur during prolonged wet and overcast weather between late autumn and early spring. **Yellow patch tends to be most severe in wet, poorly drained or shaded sites.**

Management. Yellow patch severity is reduced by improving surface drainage and by squeegeeing-off standing water on greens during rainy weather. Fungicides appear to perform better preventively in an October or November timing rather than curatively in a spring timing. Flutalonil (ProStar®), myclobutanil (Eagle®), and triadimefon (Bayleton®) were reported to provide good preventive yellow patch control in a Kansas study. Once the disease appears, fungicides such as chlorothalonil (Daconil Ultrex®, Echo®, Concorde®, Manicure®, others), iprodione (Chipco 26 GT®), and flutalonil will prevent severe thinning. Even following multiple curative applications of different fungicides the rings and patches may remain evident for long periods. In general, fungicide-treated turf will heal more rapidly than untreated turf with the advent of warmer temperatures in the spring. An application of some nitrogen fertilizer will help speed recovery once winter dormancy has broken and the turf has resumed active growth.

Red Thread

Red thread development is also favored by extended periods of wet and overcast weather in the spring and autumn. Unlike yellow patch, however, red thread can occur at almost any time of year. Red thread may occur during warm and drizzling weather in summer, during cool weather in the presence of abundant surface moisture, or at snow melt in winter. Red thread may become widespread among turfgrass species during mild winters.

Red thread is most damaging to perennial ryegrass, common-type Kentucky bluegrasses, and the fine-leaf fescues grown under low fertility. Improved cultivars of Kentucky bluegrass as well as tall fescue, bentgrass, and bermudagrass (*Cynodon* spp.) may also be affected, but these grasses do not usually sustain a significant level of injury if sufficiently fertilized with nitrogen. Red thread, however, is becoming more commonplace on lawns serviced by lawn care companies and even on golf course fairways. **Red thread therefore should not always be thought of as a disease of poorly nourished turf.**

Symptoms. Symptoms of red thread are concentrated in pink to red colored circular patches of two inches (5

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Research Summary

Wear Tolerance of Cool-Season Turfgrass Cultivars

A new method to simulate wear stress on large-scale turfgrass cultivar characterization studies was utilized to assess the comparative cultivar wear tolerance within nine cool-season turfgrasses. The wear assessments were conducted in two different years for the Kentucky bluegrasses (*Poa pratensis*) and perennial ryegrass (*Lolium perenne*) cultivars. Wear frequencies ranged from every two days in June and July to every four days in August. The resultant wear stress tolerance assessments were based on visual estimates.

Kentucky bluegrass cultivars, having good to excellent wear tolerance in both studies included, Princeton 103, Princeton P-105, Unique, and Eclipse. There was great variability in comparative wear tolerance among the 43 cultivars assessed in one study and also among the 54 cultivars in the second study.

Comparisons among the perennial ryegrass cultivars revealed that the most recently developed cultivars had better wear tolerance. Palmer III, Catalina, and Prizm had relatively high wear tolerance ratings in both years. The newer cultivars, such as Churchill, Exacta, Paragon, and Gator II, had excellent wear tolerance. There were 96 cultivars in one study and 32 cultivars in the new cultivar study.

Among the five fine-leaf fescues (*Festuca* spp.), Chewing's and hard fescues, as a group, had better wear tolerance than the strong-creeping red, sheep, and slender-creeping red fescues. However, Pathfinder strong-creeping red fescue had significantly better wear tolerance than the other 31 fine-leaf fescue cultivars assessed. Also, Reliant II hard fescue had excellent wear tolerance, while Southport and Brittany Chewing's fescues had good wear tolerance ratings.

Among the bentgrass (*Agrostis* spp.) cultivar assessments, the colonial bentgrass cultivars typically had better wear tolerance than the creeping bentgrass cultivars under a fairway cutting height of 0.4 inch (1.03 cm). Penn G-2 creeping bentgrass had the best wear among 32 bentgrass cultivars in the putting green assessment study and 26 cultivars in the fairway assessment study. Recently developed colonial bentgrasses, SR 7100 and Pebble, had better wear tolerance than most creeping bentgrass cultivars in the fairway assessment study.

Comments. Research by Anda and Beard has shown that the relative wear stress tolerance among Kentucky bluegrass cultivars is highly correlated with the canopy biomass, as reflected in a high shoot density.

Source: *Breeding cool-season turfgrasses for wear tolerance using a wear simulator* by S.A. Bonos, E. Watkins, J.A. Honig, M. Sosa, T. Molnar, J.A. Murphy, and W.A. Meyer. International Turfgrass Society Research Journal, 9:127–149, 2001.

