TECH CENTER

Disease control in cool-season grasses

New fungicides and disease prediction models highlight this year's cool-season disease control update.

by Gail L. Schumann, Ph. D., University of Massachusetts

■ Before the current wide selection of fungicides was available, cultural methods were the mainstay of disease management. Today, cultural practices are still the foundation of disease management. Keep in mind, however, that resistant cultivars and biological controls will always perform best when integrated into a sound cultural program.

Stress factors—Cultural practices have two primary goals:

- minimize turf stress
- minimize opportunities for disease-causing pathogens to infect turf.

Stress can be reduced with balanced fertility and special attention to nitrogen levels. Most turf diseases are described as being either "low nitrogen," (dollar spot, red thread, anthracnose) or "high nitrogen" (brown patch, pythium blight, leaf spot). Stress reduction alone can raise or lower disease severity.

Soil factors such as drainage, pH, compaction and thatch are directly and indirectly involved in disease severity. The patch diseases (necrotic ring spot, summer patch, take-all patch) and pythium root disease are all associated with these stress factors. On putting greens, raising the mowing height, even temporarily, will reduce these and other diseases.

Summer patch breakthrough—Recent research at Rutgers University offers a new approach to summer patch control.

Summer patch is caused by a fungus that infects the roots. Ammonium sulfate, which reduces soil pH, reduces summer patch in Kentucky bluegrass and annual bluegrass. Ammonium fertilizers have been recommended for many years to reduce take-all patch of bentgrass, also caused by a similar root-infecting fungus.

Some factors—To achieve the second goal of minimizing disease-causing pathogens, temperature and moisture must be considered.

Many fungi grow best at certain temperatures, so the disease they cause often occurs at similar temperatures. Red thread and leaf spot are most common in cool weather, but pythium blight is observed only in very hot weather. Although turfgrass managers cannot control the weather, they can minimize moisture.

Fungi need water to live. The longer water remains on the leaf blade, the more severe most diseases will be. Here are some additional hints:

- For lawns and larger landscape areas, careful irrigation timing can minimize leaf wetness and reduce diseases. Pruning and thinning trees and other landscape plantings to increase air flow will help to dry turf quickly.
- Mow turf only when it is dry.
- On golf courses, remove dew by whipping or early morning mowing.

New fungicides—Two new fungicides are available for turfgrass. Flutolanil (Prostar 50WP, from AgrEvo) is labelled for diseases caused by basidiomycete fungi such as brown patch, fairy ring, gray snow mold, red thread/pink patch, southern blight and yellow patch.

Cyproconazole (Sentinel 40 WG, from Sandoz) is a new triazole fungicide in the sterol inhibitor (DMI) group. It has a broad label for many important turfgrass disease.

Some familiar fungicides will no longer be available for turfgrass managers after current supplies are exhausted. The makers of anilizine (Dyrene) and the mercury compounds will not seek re-registration.

Mercury compounds have been restricted-use products in a number of states. They were labelled only for snow mold on golf greens and tees.

Benomyl, which has been sold as Tersan 1991 and some other products, is no longer available for use on turfgrass.

Fungicide resistance—Resistance to disease control products is still of concern, even though the problem occurs primarily on golf courses where repeated fungicide applications are made. Resistance has been observed mostly where fungicides from the same chemical family were used repeatedly and exclusively. The most significant problems have been with pythium blight (with metalaxyl), dollar spot and pink snow mold (with fungicides from several chemical groups).

Observations of dollar spot resistance on golf courses to the sterol inhibitor (DMI) fungicides is becoming widespread, especially where DMI fungicides were used exclusively for control. Resistance is usually observed as a shortened control interval. Cyproconazole, fenarimol, propiconazole, and triadimefon—all in the DMI fungicide family—are not suitable alternatives to prevent or delay DMI resistance.

If you want to mix or alternate fungicides from different chemical families, consult specialists in your area. Some long-term studies at Penn State should mean improved recommendations on the use of reduced-rate mixtures of fungicides for improved efficacy and resistance management.

Disease prediction models—Where repeated fungicide applications are routine, such as on golf course greens, using disease prediction systems with computerized weather stations may minimize fungicide applications. Disease prediction models are available for anthracnose, brown patch, dollar spot and pythium blight.

