Infected site. Summer Patch is affected by a variety of site characteristics, including air flow, drainage, grade, soil compaction, and the amount of sun and shade. The sunny-side of paved areas and buildings can also contribute to Summer Patch by raising adjacent soil temperatures.

Adjusting management and cultural practices to improve control of Summer Patch

by Christopher Sann

IF YOU HAVE BEEN A TURFGRASS MANAGER for any period of time, you have had to deal with Summer Patch disease. The damage that it causes is like no other turfgrass disease. It can devastate large areas in what appears to be a short period of time, and, if inadvertently encouraged by neglecting to eliminate one or more of the contributing factors, Summer Patch can keep damaging the same area for years—despite vigorous attempts to control it.

To deal with Summer Patch efficiently, you need to know as much as you can about it. Dr. Nelson's article on page 1 addresses this first level: understanding the biology of Summer Patch. It also addresses the problem of making an accurate diagnosis of Summer Patch—given the usual multiplicity of problems and the complexity of conditions in the field.

The next level is doing something about it. What is the best way to treat this disease? Most importantly, given Summer Patch's ability to re-invade certain sites, what is the best way to stop it from doing more damage in the future? To properly control Summer Patch, turfgrass managers need to take the long view. That may seem like a lot to ask a person when he may be facing the wholesale loss of large areas of turf, but it is the only way to effectively approach this disease.

Hitting it with a series of fungicide applications—when its symptoms are most obvious—will stop the current infections, but won't solve the problem. It can come back again and again. A variety of factors that may be contributing to this kind of chronic infection are site-specific, so this article is followed by a description of three sample sites and action plans tailored to reflect the characteristics of each site. A survey form and quick reference guide is also given, which you can use on your own Summer Patch problem sites.

CULTURAL PRACTICES

SITE-SPECIFIC REMEDIES ARE ESSENTIAL to long-term control, but so are adjustments to a number of common cultural practices, such as mowing height, water and other inputs, and using resistant turfgrass varieties. These adjustments can have significant effects on the severity of Summer Patch symptoms.

Cutting height

CUTTING HEIGHT IS PROBABLY the most significant of the mechanical cultural practices that affect Summer Patch. General studies have shown that the quality of a turfgrass stand improves as the height of cut increases. In a two-year test of two cutting heights (3.0" vs. 1.5" [78mm vs. 39mm]) of the same bluegrass variety, there was an average 18% increase in the quality of the tall-cut turf over the short-cut plots. In dryer years, that improvement in quality was 29%, and the fall recovery period of that same year showed a 31% increase in quality. Test of reserve carbohydrate levels, a measure of turf's ability to recover from short-term problems, showed that tall-cut turf had 78% higher levels than short-cut turf.

Cutting height also has a direct effect on soil temperatures, and that can have a strong effect on Summer Patch growth. The average soil temperature measured at one-inch deep was 6% higher in short-cut turf than in tall-cut turf for the months of July, August, and September. This translates into about 3°F difference. Under marginal weather conditions short-cut mowing can raise the soil temperature from a range that is conducive to steady fungal growth into a range that favors an explosive growth rate. The higher soil temperature also shifts the turf itself from an active natural root growth phase to one characterized by restricted root growth.

Water & other inputs

WATERING PRACTICES can play a role in the expression of Summer Patch symptoms. A test of varying amounts and frequencies of watering of both short-cut and tall-cut turf produced opposite, but logical results. The lightly, frequently watered plots were watered 10 times more frequently, but to only 1/10th the depth of the deeply, infrequently watered plots. The 1.5"(39mm) short-cut turf that was lightly, but frequently watered showed an 8% improvement in quality over the same height of turf that was deeply and infrequently watered. A comparison of 3.0"(78mm) tall-cut turf plots yielded a 7% quality edge for the deeply and infrequently watered tall-cut turf. So short-cut turf responds better to light, frequent waterings, while the tall-cut turf, which provides a less welcoming host for Summer Patch, does better with deep, The potential for a Summer Patch outbreak is highest when a very wet period is immediately followed by a prolonged hot spell. This combination of environmental conditions can be so strong as to overwhelm even the most conscientiously designed preventive program.

infrequent waterings.

