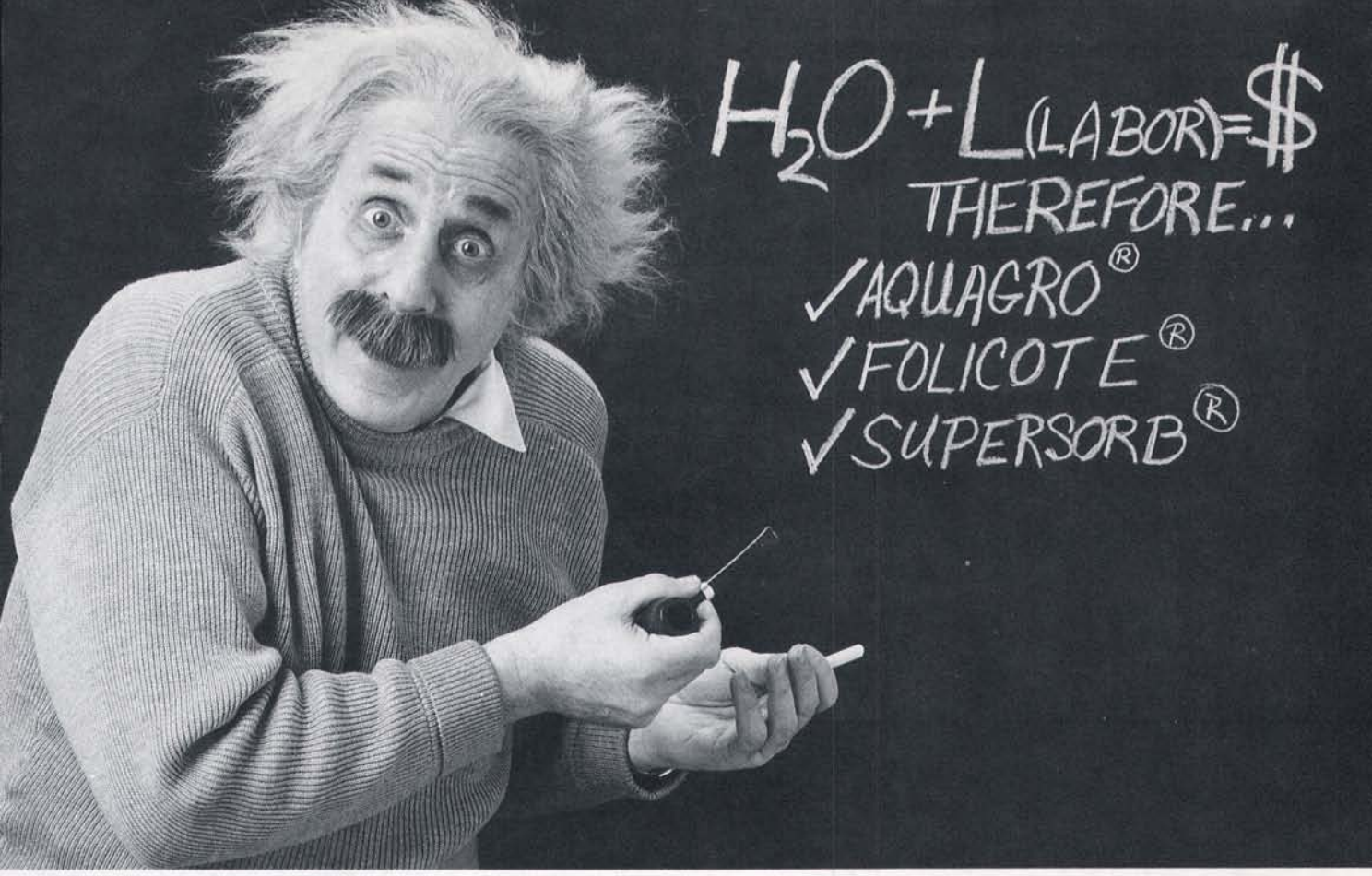

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Modern Standards Increase Pressure on Turf Disease Control

Golf course superintendents have learned to live with the seasonal threat of turfgrass diseases. Low mowing heights, high fertilization rates and automatic irrigation have created an artificial environment which dictates a close watch on pathogens that attack both the foliage and the root system of golf turf. Golfers expect fast greens, low-cut fairways and dense tees, something only a skilled superintendent can provide. He could not do it without knowledge of turf disease control.

Other sports turf managers have begun to experience some of the same maintenance challenges as they strive to keep fields in play year-round. Pushing and reseeding the turf to maintain a solid stand during periods of high humidity, drought and high temperature open the door for development of diseases. There isn't time to allow sports turf to defend itself naturally or to recover from stress. The clock is always ticking and each minute is becoming more valuable.