A new brown patch prediction system from the University of Massachusetts uses air temperatures, soil temperatures, duration of high relative humidity and rainfall to predict brown patch outbreaks. Predictions are cancelled when air temperatures fall below 60° F within 48 hours of a prediction. Fungicide applications according to this forecasting system were reduced in university trials in Massachusetts, New Jersey, and Georgia compared to calendar spray schedules. A

continued on page 61

Table 1.

Disease control for cool-season turf

Disease name	Cultural control	Chemical control
Anthracnose	Fertilize, aerate, raise mower height, less water on leaf blades.	chlorothalonil, cyproconazole, fenarimol, propiconazole, thiophanate-methyl, triadimefon
Brown patch (rhizoctonia blight)	Avoid excess nitrogen and water; minimize water on leaf blades.	captan, chloroneb, chlorothalonil, cyproconazole, fenarimol, flutolanil, iprodione, mancozeb, maneb, PCNB, propiconazole, thiophanate-methyl, thiram, triadimefon, vinclozolin
Dollar spot	Fertilize, aerate, minimize water on leaf blades; use resistant cultivars.	chlorothalonil, cyproconazole, fenarimol, iprodione, mancozeb, maneb, PCNB, propiconazole, thiophanate-methyl, thiram, triadimefon, vinclozolin
Fairy ring	Core and water; mask symptoms with N or iron; in severe cases, remove soil or fumigate.	flutolanil, (See specialist for information on fumigants)
Fusarium leaf blight, crown and root rot	Avoid drought, minimize water on leaf blades; reduce thatch.	fenarimol, iprodione, mancozeb, thiophanate-methyl, triadimefon
Leaf spot melting out	Avoid excess N and water, minimize water on leaf blades, raise mowing height; use resistant cultivars.	captan, chlorothalonil, iprodione, mancozeb, maneb, PCNB propiconazole, vinclozolin
Necrotic ring spot	Avoid water and fertility stress, aerate. Reduce thatch; use resistant culitvars.	fenarimol, cyproconazole, iprodione, thiophanate-methyl
Powdery mildew	Improve air flow, reduce shade; avoid excess nitrogen.	fenarimol, cyproconazole, mancozeb, propiconazole, triadimefon
Pythium blight	Avoid excess N; improve drainage. Don't water at night or mow in wet weather.	chloroneb, ethazol, fosetyl-Al, mancozeb, metalaxyl, propamocarb
Pythium root rot	Improve drainage, areate, raise mowing height.	ethazol, propamocarb
Red thread/pink patch	Fertilize, avoid low pH, minimize water on leaf blades. Use resistant culitvars.	chlorothalonil, cyproconazole, fenarimol, flutolanil, iprodione, mancozeb, propiconazole, thiophanate-methyl, triadimefon, vinclozolin
Rust	Fertilize, aerate, avoid water stress and mimimize water on leaf blades. Use resistant cultitvars.	chlorothalonil, cyproconazole, flutolanil, mancozeb, maneb, PCNB propiconazole, triadimefon
Slime molds	Minimize water on leaf blades. Hose or rake away mold.	no fungicide necessary
Snow molds		
Typhula blight (gray snow mold)	Let turf go dormant; mow until growth stops; minimize length of snow cover.	chloroneb, chlorothalonil, cyproconazole, fenarimol, flutolanil, iprodione, PCNB, propiconazole, thiram, triadimefon, vinclozolin
Fusarium patch	Same as Typhula blight control.	chlorothalonil, cyproconazole, fenarimol, iprodione, PCNB, propiconazole, thiophanate-methyl thiram, triadimefon, vinclozolin
Stripe smut	Buy smut-free seed. Avoid excess N in spring; avoid water stress in summer. Use resistant cultivars.	cyproconazole, fenarimol, flutoloanil, propiconazole, thiophanate-methyl, triadimefon
Summer patch	See necrotic ring spot. Raise mower height, lower pH with ammonium.	cyproconazole, fenarimol, propiconazole, thiophanate-methyl, triadimefon
Take-all patch	Improve drainage, lower pH with ammonium fertilizers; raise mower height; avoid P and K deficiency. Avoid using lime.	fenarimol
Yellow patch	Minimize water on leaf blades; avoid excess N. Reduce thatch.	flutolanil
Yellow tuft	Avoid excess N; minimize water on leaf blades; improve drainage. Mask symptoms with iron.	metalaxyl

NOTES: List reflects current pesticide labels. Check with your local specialists for specific recommendations. No product endorsement is impled, nor is discrimination intended against any materials. Every effort has been made to provide correct, complete and current information. Nevertheless, changes in pesticide regulations occur constantly, and human errors are possible. State restrictions also vary. These recommendations are not a substitute for pesticide labelling. Read and follow label instructions.