In a test of *Magenporthe poae* under laboratory conditions, higher water levels produce maximum *M. poae* growth rates. Maximum growth occurred at 77–86°F (25–30°C) after four days. These maximum growth rates occurred over a range of moisture levels from just less than field capacity to slightly more than field capacity. At these moisture and temperature levels, the colony growth rates averaged about .5" (13mm) per day.

As this test implied, the potential for a Summer Patch outbreak is highest when a very wet period is immediately followed by a prolonged hot spell. This combination of environmental conditions can be so strong as to overwhelm even the most conscientiously designed preventive program.

MANAGEMENT PRACTICES

Fertilizers

IN ADDITION TO THE UNIVERSITY OF MARYLAND studies with nitrogen sources and Summer Patch severity, general studies on nitrogen sources and general turf quality have yielded some pertinent information. Over a two-year period, the use of sulfur-coated urea showed an average 4% improvement over uncoated urea and two other soluble sources. In dry years, this improvement rose to 8%. The nitrogen sources had a definite impact on root biomass. Turf plots fertilized with sulfur-coated urea show a 21% increase in root biomass compared to those fertilized with plain urea. When dealing with one of the root damaging fungi, this can play a significant role. This information was confirmed by the University of Maryland studies, where, from mid-July through mid-September, turf fertilized all season with sulfur-coated urea exhibited 38% less damage from Summer Patch than turf fertilized with uncoated urea.

Fungicides

THE TRADITIONAL METHOD OF SPRAYING a labeled fungicide to solve an immediate problem only provides temporary relief at best. Additional outbreaks can occur later in the same season or the next year. The reason is simple: spraying the labeled fungicide does nothing to correct the underlying causes.

Preventive applications of fungicides can broaden the protection and reduce the potential for heavy damage, but, by themselves, they represent only a partial solution to the problem. Within these limitations, a number of systemic fungicides are effective in controlling Summer Patch *(see the table on page 3)*. They must be applied starting in mid- to late spring—once soil temperatures reach 60°F (15°C). Remember that the turf may appear completely healthy during this period.

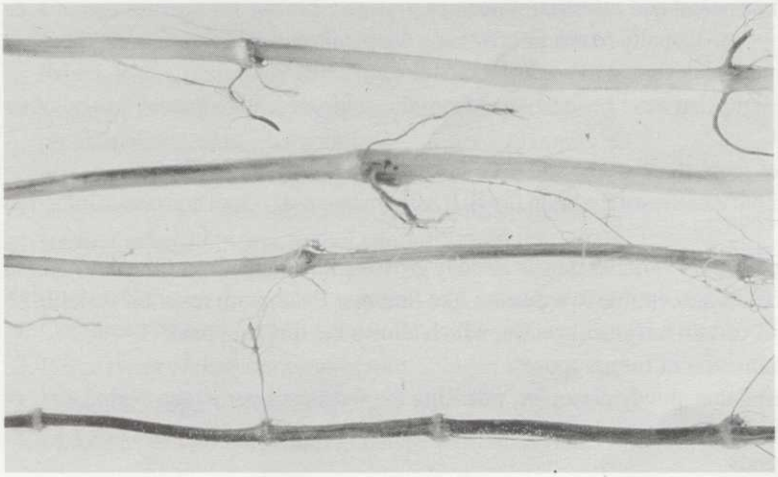
The fungicides should be applied at labeled rates—generally two to three times at monthly intervals prior to the time of maximum soil temperatures. It is essential that the fungicides be applied with enough water to carry them down to the root zone, where they can be absorbed by the plants through their root systems. Without this drenching, control is much less effective and more costly. To achieve the highest levels of control, these applications need to be coordinated with other recommended actions.

Certain contact fungicides, particularly chlorothalonil, which is sold under the trade name Daconil 2787, may enhance disease development and should be avoided in sites with a history of severe Summer Patch problems.

Turfgrass species

DIFFERENT TURFGRASS SPECIES and different varieties within a species can play a significant role in the expression of Summer Patch symptoms. Tests of four turfgrass species other than bluegrass for susceptibility to Summer Patch produced the following results: When test plots were evaluated for Summer Patch damage after six weeks, ryegrass showed 20% damage, tall fescue 28%, creeping bentgrass 69%, and creeping fescue 74% damage *(see table on page 5)*.