Lose a green or a field in the middle of the busy season, and you may find yourself out of a job. Who is to say what amount of disease damage is acceptable? In many cases, once symptoms appear the battle is partly lost and some damage is inevitable. The damage can raise doubts about the sports turf manager's skill. To have a tight grasp on his job, he must have some control over turf diseases, especially if he works in the Northeast or Midwest. This can be frustrating, to say the least, when you consider all the fine points involved in disease control. It's no wonder that preventative disease control is favored by most sports turf managers.

Disease identification and fungicide selection can be a real can of worms. In an effort to be scientifically precise, turfgrass pathologists have created a system of nomenclature rivalled in complexity only by the chemistry of fungicide formulations. Furthermore, they are constantly revising their classification of disease pathogens as they discover multiple or slightly different strains causing symptoms in turf.

Sports facility managers and architects complicate matters further when bentgrass greens are planted in the humid Southeast, athletic fields and golf courses are overseeded with cool-season grasses in the Sun Belt, and use levels of sports turf in the North increase disease pressure on bentgrasses, Kentucky bluegrass, annual bluegrass and fescues. As mowing heights are lowered to meet modern standards for play, turfgrass' primary means of self-defense, a deep, healthy root system, becomes restricted. Sand rootzones can add to disease problems until sports turf managers learn how to avoid layering and drainage problems that lead to root decline. Despite all this, the number of failures of natural turfgrass have been kept to a minimum by the skill of the sports turf manager and golf course superintendent.

Necrotic Ring Spot on Kentucky bluegrass.

Pythium Blight on bentgrass.

Rhizoctonia Brown Patch.

Fusarium Blight.

Sports turf managers should have a plan in case weather and use conditions increase the potential for diseases. Even if symptoms match the textbook description of a disease, have samples tested to reveal which fungal pathogens are involved. Use this information not only to determine curative measures, but to plan preventive measures for the future.

Disease control first became a necessity as golf courses, grass tennis courts and bowling greens were constructed in the Northeast at the beginning of the century. Standards established in Europe for these sports were challenged by the summer heat and humidity of the eastern states.

The first major disease to concern greenskeepers ruined bentgrass greens by causing irregular brown patches up to a yard in width. C. D. Piper, a United States Golf Association Green Section staff member, isolated a fungus called *Rhizoctonia solani* from samples of infected bentgrass at the Olcott turf gardens in Connecticut in 1914. The disease was named brown patch and a copper compound called Bordeaux mix was found to provide some control. Brown patch will also attack annual bluegrass, bermudagrass, fescue, ryegrass, and zoysiagrass.

Smaller brown patches about the size of a silver dollar were also disfiguring greens. At first these were also thought to be brown patch, but a different fungus was discovered in samples, one called *Sclerotinia homeocarpa*. Turf managers called the disease dollar spot. This disease is also found on annual bluegrass, bermudagrass, fine fescue, Kentucky bluegrass and ryegrass.

For many years, formulations of mercury were used to control both brown patch and dollar spot. A few more diseases of turf were recognized, including leaf spot, rust and copper spot.