Source: Dr. Schumann

Table 2.

Scientific and trade names of turfgrass fungicides

Scientific name	Contact/Systemic	Common trade name
captan	C	Captain 80WP
chloroneb	C	Pro-Turf Fungicide V, Teremec SP, Terraneb SP
chloroneb + thiophanate methyl	C+S	Pro-Turf Fungicide IX
chlorothalonil	C	Echo, Daconil 2787, Thal-o-nil
cyproconazole	S	Sentinel
ethazol	C	Koban, Terrazole
fenarimol	S	Rubigan
fenarimol + chlorothalonil	S+C	Twosome
flutolanil	S	Prostar
fosetyl-al	S	Aliette
iprodione	S+C	Chipco 26019 Chipco Flo, Proturf Fungicide X
mancozeb	C	Dithane, Fore Fore Flo, Mancozeb
maneb	C	Maneb, Maneb Plus Zinc
metalaxyl	S	ProTurf Pythium Control, Subdue
metalaxyl + mancozeb	S+C	Pace
PCNB	C	PCNB, ProTurf FF II, Penstar, Terraclor
propamocarb	S	Banol
propiconazole	S	Banner
thiophanate-methyl	S	Cleary's 3336, Fungo, ProTurf Systemic Fungicide SysTec 1998
thiophanate-methyl+ chlorothalonil	S+C	ConSyst
thiophanate-methyl + mancozeb	S+C	Duosan
thiram	C	Spotrete, Thiram
triadimefon	S	Bayleton, Lebanon Turf Fungicide, ProTurf Fungicide
triadimefon + metalaxyl	S	ProTurf Fungicide VII
triadimefon + thiram	S+C	ProTurf Fluid Fungicide II
vinclozolin	S	ProTurf Fluid Fungicide III, Curalan, Touche, Vorlan

Not all products are available in all states.Some products available only to licensed pesticide applicators. This list is presented for information only. No endorsement is intended for products listed, nor criticism meant for products not mentioned.

Source: Dr. Schumann

Disease control in warm-season grasses

Turfgrass disease is caused by fungi, bacteria, viruses or nematodes. Balance chemical applications with cultural controls, in the interest of efficiency and economy.

by Bruce Martin, Ph. D., Clemson University

■ The wide variety of warm-season turfgrass diseases makes it imperative that chemical applications be based on correct diagnosis, in the interest of efficiency and economy.

Turf managers should strive to use integrated systems of disease management compatible with good turf horticultural practices. Pesticide applications should only be used to supplement the overall integrated pest management system.

Brown patch—Caused by *Rhizoctonia* fungi, brown patch is most commonly caused by *R. solani,* although other species have been implicated. Overall, brown patch is the most common and damaging warm-season turf disease. It attacks bermuda, St. Augustinegrass, centipedegrass and zoysia.

Its symptoms appear in spring, as the turfgrass breaks out of dormancy, or in the fall, as the turfgrass nears dormancy.

Individual patches of diseased turf may develop to 20 or more feet in diameter. Shoots along the outer border of patches usually are yellow due to rotted leaf sheaths near the soil surface.

Control practices include good drainage and judicious irrigation practices. Avoid high nitrogen fertilization at those times when the disease is likely to appear. Several labeled fungicides provide good control when applied on a preventive fall schedule when symptoms first appear.

The new fungicide, Prostar, has shown

WARM INSECT *from page 33*

occured when tawny mole cricket mating flights had begun in many parts of the Southeast.

Coupled with a spring drought, these early season conditions influenced egg laying and egg hatch. In 1993, in many areas, there was no distinct "peak" tawny mole cricket hatch, and hatching extended well into July.

