ty of reasons.

CROSSFIRE
TURF-TYPE TALL FESCUE

Crossfire turf-type tall fescue is the only strategy you need for battling a summer ambush of heat and drought. Crossfire is a lower and slower growing variety of tall fescue that exhibits a very dark green color. It combines improved heat and drought tolerance with outstanding turf quality to produce a dense and durable turf. Crossfire's high marks in overall performance during its initial evaluation proved it was ready for the field. Let Crossfire show you how to endure a long summer siege.

SPARTAN
HARD FESCUE

Spartan is a robust, advanced generation of hard fescue that is dark green, leafy, and persistant. It demonstrates excellent cold tolerance and creates attractive, low growing, low maintenance turf. Spartan mixes well with perennial ryegrass, Kentucky bluegrass, and other fine fescues. It is an outstanding component in many shady and low maintenance mixes suited for use on home lawns, parks, and golf course roughs.

AMERICA
KENTUCKY BLUEGRASS

America is a low maintenance Kentucky bluegrass that has a dense dwarf growth habit, dark green color, excellent disease resistance, and good shade tolerance. Perfect in mixes, America is ideal for golf course fairways, sod production, playing fields, and home lawns.

Pickseed also produces the following quality turfgrass varieties: Agram chewings fescue, Jasper creeping red fescue, Jazz perennial ryegrass, Alpine Kentucky bluegrass, Exeter colonial bentgrass, and National creeping bentgrass.

SHORTSTOP
TURF-TYPE TALL FESCUE

Shortstop is the little guy with big benefits. As its name implies, Shortstop is a slower and shorter growing variety of turf-type tall fescue. But don't let its stature fool you. Shortstop is plenty tough. It has heat and cold tolerance, disease resistance and is widely adapted. Shortstop forms a beautiful, dense, uniform turf of finer, darker green leaves.

BRONCO
Kentucky Bluegrass

Bronco is a very wide bladed Kentucky bluegrass that was developed specifically as a mix companion for turf-type tall fescue. While its texture and color gives it the appearance of a tall fescue, the comparison between the two ends there. Bronco is elite Kentucky bluegrass all the way. Its been bred to be less dense so it won't crowd out tall fescue and yet still aggressive enough to fill in and repair damaged areas quickly. That's what makes Bronco ideal for sports turf use.

Pickseed products are distributed throughout North America by quality seed suppliers.

PICKSEED®
PICKSEED WEST Inc.
P.O. Box 888 • Tangent, Oregon 97389
(503) 926-8886

Circle No. 141 on Reader Inquiry Card

DISEASES OF TURFGRASSES

Old reliable disease control methods—resistant species, culture and chemistry— are joined by the new kids on the block, bio-rational controls.

by Peter Landschoot, Ph.D., Pennsylvania State University

Diseases continue to be limiting factors in successfully managing quality turf. Despite the best efforts of plant pathologists, turfgrass breeders and vigilant turf managers, large numbers of lawns and golf courses are damaged by diseases each year.

While the pathogens which cause these diseases cannot be eliminated from turf, in many cases it is possible to manage them to tolerable levels. This, however, requires an understanding of the plants as well as the pathogens which parasitize them.

The first step in managing a turfgrass disease is to obtain an accurate diagnosis. While this is a straightforward task with turfgrass pests that are relatively easy to observe (weeds and insects), the pathogens which cause turf diseases are usually only visible under a microscope.

Occasionally, turfgrass pathogens produce large fruiting structures (mushrooms for example), or massive amounts of spores and mycelium which can be seen without a microscope. More often, symptoms (the expression of the plant to the disease) are used as diagnostic features.

Symptoms of turfgrass diseases can take on a variety of sizes, shapes, and colors. On individual plants they may appear as small, circular, tan-colored lesions surrounded by brown or purple halos on leaves; as a yellowing of the entire leaf blade; or as a brown or black rot of the crowns and roots. Symptoms can also be observed on populations of plants. They may take the form of circular patches, rings, or irregular areas of blighted turf.

Symptoms of leafspot on Kentucky bluegrass. Note the dark brown halos encircling the lesions. Photo courtesy of N. Jackson.