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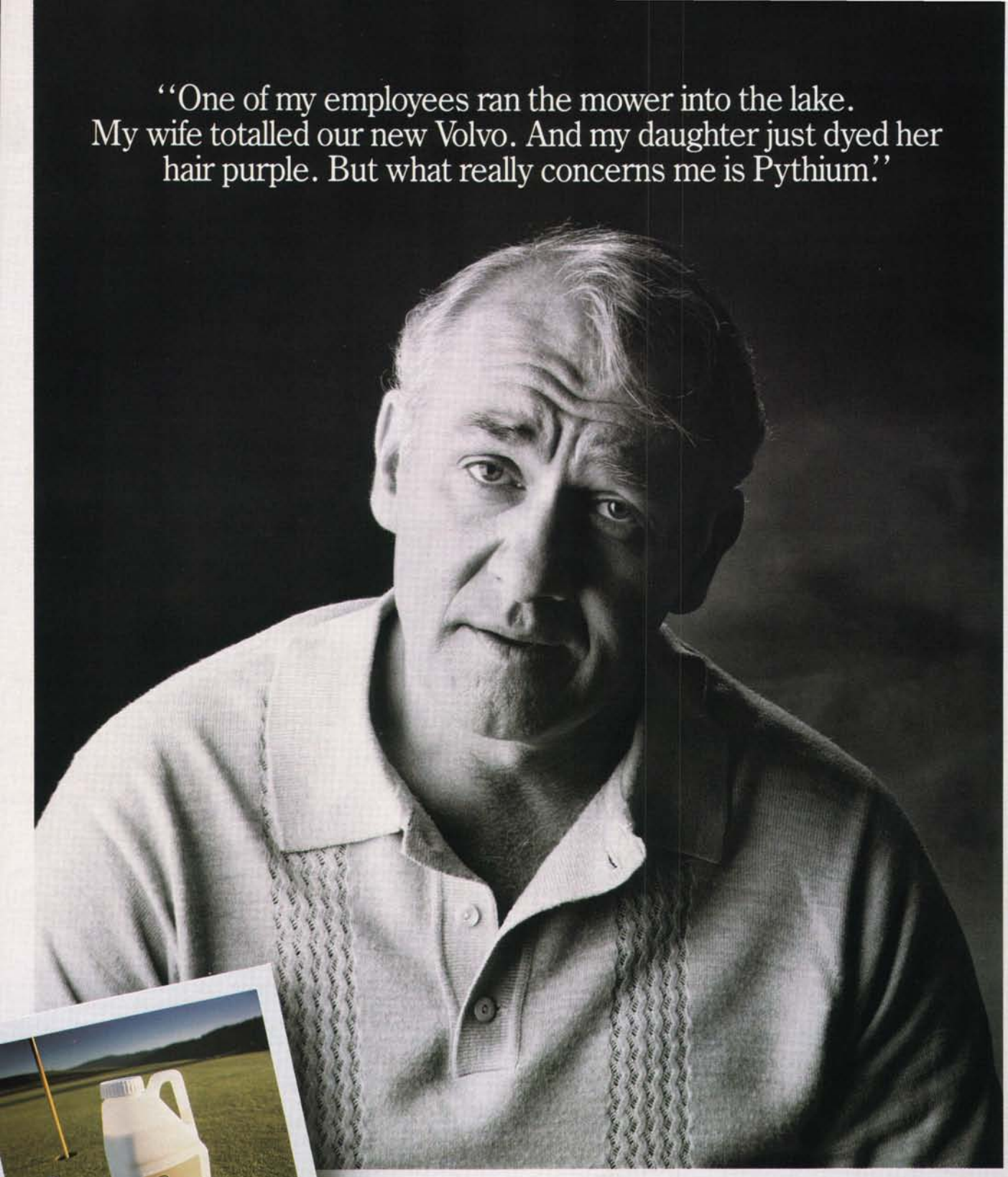
"One of my employees ran the mower into the lake. My wife totalled our new Volvo. And my daughter just dyed her hair purple. But what really concerns me is Pythium."



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Turf Disease Control

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Leaf spot (*Helminthosporium*) starts out as purple to black spots on leaves of bentgrass, bermudagrass, Kentucky bluegrass, ryegrass or the fescues. The spots grow in size turning tan in the center. In warm weather, entire blades as well as crowns and roots can die and cause a thinning of the turf stand.

Rust (*Puccina*) also thins turf by causing infected Kentucky bluegrass, ryegrass, tall fescue and zoysiagrass to turn yellow and finally reddish brown. Reddish-brown spores coat the blades of infected turf. Copper spot (*Gloeocercospora*) causes small copper-colored spots in bentgrass greens and fairways.

Actually, red thread (*Corticium*) was the first disease found to damage turf. With so much emphasis placed on the greens, fairways initially received inadequate applications of nitrogen. During cool, damp weather in spring and fall, the leaves of malnourished bentgrass, ryegrass, Kentucky bluegrass and fine-leaf fescue become covered with tiny pink reproductive bodies called stroma. Adequate, but not excessive fertilization of the fairways helps reduce the severity of this disease.

In 1931, a new fungicide was recognized for its effectiveness on these diseases, called thiram. Thiram also increased the safety of Semesan, an organic mercury compound, when the two were mixed together.

Until the 1950s, control efforts were almost totally directed at greens, tennis courts and bowling greens. After World War II and the Korean War, disease control started to move onto fairways and other turf areas. Superintendents began raising their standards for fairways and tees, treating them for diseases as well as the greens.

The residential turf market also started to boom with a tremendous increase in Kentucky bluegrass, especially one discovered at Merion Country Club in Pennsylvania called Merion. The bluegrass was extremely popular until it started failing a few years after heavy fertilization. The culprit was a disease identified as stripe smut (*Ustilago striiformis*). It was discovered that thatchy bentgrass was also attacked by smut.

After a few years, beautiful Merion lawns would start to fall apart, growing clumpy and weed-infested. At first a few individual plants would turn yellow and the blades would curl. Close examination showed black stripes running the length of the blade. If rubbed, these stripes smudged into a black dust. The infected plants could not compete with crabgrass or broadleaf weeds. This disease started a revolution in both disease control and breeding of disease-resistant turfgrasses.

As pathologists paid more attention to turfgrasses and specialists were trained and entered the field, more fungal organisms were isolated and linked to disease symptoms. As a result, new fungicides were developed.

That decade turf managers saw the introduction of cycloheximide (Actidione), cadmium fungicides, captan and anilizine (Dyrene). These fungicides improved control of brown patch, dollar spot, leaf spot and powdery mildew. As the market grew in the '60s, chlorothalonil (Daconil 2787) and mancozeb (Dithane, Penncozeb) came on the market.