The spread of imported fire ants is limited by cold weather. Fire ant reproductives (males and females that reproduce) fly, mate and queens form new colonies primarily in the spring and fall after rain showers.

A cool, extremely wet or very dry spring may delay new colony development until conditions are more favorable.

Chemical control—Mapping areas of pest activity may narrow both treatment areas and amount of pesticide needed. Grubs and mole crickets usually reinfest the same "preferred sites" each year.

Timing is at least as important as the insecticide you choose. Most pest activity is influenced by soil and air temperature, moisture and life stage. So keep monitoring records: when insects first hatch, species and life stage, damage, and an overall evaluation of the turf quality.

Subsurface placement of some insecticides results in the same level of mole cricket and grub control with half the rates of surface applications.

Improvements continue for placing both liquid and granular insecticide below the soil surface for treatment of mole crickets and grubs. Subsurface placement of some insecticides results in the same level of control with half the rates of surface applications.

With subsurface applications, you have:

- fewer surface residues, which decrease the potential for runoff and human exposure;
- less potential for ULV breakdown; and
- placement close to the pests provides control with less product.

Saturated and poorly drained soil, however, and extremely hot and humid weather influence the effectiveness of liquid injection applications.

Remember also that the pH of the spray water may influence the effectiveness of any insecticide spray applications. Some insecticides—like trichlorfon (Proxol or Dylox) acephate (Orthene) and isazophos (Triumph)—break down in high pH water. Use a commercial buffer to lower the pH of the water to 5.5 to 6.0 before adding one of these insecticides.

Pre-treatment irrigation may make the difference between success and failure during dry, hot periods. Pre-treatment watering does not replace watering after insecticides are applied. Rather, it moves soil pests closer to the surface, making contact with the insecticide more a possibility.

New products include:

- **Turplex** bioinsecticide (azadirachtin), registered for control of surface-feeders (Scotts ProTurf).
- **Vector WG** *(s. glaseri)* for white grub control; **Vector MC** *(s. riobravis)* for mole cricket control (Lesco).
- Mole cricket infecting nematodes (Biocontrol).
- **Exhibit** *(s. carpocapsae)* contains parasitic nematodes for control of billbugs, cutworms and sod webworms (Ciba T&O), as does **Vector TL** (Lesco).
- **Merit** (imidacloprid) is registered for turf (except on sod farms) and landscapes, including white grub control (Miles).
- **Scimitar** for control of several surface-feeders, chinch bugs and mole crickets (Zeneca).
- **Mainstay** (fonofos) for control of grubs, mole crickets, billbugs and others (Lesco).
- **Dylox** is now available as 6.2 formulation (AgrEvo, formerly NorAm).
- **Pageant DF** is a dry, flowable chlorpyrifos product. **Talstar** has received several state registrations (24c's) for fire ant, or fire ant and mole cricket control (FMC).

—Pat Cobb is professor of entomology at Auburn University, Ala.

CULTURAL CONTROL

Integrating a cultural pest management program is neither easy nor inexpensive, but on-going industry research indicates that it can be a viable option to offer customers.

A knowledge of pest history at a site and knowledge of potential insect pests specific to location are important only in the context of frequent inspection of the turf. Proper fertilization, mowing and water use promote healthy turf which can recover quicker from pest damage. Thatch management may discourage development of some pests or enhance pesticide performance when properly timed treatments are necessary.

COOL DISEASE *from page 26*

prediction system for brown patch on perennial ryegrass has recently been developed at the University of Maryland.

Forecasts based on environmental conditions can help apply fungicides only when they are needed. They are particularly useful for extending spray intervals and eliminating applications when conditions approach, but do not quite reach those necessary for a severe disease outbreak.

They can help take the guess work out of fungicide applications and provide scientifically-based documentation for application decisions.

Genetic resistance—Breeding programs continue to offer new turfgrass cultivars with improved disease resistance. Where disease problems occur repeatedly, consider overseeding with blends and mixtures of improved cultivars. As with many kinds of biocontrol, genetic existence usually works for a single disease problem. That is why blends and mixtures are usually the most appropriate approach to healthy turfgrass. Genetic resistance is most effective when it is integrated with cultural practices and the judicious use of fungicides.

—Dr. Schumann is an associate professor of turf pathology at the University of Massachusetts, Amherst.