Once an accurate diagnosis has been made, the next step is to devise a control strategy. Traditionally, disease control strategies have been grouped into four categories: cultural control; chemical control; disease-resistant species and varieties; and the newest category, bio-rationals (biological control).

Cultural controls

Cultural control measures should be the first line of defense against turf diseases. They are geared toward modifying the environment of the turfgrass stand. Cultural practices which play a role in the development of turf diseases include mowing, fertilization, liming or acidifying the soil, irrigation, thatch removal, aerification, and any other practice which modifies the turf environment.

Mowing practices have a strong influence on turfgrass diseases. Every time a mower removes leaf tissue, a wound is created through which a pathogen may enter the plant. Also, guttation fluids can accumulate at the cut leaf tip and provide a food source for some pathogens. In some cases, mowers may actually spread the pathogen from one location to another.

Mowing below the height at which the turfgrass species is best adapted can place stress on the grass and make it more susceptible to some diseases (especially during the summer months). To reduce the potential for increased disease injury, mow at the height recommended for the species

IPM: A CONCEPT FOR DISEASE MANAGEMENT

Integrated pest management (IPM) can be defined as using all available tools, including cultural practices, pesticides, resistant species and varieties, and bio-rationals, to manage pests below an economic or aesthetic threshold level.

A well-planned and executed IPM program should result in suppressing the target pest with minimal impact on non-target organisms and the environment.

An IPM program for managing turfgrass diseases begins by accurately identifying the disease. If the signs and symptoms cannot be distinguished by casual observation, a sample should be submitted to a diagnostic lab for positive identification. Some turfgrass managers have purchased microscopes to improve the precision of disease diagnosis while others have used antibody-based diagnostic kits for identifying some foliar diseases (see Shane, LANDSCAPE MANAGEMENT, June 1989).

Once the disease has been diagnosed, an economic or aesthetic threshold of disease injury should be established. The threshold level is the point at which further disease injury cannot be tolerated. Once this level have been reached or exceeded, control measures are warranted.

Threshold levels will vary depending on how the turf is used (golf course greens, for example, will be adversely affected by even a small amount of disease damage while considerably more disease injury can be tolerated on low maintenance turf). The site should be monitored on a regular basis to determine when the threshold level is reached.

The coordination of several management practices determines the success of an IPM program. These practices must be compatible with a sound turf management program and be practical as well as cost effective. IPM will undoubtedly become increasingly important in the future as more restrictions are placed on the use of pesticides. By adapting the IPM concept now, the effective management of turf diseases will be an easier task in the future.

—Dr. Landschoot□

you are attempting to manage. Also, maintain a sharp cutting blade to prevent leaf tissue from tearing and shredding, and refrain from mowing when the turf is under heat or drought stress.

Fertilization is an important factor in the development of turfgrass diseases.

Some pathogens favor lush, succulent leaf growth that may occur as the result of heavy applications of nitrogen fertilizer. Diseases that are favored by excessive applications of nitrogen fertilizer include leaf spot, brown patch, pythium blight, stripe smut, and the snow mold diseases.

Certain diseases are more prevalent under low fertility. Nitrogen-deficient turfgrass plants are more susceptible to dollar spot, red thread, pink patch, and the rust diseases.

The soil pH has an important role in managing at least two diseases: microdochium (fusarium) patch and take-all patch. Both diseases are serious problems on golf course turf that tend to be favored by a high pH (7.0 or above). Studies have shown that applying acidifying fertilizers (such as ammonium sulfate and ammonium chloride) or sulfur can lower the pH of the soil and suppress these diseases. This is especially important for take-all patch since it is not readily controlled by fungicides.

While irrigation is essential during the summer to prevent drought damage, it can also contribute to disease problems. Most fungal pathogens require free water to initiate the infection process. Watering at night should be avoided since it leaves a film of water on the plants for an extended period of time. Watering should be performed early in the morning during periods of disease activity.