The '60s also brought attention to a number of diseases. While *Pythium* had been recognized as a pathogen of turf in the '30s, it was a growing problem on poorly-drained greens and fairways, often those irrigated with pond water. In warm weather, reddish-brown circular spots up to six inches in diameter can join together to wipe out large areas in a day or two.

The fungus can spread from irrigation ponds to the thatch and soil in water-logged turf without injury symptoms until temperatures rise. Under the right conditions, the fungus quickly attacks young or weakened turf covering the blades at first with cottony structures called mycelium. In a matter of hours, the blades turn reddish brown and shrivel. If the area is mowed when wet, the disease can spread further.

Pythium became a greater problem when superintendents started overseeding bermudagrass greens with annual and perennial ryegrass. The disease can damage all cool-season grasses as well as bermudagrass. The first fungicides specifically effective against pythium were released. They included chloroneb (Tersan SP) and ethazole (Koban). Three regional species of *Pythium* have since been identified; *P. ultimum, P. myriotylum and P. aphanidermatum.*

Fusarium blight was the biggest discovery of the '60s. It was found to attack Kentucky bluegrass, bentgrass and red fescue during humid summer weather. Circular patches of turf would rapidly die. A close look at the infected plants revealed that the roots, rhizomes and crowns had rotted and become dark brown to black. In many cases, the center of the patch remained green. This donut-shaped damage was coined "frog-eye" by turf managers. Pathologists isolated various strains of a fungus called *Fusarium*, and gave the name *Fusarium* blight to the disease.

Since Helminthosporium had become the most serious of all diseases of cool-season turfgrasses by the '60s, pathologists evaluated them more closely. They isolated three different species and 11 different diseases. While this aided the exact identification of the various Helminthosporium pathogens, it only added to the confusion at the fungicide manufacturer and applicator level. As a result, *Drechslera, Bipolaris and Exserohilum* species may be assigned by pathologists to some types of Helminthosporium fungi in lab reports.

In addition to leaf spot on cool-season grasses, Helminthosporium diseases include melting-out on Kentucky bluegrass, net-blotch on fescues, red leaf spot on bentgrass, leaf blight and crown rot on bentgrass, brown blight on ryegrass, leaf blotch on bermudagrass, zonate eyespot on bermudagrass, and stem and crown necrosis on bermudagrass.

Another disease attracting attention in the '60s was "take all" patch, a serious disease of bentgrass in the Northwest during the spring and fall. The fungi, *Gaeumannomyces*, would turn patches of bentgrass up to two feet in diameter tan, especially where soils and irrigation water were alkaline. Control is extremely difficult once the disease has become established.

The first systemic fungicide was also developed during the '60s, Thiabendazole (Mertect). Systemics enter the plant to fight diseases from within instead of contacting the pathogen on the leaf surface or in the soil and thatch. Most systemics were developed in the '70s, including benomyl (Tersan 1991), thiophanate methyl (Fungo), iprodione (Chipco 26019), metalaxyl (Subdue) and triadimefon (Bayleton).

Introductions of systemic fungicides continued into the '80s with Phosethyl Al (Aliette), propamocarb (Banol), propiconazol (Banner), fenarimol (Rubigan) and vinclozolin (Vorlan).

Other diseases of importance to the sports turf manager today include anthracnose, necrotic ring spot, summer patch, southern blight, spring dead spot, Fusarium patch, Sclerotinia patch and Typhula blight.

Patch Diseases of Turfgrass

Winter
Spring Dead Spot *bermudagrass*
Typhula Blight *annual blue, Ky. blue, fescue, ryegrass*
Fusarium Patch *annual blue, bent, berm., Ky. blue, fescue, ryegrass*
Sclerotinia Patch *Ky. blue, red fescue, rye*
Winter Crown Rot *bent, Ky. blue, fescue*

Spring and Fall
Necrotic Ring Spot *bent, Ky. blue, fescue, ryegrass*
Take-All Patch *bent, Ky. blue, fescue, rye*
Rhizoctonia Yellow Patch *bent, berm., Ky. blue, tall fescue, zoysia*
Red Thread *bent, berm., Ky blue, fescue, rye*
Pink Patch *red fescue, ryegrass*

Summer
Fusarium Blight *bent, berm., Ky. blue, tall fescue, ryegrass*
White Patch *tall fescue, red fescue*
Pythium Blight *bent, berm., Ky. blue, fescue, ryegrass, zoysia*
Brown Patch *bent, berm., Ky. blue, fescue, ryegrass, zoysia*
Dollar Spot *bent, berm., Ky. blue, red fescue, zoysia*
Sclerotium Blight *bent, berm., Ky. blue*
Summer Patch *Ky. blue, annual blue*

Table courtesy: Dr. Houston Couch, VPI, Blacksburg, VA

Anthracnose is a serious warm-weather disease where *Poa annua* makes up a large portion of the turf stand and the soil has become compacted. Patches of annual bluegrass turn yellow and then reddish brown. The plants are easily pulled out to reveal black reproductive spines at the base.