Even varieties within a species can show different levels of resistance. When plots were evaluated in the second year after being inoculated



Rotted rhizomes associated with Summer Patch. The fungus that causes Summer Patch spreads on the surface of roots and rhizomes, and can, therefore, spread rapidly through a stand of turf. These rhizomes show the results.

with *M. Poae,* the variety that was supposed to show more resistance did, despite first year results to the contrary. Apparently, varieties that have shown a historical resistance to Summer Patch can be overwhelmed by severe conditions, but, if the severe conditions dissipate, the resistance can reappear.

Co-factors—the final ingredient

CO-FACTORS CAN OFTEN BE THE DECIDING element in the ultimate expression of Summer Patch symptoms *(see article on page 5 in premier issue of* Turf Grass Trends*).*

Here are a few examples of co-factors and how they can affect *M. poae:*

- IF THE SOIL IN THE TOP TWO INCHES IS COMPACTED, this can lead to higher soil temperatures earlier than non-compacted soils, thereby increasing the time that soil temperatures are in the optimum range for Summer Patch.
- IF A LAYERING PROBLEM EXISTS IN THE ROOT ZONE, causing water to spend a longer time in that zone, then this can greatly enhance the conditions for maximum fungal growth.
- IF THE TURF HAS A CHRONIC NECROTIC RING SPOT history, the root mass volume can be dramatically reduced, making it vulnerable to a *M. poae* infection that would not damage healthier turf.

Stress management for lawns—no joke

A KEY ELEMENT IN THE MANAGEMENT of Summer Patch is the reduction of stress conditions. In general, any practice that will reduce stress and promote a vigorous root system will reduce disease severity. The adjusted practices already discussed all have stress-reduction effects. For example, mowing turf at heights recommended for the particular variety and avoiding excessively low cutting heights, particularly during periods of heat stress, help by creating better conditions for the turf than for the fungus. Using slow-release fertilizers and deep and infrequent irrigations also lessen stress by creating conditions that favor deep, steady root growth. Other practices—such as aerification, syringing to reduce heat stress, improving drainage, and reducing compaction and thatch—also help to alleviate symptoms of Summer Patch.

The use of resistant varieties also aims at reducing stress, by eliminating plants that are susceptible to the disease and replacing them with plants that have a built-in way of fending off the disease. Re-sodding or overseeding affected areas with tolerant varieties of perennial ryegrass, tall fescue, or resistant varieties of Kentucky bluegrass are perhaps the best strategy for controlling the disease. Mixtures of these species and varieties will provide more effective control than using a single species or variety.

Formulating a plan

THE ADVANTAGES of a comprehensive approach are obvious: if the value of a series of individual actions has been demonstrated, then linking them together is most likely to produce the better long-term results. Adjusting your cultural practices will produce results, but combining the recommended practices with changes based on a thorough analysis of contributing site-specific conditions will produce the best results. ■

TERMS TO KNOW

aerification .... The process of mechanically introducing air space in the top layer of soil to loosen it and encourage absorption of water.
asymptomatic .... Not exhibiting symptoms.
biomass .... Living material. Used to refer to the amount of organic material represented by plants.
compaction .... A condition of soils subjects to heavy vehicular or foot traffic, which can contribute to Summer Patch by allowing higher soil moisture levels.
conidia .... Fungal spores important in dispersal and infection processes.
inoculate .... To infect plants with a pathogen—usually to test its effects on the plants under various conditions or to test the effectiveness of materials designed to control the pathogen.
isolates .... Samples of a pathogenic fungus that have been isolated from the environment to ensure that no other microorganisms are present.
percolation .... The process by which water seeps through the soil pore spaces.
Pythium root rot .... A disease caused by pathogenic varieties of Pythium fungi. It is characterized by root and crown infection and decay.
overseeding .... The practice of introducing turfgrass varieties into an already growing turf stand. Over time this method may be used to replace varieties susceptible to a disease like Summer Patch with resistant varieties.
rhizome(s) .... An underground structure of certain turfgrass species, which allows the turf to spread.
sporulate .... A verb that refers to the production of fungal spores.
sulfur-coated urea .... Fertilizer coated with material that slowly dissolves, releasing the fertilizer over a long period.
syringing .... Lightly watering plants. Usually done frequently.
urea .... A material used for fertilizers.