Thatch is the tightly-bound layer of dead and living stems and roots that develops between the zone of green vegetation and the soil surface. A moderate amount of thatch can insulate the turf canopy from the soil and provide resiliency on sports turf. Too much thatch can prevent wetting of the soil and result in drought-stressed turf which is more susceptible to some diseases.

Thatch can also provide a habitat for disease organisms and bind pesticides before they reach the target pathogen. A regular thatch reduction program is essential to manage diseases.

Soil physical properties can greatly affect the health and performance of turfgrasses. Soil compaction leads to poor infiltration and reduced oxygen diffusion into the root zone. Some root and crown diseases such as summer patch and anthracnose are frequently associated with compacted and poorly-drained soils on putting greens.

Aerifying compacted and wet soils allows improved rooting, thus, increased resistance to root diseases.

Chemical control of turfgrass diseases is usually accomplished by using fungicides. Turf fungicides can be divided into two broad categories: (1) contact fungicides and (2) systemic fungicides (Table 2).

White mycelium on turf in the early morning is a sign of the pathogen which causes dollar spot disease (*Sclerotinia homoeocarpa*).

Chemical controls

Contact fungicides are generally applied to the leaf and stem surfaces of turfgrasses. They do not move appreciably within the plants. Hence, these materials may be washed or mowed off the plant surfaces. Consequently, they are only effective for short durations (usually 7 to 14 days) and do not protect new foliage. These fungicides are usually used to control foliar diseases and not root/crown diseases. As a group, contact fungicides, with a broad spectrum of control, have been used extensively in the turf industry for a number of years.

see disease on page 34

TABLE 1.
DIAGNOSTIC FEATURES ON SOME COMMON TURFGRASS DISEASES.

DISEASE	CAUSAL AGENT(S)	SYMPTOMS/SIGNS	SUSCEPTIBLE GRASSES
Anthracnose	Colletotrichum graminicola	Yellowing of leaf blades associated with a black crown rot. Pin cushion-like fruiting bodies with small, spiney projections can be seen with a hand lense.	Annual bluegrass, bentgrasses, and fine fescues.
Brown patch	Rhizoctonia solani	Large, circular brown patches or thinning of turf. On low-cut turf, patches often surrounded by dark rings. White, cottony mycelium may be present on high-cut turf in early morning.	Bentgrasses, ryegrass, tall fescue, St. Augustinegrass, and zoysiagrass.
Dollar spot	Lanzia spp. Moellerodiscus spp. (sclerotinia homeocarpa)	Small, bleached patches of dead grass appear in turf. Lesions on leaves are white, often with brown borders. White, cottony mycelium may be present on dew-covered turf in early morning.	All cool- and warm-season turfgrasses.
Fairy ring	Basidiomycete fungi	Dark-green rings become apparent in mature turf. Mushrooms often present around periphery of ring.	All cool and warm season turfgrasses.
Gray leaf spot	Pyricularia grisea	Oblong leaf spots that are brown or tan in the center with purple or brown halos. Severely affected plants appear scorched.	St. Augustinegrass
Leaf spot/melting out	Drechslera and Bipolaris spp.	Small tan lesions with purple or brown borders on leaf blades. In severe cases, the crowns are rotted and the turf may be significantly thinned.	Primarily Kentucky bluegrass. Other cool- and warm-season grasses may be affected.
Necrotic ring spot	Leptosphaeria korrae	Large ring-shaped patches, usually creating depressions in turf. Roots and crowns show brown or black rot.	Primarily Kentucky bluegrass. In some cases, fine fescues and annual bluegrass.
Powdery mildew	Erysiphe graminis	White, fluffy mycelium on leaf blades, usually present on turf growing in shaded areas.	Kentucky bluegrass and Bermudagrass.
Pythium blight	Pythium aphanidermatum & other Pythium spp.	Irregular patches of blighted turf. White, dense, cottony mycelium growing in turf in morning.	Perennial ryegrass, bentgrasses, tall fescue.
Red thread/ Pink patch	Laetisaria fuciformis/ Limonomyces roseipellis	Small red to pink patches of blighted turf. Long, slender threads of red mycelium (red thread), or fluffy, pink mycelium (pink patch) growing out of foliage.	Fine fescues, perennial ryegrass, Kentucky bluegrass.
Rust	Puccinia spp.	Yellowing of leaves often apparent. Brown pustules occurring on leaves and stems.	Tall fescue, perennial ryegrass, Kentucky bluegrass, zoysiagrass, and bermudagrass.
Slime molds	Myxomycetes	Blue or tan-colored spore-like structures on leaves.	All cool- and warm-season turfgrasses.
Snow mold (gray)	Typhula incarnata	Large patches of matted turf appearing at snow melt. Gray mycelium and orange resting structures often present on affected foliage.	All cool-season turfgrasses.
Snow mold (pink)	Microdochium nivale	Small patches of matted turf with pink or reddish color on the leaves.	All cool-season turfgrasses.
Spring dead spot	Leptosphaeria korrae, Ophiosphaerella herpotricha, or Gaeumannomyces graminis.	Large ring-shaped patches, often creating depressions in turf. Roots, crown and stolons show brown or black rot.	Bermudagrass
Stripe smut	Ustilago striiformis	Black streaks of spores along length of leaf blades. Shredding of leaf blades.	Kentucky bluegrass and bentgrass.
Summer patch	Magnaporthe poae	Large yellow or tan ring-shaped patches. A root and crown rot is usually apparent.	Bluegrasses and fine fescues.