Summer patch and southern blight are also hot weather diseases. The species *Magnaporthe* has been contributing to the severity of Fusarium blight. It attacks cool-season turfgrasses exposed to high temperatures, open sun and heavy thatch, especially in the transition zone where cool-season turfgrasses are under high maintenance. Southern blight occurs on some cool-season turfgrasses in hot, wet weather. Large patches of turf are damaged by the fungus *Sclerotium rolfsii*. Soil on the edge of the damaged area is covered with white mycelium.

Necrotic ring spot is a new disease which attacks primarily Kentucky bluegrass and bentgrass in the North during the spring and fall. The fungus *Leptosphaeria korrae* kills patches of turf from a few inches to a few feet in diameter, sometimes leaving a reddish-brown ring around damaged areas.

Spring dead spot, Fusarium patch, Sclerotinia patch and Typhula blight are winter diseases of turf. Damage is not apparent until snow melts or bermudagrass comes out of dormancy in the spring. Spring dead spot is thought to be a disease, partly the result of the same fungus that causes necrotic ring spot. Bermudagrass simply fails to come out of dormancy in the spring, especially after unseasonably cool winters in the South. Part of the cause may be use and maintenance practices in the fall while the bermuda is going dormant.

Fusarium patch, Sclerotinia patch and Typhula blight are snow molds which cause a rude awakening in the spring after the snow melts and circular patches of brown dying turf are uncovered. Nearly all cool-season turfgrasses can be damaged. Typhula blight is called gray snow mold for the gray mycelium found on the infected turf. Fusarium patch is also called pink snow mold due to its pink mycelium. Sclerotinia patch appears like gray snow mold but it is found in the colder ranges of the northern states and Canada.

Fungicide treatments for snow molds must take place in late fall or early winter to reduce the population of fungi in the turf. But like any disease, cultural practices can have a great impact on their severity.

Irrigation, fertilization, mowing and other maintenance practices should be adjusted to discourage disease development. Drainage, soil texture, soil pH, compaction, wind and shade problems must be corrected for long term improvement.

Lush growth caused by excessive nitrogen fertilization is a contributing factor to many diseases. Among them are summer patch, brown patch, leaf spots and blights (especially in spring), powdery mildew, Pythium, smuts, Typhula blight (in fall), Fusarium patch and Helminthosporium. On the other hand, a lack of nitrogen reduces the ability of turfgrasses to resist certain diseases, including anthracnose, dollar spot, red thread, and rust.

Using less expensive, incomplete fertilizers may not save money at all when the benefits of phosphorus and potassium are taken into account. Phosphorus stimulates root development especially in new seedings and stolon plantings. Potassium increases the strength of plant cells to help them reduce the severity of brown patch, dollar spot, Fusarium patch, Helminthosporium diseases, red thread and take all patch.

Incorporating calcium into nutritional programs has been shown to reduce the susceptibility of turfgrasses to Pythium and red thread. Also, acidifying fertilizers can lower the pH of soil to reduce the incidence of take-all patch and Fusarium patch.

Irrigation has perhaps the largest influence on disease development. When conditions are right for diseases, water must be applied to the turf in the right amount and at the right time. Too much water will incite summer patch, brown patch, powdery mildew and Pythium. Too little will encourage the development of dollar spot, leaf spot and blights.

Turf must receive the water it requires to carry out its metabolic processes but the

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Turf Disease Control
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foliage should not remain wet for extended periods of time. This is especially true for summer diseases such as anthracnose, dollar spot, summer patch, Fusarium blight and rust. The severity of summer patch can be moderated by daytime syringing to cool the turf, but air circulation and sun should be available to dry the turf rapidly. Night watering is not recommended in cases where dollar spot, leaf spot and blights are a problem.

Pathologists frequently recommend that dew be removed from turf by irrigation, hosing or poling. Turfgrasses release substances through their leaves at night which contribute to the growth of fungi. Mowing turf covered with dew or wet from irrigation has contributed to the spread of Pythium.

Where possible, mowing frequency should be reduced and the height of cut raised during hot spells. Increased mowing frequency enhances the potential for disease development, since fungal pathogens can invade the open tissue at leaf tips. Very low mowing can encourage the development of summer patch, Helminthosporium diseases, rust, brown patch and dollar spot. Mower blades should be kept sharp to keep foliage tearing to a minimum. Topdressing may help since it effectively raises the height of cut and encourages the breakdown of thatch.

Clipping removal can play a part if fighting Helminthosporium, Pythium and brown patch. Dispose of clippings so that fungi contained in them can't spread to other turf.