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cm) to three feet (90 cm) in diameter. Patches frequently coalesce to involve large, irregular shaped areas. From a distance, affected turf has a straw-brown, tan, or pinkish color. The signs of red thread are distinctive and unmistakable. In the presence of morning dew or rain, a coral-pink or reddish layer of gelatinous fungal growth can easily be seen on leaf blades and sheaths. The infected green leaves soon become water-soaked in appearance. When leaves dry, the fungal mycelium becomes pale pink in color and on close inspection it is easily seen on the straw-brown or tan tissues of dead leaf blades and sheaths. Bright red, hard, and brittle strands of fungal mycelium called "red threads" or sclerotia can invariably be observed extending from leaf surfaces, particularly cut leaf tips. These red threads fall into the thatch and serve as resting structures for the fungus by surviving long periods that are unfavorable for growth of the pathogen. Pink patch (*Limonomyces roseipellis*) produces similar signs and symptoms, however, the pink patch fungus does not produce sclerotia. Pink patch is usually found in association with red thread, and its pathological properties and management are the same as for red thread.

Management. Red thread is generally, but not always, most injurious to poorly nourished turfs. The pathogen is a foliar blighter and does not infect crowns or kill plants. Frequently, red thread is best managed by an application of 1.0 to 2.0 lb nitrogen/1,000 ft^2 (50–100 kg N/ha). **Quick-release, water-soluble nitrogen (e.g., urea) is more effective in reducing red thread injury than slow-release nitrogen. The most effective suppression accorded by nitrogen occurs when fertilizer is applied as soon as the disease develops** and may be less effective after significant blighting has occurred. The level of suppression provided by nitrogen does not always reduce blighting to commercially acceptable levels. **Application of nitrogen during periods too**

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cool for turfgrass growth will not aid in reducing disease severity. This is because nitrogen alleviates red thread injury by stimulating the production of new leaves and tillers to replace blighted tissue. Phosphorus (P) and potassium (K) applied alone have little or no effect on red thread, especially in soils with moderate to high P and K levels. **Nitrogen plus potassium, however, has been shown to alleviate red thread more effectively than nitrogen alone.**

Red thread may develop in well-fertilized turf and additional nitrogen may not be warranted for general agronomic reasons. Furthermore, loss of turfgrass density due to foliar blighting often favors weed encroachment. Spring blighting in particular favors crabgrass (*Digitaria* spp.) and broadleaf weed invasion. **The use of fungicides to control red thread in the spring has been shown to reduce crabgrass levels significantly by preventing deterioration of stand density.** Hence, fungicide use may be necessary in some situations. Fungicides that control red thread include azoxystrobin (Heritage®), chlorothalonil (Daconil Ultrex®, others), iprodione (Chipco 26 GT®), flutolanil (ProStar®), propiconazole (Banner MAXX®), triadimefon (Bayleton®), trifloxystrobin (Compass®), and vinclozolin (Curalan®, Touche®, Vorlan®).

Reference. Tredway, L.P., M.D. Soika, and B.B. Clarke. 2001. Red thread development in perennial ryegrass in response to nitrogen, phosphorus, and potassium fertilizer applications. *International Turfgrass Soc. Res. J.* 9:715–722.

Ask Dr. Beard

Q. *I have seen a condition where an ice layer forms over the turfgrass leaves, yet the leaves are not killed even with species that are relatively susceptible to low-temperature kill. Why is this?*

A. There are two situations when this condition typically occurs.

One is during clear nights with nocturnal long-wave reradiation. As a result the temperatures in and above the turfgrass canopy fall rapidly. If the air temperature falls below the dew point then the moisture in the air condenses on the cold leaf surface. If dew forms on the grass leaves and if the temperatures are below 32°F (0°C) then ice formation occurs on the leaves. **During the freezing process a certain amount of the energy is released from the water, some of which is conducted to the leaf tissue causing a warming effect. This process may avoid lethal subfreezing temperatures during that particular night.** Subsequently, potential injury is minimized if the air temperatures rise above freezing the next day and the ice layer thaws.

There also is the situation when the temperature of the upper atmosphere results in **super-cooled rain that freezes on contact with the turfgrass leaf surfaces, thus forming a coating of ice known as *glazed frost*.**

With either of these situations, it should be noted that if temporary ice formation does occur within the leaf, then **either foot or vehicular traffic on the frozen leaves usually causes death. Death is attributed to the ice causing a mechanical fracturing of the brittle protoplasmic membrane within individual cells, which results in death of those leaves within the footprint or wheel track.** The obvious preventive approach under these conditions is to prohibit foot or vehicular traffic on the frozen turf leaves until thawing has occurred. This can occur either naturally as daytime temperatures rise with the irradiance level or by the application of a light water syringing during the morning period.

Ask Dr. Beard: TURFAX, c/o Ann Arbor Press, P.O. Box 20, Chelsea, MI 48118, E-mail: skip@sleepingbearpress.com