



Hanging by a (Red) Thread

By Steve Abler and Dr. Geunhwa Jung, Turfgrass Diagnostic Lab, Department of Plant Pathology, University of Wisconsin-Madison

In keeping with my recent theme of look-alike diseases, I thought that I would cover a disease that is relatively easy to diagnose, yet is often mistaken for other diseases.....red thread.

Red thread is the oldest recognized foliar disease of turfgrasses. It was first diagnosed in Australia in 1854, and was first reported in the United States in the 1920s. The disease is caused by the fungus *Laetisaria fuciformis*. This pathogen is able to infect and colonize all cool season turfgrasses grown in Wisconsin; however, the most severe disease symptoms are most commonly found on the fine-leaved fescues and perennial ryegrass. Symptoms of red thread in golf course roughs are manifested as roughly circular, white patches of blighted grass a few inches to a few feet in diameter (Figure 1). The edges of the patches appear ragged because there is often healthy grass blades intermixed with the affected, bleached blades.

On closely mown grasses, such as those on golf course fairways, the patches are usually less than a foot in diameter and have more distinct margins (Figure 2). Tufts of cottony pink to reddish mycelium of the fungus may be found scattered in active patches during weather conditions conducive for disease development.

The key diagnostic feature of the disease is the presence of red, filamentous fungal sclerotia emanating from colonized leaf blades (Figure 3). These distinct sclerotia are the basis for the name "red thread." Weather conditions that are optimum for disease development include periods of extended leaf wetness and daytime air temperatures between 60-80°F. It is not uncommon for red thread to be active at temperatures as low as the mid-thirties or into the mid-eighties when there are long durations of leaf wetness. Therefore, limiting the time in which the leaf blades are wet serves to reduce disease incidence.

Laetisaria fuciformis is a strictly foliar pathogen and usually does not kill the grass plant. Red thread is most severe on slowly growing grasses; therefore, practices that reduce the growth rate of the turfgrasses, such as the use of plant growth regulators, will increase the occurrence and intensity of red thread.

On the other hand, applications of water soluble nitrogen fertilizer will stimulate foliar growth and reduce disease symptoms. There are over a dozen fungicides labeled for the control of red thread. Of these, the strobilurins (azoxystrobin, pyraclostrobin, trifloxystrobin), and the sterol inhibitors (fenarimol, myclobu-



Figure 1. Red thread patch on a perennial ryegrass rough.

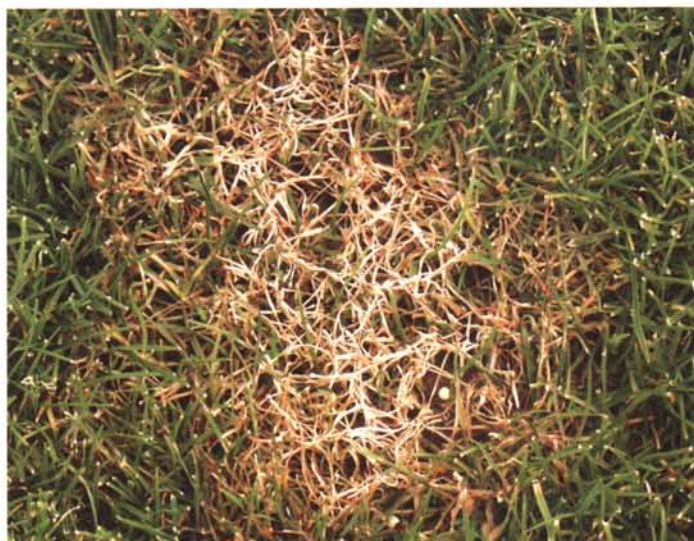


Figure 2. Red thread patch on a perennial ryegrass fairway.



Figure 3. Red sclerotia of the red thread pathogen.



Figure 4. Pink tufts of mycelium of the pink patch pathogen.



Figure 5. Red thread patches on a fine fescue fairway that resemble dollar spot.

tanil, propiconazole, triadimefon) have been shown to be highly efficacious (Couch et al., 2000 and 2002).

Of the handful of diseases that often resemble red thread, the symptoms of *Limonomyces* pink patch (incited by *Limonomyces roseipellis*) are nearly indistinguishable from those of red thread. The grasses that the red thread and pink patch pathogens prefer to colonize and the weather conditions that are conducive for disease are so similar that both pathogens are commonly found in the same patch. It took researchers until the 1980s to discover that there were two closely related pathogens which cause the symptoms previously only attributed to the red thread pathogen.

Pink patch is so named because it usually produces tufts of pinkish mycelium that look like cotton candy on colonized turfgrasses (Figure 4). Red thread and pink patch can be distinguished from each other because the pink patch pathogen does not produce red sclerotia that are characteristic of red thread. Also, when the filamentous hyphae of *L. roseipellis* are examined using a microscope, they have structures called clamp connections. The hyphae of *L. fuciformis* do not produce clamp connections.

Recently, a new biotype of *L. roseipellis* which infects and colonizes tall fescue was reported in Georgia and was named "cream leaf blight" (Burpee et al., 2003). This biotype resembles the red thread and *Limonomyces* pink patch pathogens. Although the hyphae of the pathogen

do not have clamp connections, it was determined to be more closely related to the *Limonomyces* pink patch pathogen than to red thread pathogen on the basis of additional morphological and physiological characters of the hyphae as well as DNA sequence analysis. The good news for golf course superintendents is that because the pathogens are closely related, cultural and chemical control measures for pink patch are the same as the control methods for red thread.

Two other look-alikes of red thread are *Microdochium* patch and dollar spot. Since red thread and *Microdochium* patch are often a problem during cool, wet weather of the early spring and late fall seasons and both produce whitish patches, they are often confused with each other.

Symptoms of *Microdochium* patch can be distinguished from those of red thread because patches produced by *Microdochium nivale* do not contain red sclerotia, usually have dark red borders, and do not have green grass blades amongst diseased blades like red thread patches. Additionally, *M. nivale* prefers annual bluegrass and creeping bentgrass as hosts and produces abundant spores that are revealed when colonized leaves are microscopically examined.

When the weather begins to warm in the late spring or cool in the fall of the year, the symptoms of red thread can also resemble dollar spot on closely mown grasses of golf course fairways (Figure 5). Dollar spot patches can be distinguished from red thread patches because dollar spot patches do not contain red sclerotia, and leaf blades colonized by the dollar spot pathogen often have distinct white lesions with reddish-brown borders. Additionally, the mycelium of dollar spot are white to gray in color and dollar spot patches do not have green blades intermixed with diseased blades like red thread patches.

I think that it is easy to see that there are several diseases that mimic each other during the spring and fall seasons. It is very easy to confirm or rule out red thread as the cause of the problem by looking for the distinctive red, thread-like sclerotia of the pathogen. The hardest part of the diagnosis is getting down on your hands and knees to gaze at the grass.

References

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