Always plant resistant varieties of turfgrasses. They can greatly reduce the incidence of leaf spots and blights, summer patch, powdery mildew, and red thread.

Aeration, verticutting and topdressing can take away a great resting site for diseases . . . thatch. Pathogens can survive in dead organic matter until conditions are favorable for disease outbreak. This has been shown for Fusarium, Pythium, Rhizoctonia, Helminthosporium, red thread and dollar spot. Aeration can also improve infiltration and relieve compaction to improve drainage and promote deep rooting.

The use of wetting agents and soil amendments to improve soil drainage and texture are also helpful. A product called Turf Restore is said to reduce the severity of Fusarium, necrotic ring spot and brown patch by adding beneficial microorganisms to soil. These organisms break down thatch and correct conditions that favor disease development.

Sports turf managers in the South with sandy soils should test soil periodically for nematodes. These are tiny, worm-like parasites which attach themselves to turfgrass roots and feed on plant juices. They cause severe stunting and malformation of roots which weakens the plant's defense of fugal pathogens.

Disease control is complex to say the least. Symptoms alone are not sufficient evidence to select fungicides and control methods. The pathogen(s) should be identified by diagnostic tests first. Contact your local extension service for the labs that perform these type of tests.

The sports turf manager can do some testing himself, says Vonnie Estes of Agri-Diagnostics in Cinnaminson, NJ. The company makes three simple kits that reveal the level of brown patch, Pythium or dollar spot from ground-up samples of diseased turf. "The turf manager can track disease levels by periodically testing with the kits," she states. "Fungicides can be applied before fungi start to reach damaging levels. They can also be withheld if the tests show the disease level is not serious."

Another approach to predicting disease outbreaks is by using computer models. The PestCaster from Neogen Corp. in Lansing, MI, utilizes information from a mini-weather station to predict outbreaks of Pythium and anthracnose. By recording humidity, soil temperatures, rainfall and wind speed every 15 minutes, the computer can predict when conditions are right for an outbreak.

Sports turf managers should keep records of disease outbreaks and compare them to weather conditions and maintenance practices. Where diseases are likely, one or more fungicides should be selected to provide both preventative and curative control. Some formulators offer combination products while others provide recommendations for tank mixing their products with other fungicides. Since timing can be crucial, combining fungicide applications with fertilizers or herbicides may not provide the best control. Consult local extension agents and chemical distributors for the best timing of fungicide applications in your area.

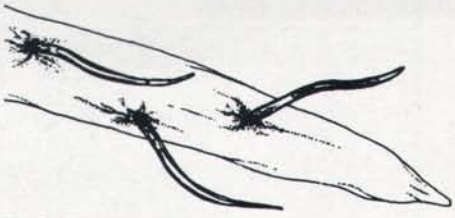
As the value of sports turf increases, the cost of disease control becomes a small price to pay to keep it in play. When there is little room for mistakes, and a sports turf manager's job is on the line, predicting turf diseases and controlling them is essential. Until turfgrasses are developed with complete disease resistance, a disease control program is a necessity.

Editor's Note: Special thanks go to Dr. Houston Couch, professor of plant pathology at Virginia Polytechnic Institute and State University, Blacsburg, VA, and Dr. Phil Colbaugh, extension pathology at the Texas A&M University extension center in Dallas, TX, for their assistance.

Nematodes Invite Diseases

If you are following all recommendations to control summer diseases and you still can't seem to beat them, there is one more test to make, especially if your turf is growing in sandy soil. Have the soil checked for nematodes.

Nematodes are microscopic worms that live in soil or water. They pierce the walls of turfgrass roots with a stylet located on the tip of their bodies and extract plant juices. They also inject digestive fluids into the roots. As a result, they weaken the roots and provide an entryway for fungi present in the soil.



Turfgrass nematode.

While all soils have some types of nematodes in them, the most severe, including the sting, rot knot and lesion nematodes, can greatly weaken turf during warm weather. A close look at roots infested with nematodes reveals disfigured coarse roots, a noticeable lack of fine roots, and darkening caused by fungi.

"From above, turf appears chlorotic and drought stressed," explains Dr. Rod Kabana, a nematologist at Auburn University in Auburn, AL. "All symptoms indicate an impairment of the root system. The fine roots with which the plants take in nutrients and water are destroyed. Even if adequate levels of moisture and nutrients are in the soil, the turf can't utilize them."

The activity and reproduction of nematodes is dependent upon temperature. "Basically, the activity of the nematode matches that of the turfgrass," Kabana states. "When the turf is dormant, so are the nematodes. Usually there are several species involved. In tropical and subtropical climates, they are active much of the year. They can also be as deep as three feet and create new generations in ten to 35 days."

Nematodes can spread from one site to another in contaminated sod, imported soil, on equipment, in irrigation water or runoff, or even as wind-blown eggs. Once they become a problem, chemical control involves soil fumigation or application of one of the organophosphates, including Nemacur, Mocap or Dasanit/Disyston. Check labels for restrictions before applying these products.

Kabana said turf managers can also build up organisms in the soil which destroy nematodes. A new product called ClandoSan stimulates the growth of normal soil microorganisms that destroy nematodes and their eggs in seven to ten days. The soil must be biologically active (not sterile) for the product to work. That means it can't be frozen or dry and must contain normal microbes.

Sports turf managers should insist upon sod grown on fumigated fields to avoid nematode problems. "You never eradicate them," says Kabana, "you can only reduce their population. Soil should be tested three times each season for nematode counts."

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NFL PLAYERS BARGAIN FOR BETTER FIELD STANDARDS

The National Football League Players' Association (NFLPA) has not dropped its demand for a moratorium on new outdoor artificial turf stadiums and better standards for those that exist in negotiations with the NFL Management Council. The two sides have yet to reach an agreement on a contract as the opening of the new season nears.

During negotiations last fall, the NFLPA introduced a "natural turf clause" designed to tackle what it sees as an increased exposure to injury caused by the artificial surfaces. Doug Allen, assistant executive director of the NFLPA, says, "Our analysis shows that more players are hurt on turf (artificial) than on grass. The legs wear out and players get burns. The injuries are more severe and it takes longer to recover from them." He went on to criticize the padding as insufficient and the maintenance as poor.

Allen says the issue is currently on the table. But John Jones, NFL Management Council public relations director, doesn't see the topic as a major stumbling block in the negotiations. He stated, "They (NFLPA) indicated in the opening bargaining sessions that it's not a priority," he says. Jones reports that management's position is that it supports further study.

NCAA SURVEY REVEALS NO DIFFERENCE IN INJURIES

The results of a recent study by the National Collegiate Athletic Association (NCAA) reveal no significant difference in player injuries between natural and artificial turf. NCAA's Injury Surveillance System collected data in 1987 on injuries in Division 1-A football games. Fifteen schools were involved in the study, with those teams having played an even number of games on each surface.

The result was that there was no significant difference between injuries on natural grass and artificial turf. In fact, in terms of raw numbers, more injuries occurred on grass.

By no means should the NCAA study be taken as the final word on the subject, says Todd A. Petr, NCAA assistant director of research. He is unsure whether the sample size was large enough. Petr says the study will be done in expanded form this season.

WRIGLEY UPDATES IRRIGATION, ADDS LIGHTS

Ancient Wrigley Field, home of baseball's Chicago Cubs, has always been the envy of aesthetic-minded observers everywhere—not just for its ivy-covered walls, but also, among other things, for the deep green color of its grass.

In the past, maintaining that excellence took a lot of work, says Lubie Veal, assistant director of stadium operations for the Cubs. This year, he says, his unit is employing a system that will dramatically reduce labor input without sacrificing quality.

The Cubs contracted with Century Rain Aid (Elk Grove Village, IL) to develop a new sprinkler irrigation system. Century sold the Cubs on Rain Bird's new R-70 rotor, a large head that can be buried underground and offers easy arc adjustment on site with a screwdriver.

"We took their existing manual system, valved it off and provided them a fully automatic system around all grass areas," explains Jim Flannigan a Century Rain Aid sportsturf professional.

"With the automatic system they can now water their grass with much less labor. They used to send people onto the field to plug in the heads. Now, it's fully timed and automatic, but if they want to run it manually, they can turn it on from the controller."

There is doubt, on the other hand, about when the Cubs will become baseball's last team to employ lights for home games. Veal notes that no Wrigley night games have been scheduled yet, and that, though the lights have gone up, "it's too early and no one knows for sure when they'll be used."

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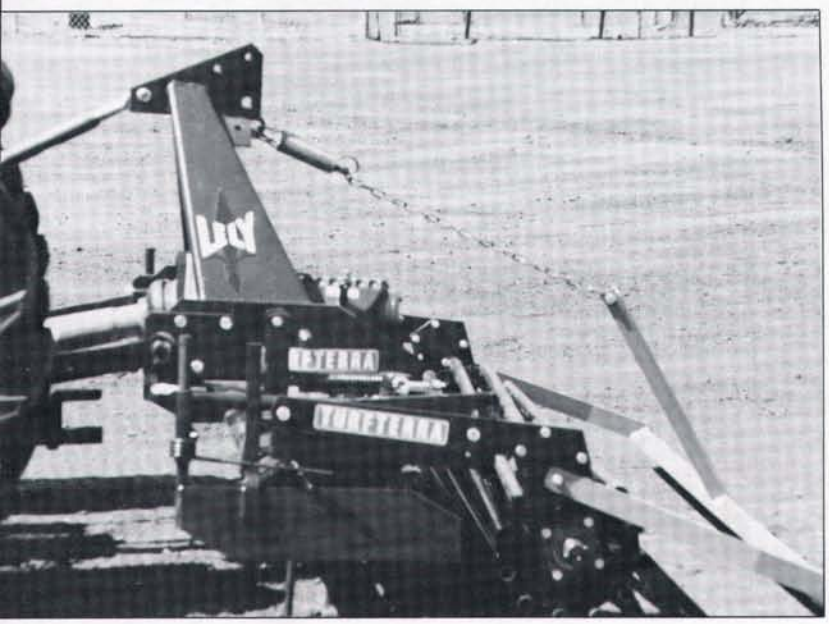

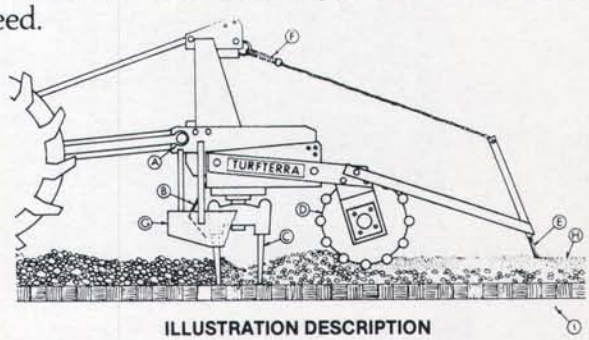

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Planting Santa Ana stolons in Los Angeles Coliseum. Photo courtesy: Steve Cockerham.

Renovating Hybrid Bermudagrass By Sprigging and Stolonizing

Like the ebb and flow of the tide, so goes the popularity of hybrid bermudagrass as a turfgrass for sports. Attempts to replace bermudagrass with tall fescue, zoysiagrass, perennial ryegrass, bahiagrass, bentgrass and even the more exotic seaside paspalum makes one wonder what is so terrible about the aggressive, warm-season grass?

If it's so bad why do some facilities in the northern limits of the transition zone have sod and stolons shipped in from southern sod farms in refrigerated trucks every spring knowing that winterkill is a possibility? Why are researchers trying so hard to find a bermudagrass that is more cold tolerant? The bottom line is nothing holds up to punishment better during the summer than hybrid bermudagrass. During the hot summer months the grass spreads like kudzu, quickly filling in where divots and cleats have done their damage.

Certainly hybrid bermudagrasses have their faults. At the height of the football season they want to go dormant. When baseball and soccer teams get started in late winter the hybrids are still drowsy with little energy to recover from injury or to fill in thin spots. By the time they are up and running, bermudagrasses on year-round sports turf may be so sparse that replanting is necessary to regain a dense stand.

The crux of the matter is that they are vegetative grasses in a field where managers like the convenience of seed, especially fast-germinating seed. If a seeded bermudagrass was available with the characteristics of the advanced hybrids and the germination rate of ryegrass, there would be no contest.

That, however, is not likely in the near future. If it's seed you want, your only current option is common bermudagrass. Commercial quantities of two improved, seed producing bermudagrasses are a few years away and they still don't appear to stack up against the likes of Tifway or Santa Ana.

In the meantime, sports turf managers are content to overseed dormant hybrid bermuda with annual and perennial ryegrasses and *Poa trivialis,* rough bluegrass. The overseeding and reseeding market has grown exponentially as the industry meets the demand for year-round cover and color. It's not unusual to hear a superintendent or athletic field manager speculate that perhaps it would be easier to maintain ryegrass, or even bentgrass on greens, throughout the summer than to switch from bermudagrass to ryegrass and back each year.

Some managers have strong opinions about the effects of ryegrass on spring transition of bermudagrass. They say the heavier you overseed and the longer you favor the ryegrass the harder it is on the bermuda. Some growers of hybrid bermudagrass sod in areas with moderate climates say that with proper management and controlled use, the bermuda doesn't need to be overseeded. Sports turf managers and turf experts in areas with more dramatic shifts in weather and temperature say the ryegrass surrenders quickly with the return of hot, humid weather.

But few turf managers south of the Mason Dixon line will dispute that hybrid bermuda takes the heat and the beating better in the summer than any other type of turfgrass. Few will also dispute the appearance and maintenance of ryegrass in the winter in the South. They know that attractive and durable year-round turf means two types of turf with two types of management.

Once the turf manager accepts the two-turf program, he commits himself to the overseeding process. He must adjust his herbicide program in the fall, he alters his irrigation schedule, he increases his fertilizer and fungicide budgets, and invests in the equipment and seed needed to sow and maintain winter turf. This is a sizable commitment requiring expertise and effort.

However, come the following spring, you find few sports turf managers making an equal commitment to restore the bermudagrass to top form. Fortunately, in many

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