Source: Dr. Landschoot

Look closely at this course. No dollar spot in sight. Not even resistant dollar spot, thanks to Rubigan.

Rubigan controls dollar spot on your tees, greens and fairways for only about 10 cents per 1,000 square feet per day. That's all. And you get a full 28 days control with just one 0.4 oz. application per 1,000 square feet.

Now look closer. Notice there's also no fusarium blight, necrotic ring spot, summer patch or take-all patch. And no large brown patch, either, with a Daconil 2787® tank mix.

Only Rubigan is labeled to prevent and treat all these harmful diseases. No wonder Rubigan is the superintendents' choice for dependable dollar spot control in all types of weather.

This year, make your course look this spotless. Make it dollar spotless with Rubigan. See your Elanco distributor. Or call toll-free: **1-800-352-6776.**

Elanco Products Company
A Division of Eli Lilly and Company
Lilly Corporate Center
Dept. E-455, Indianapolis, IN 46285, U.S.A.
Rubigan®—(fenarimol, Elanco)
Daconil 2787®—(chlorothalonil, SDS Biotech)

Circle No. 114 on Reader Inquiry Card

Dollar spotless.

TABLE 2.

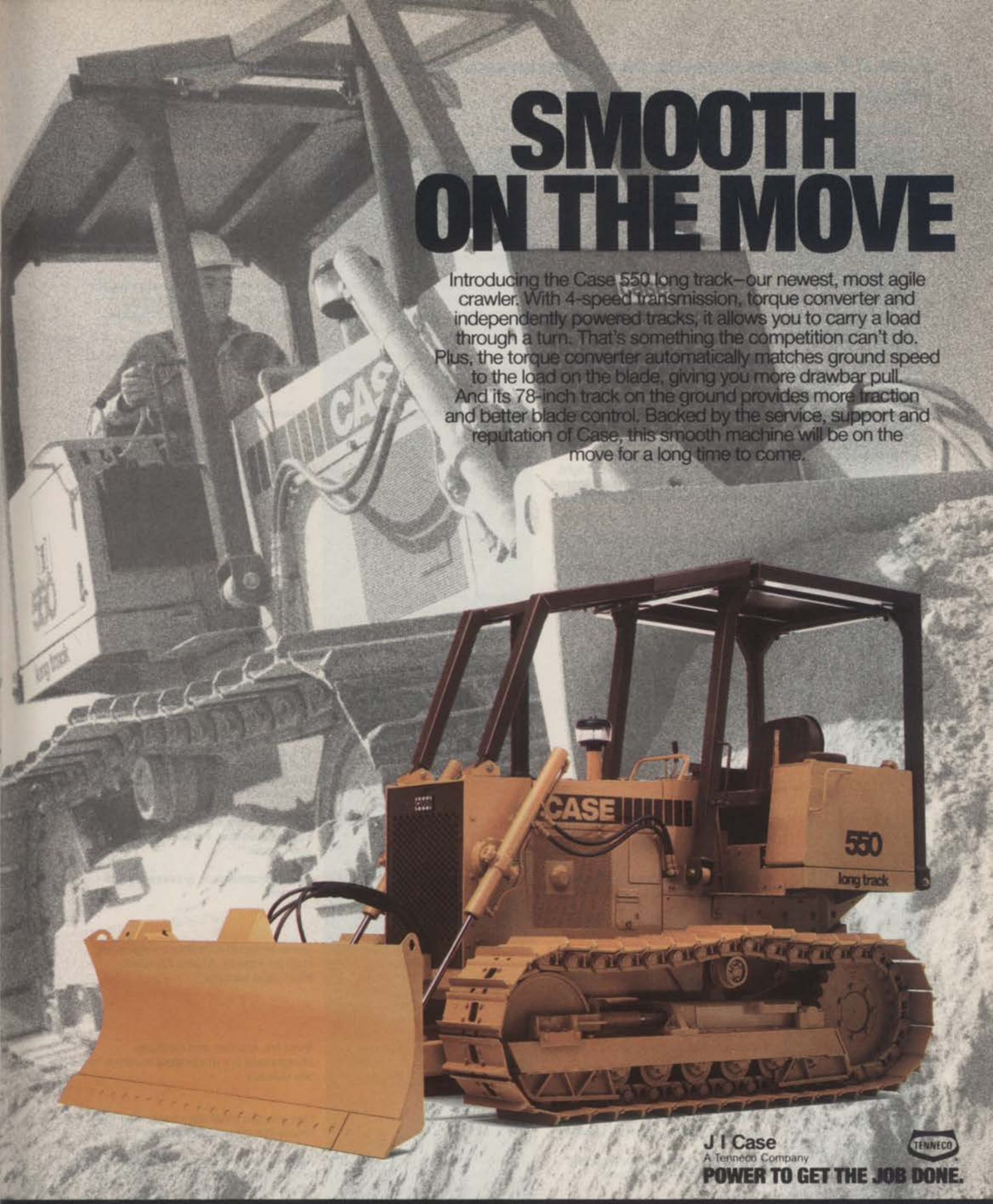
GENERIC & TRADE NAMES OF THE COMMON TURFGRASS FUNGICIDES

GENERIC NAMES	CONTACT (C) OR SYSTEMIC (S)	COMMON TRADE NAMES[1]
Anilazine	C	Dyrene
Benomyl	S	Tersan 1991, Lesco Benomyl, Lebanon Benomyl
Cadmium chloride	C	Caddy
Cadmium sebacate + thiram + potassium chromate	C + C	Kromad
Cadmium succinate	C	Cadminate
Chloroneb	C	Tersan SP, Teremec SP, Proturf Fungicide II
Chlorothalonil	C	Daconil 2787
Ethazol (etridiazole)	C	Koban, Terrazole
Fenarimol	S	Rubigan
Fosetyl-Al	S	Aliette
Iprodione	S	Chipco 26019, Proturf Fungicide VI
Mancozeb	C	Fore, Formec, Dithane F-45, Lesco Mancozeb, Manzate 200 DF
Maneb	C	Dithane M-22
Maneb + zinc sulfate	C + C	Tersan LSR, Dithane M-22 w/Zinc, Lesco 4 F w/Zinc
Mercury chloride	C	Calo-Clor, Calo-Gran
Metalaxyl	S	Subdue, Proturf Pythium Control
Metalaxyl + mancozeb	S + C	Pace
Pentachloronitrobenzene (quintozene)	C	Terraclor, Turfcide, Proturf FF II, Lesco PCNB
Phenylmercuric acetate	C	PMAS
Phenylmercuric acetate + thiram	C + C	Proturf Broad Spectrum Fungicide
Propamocarb	S	Banol
Propiconazole	S	Banner
Thiophanate-ethyl + thiram	S + C	Bromosan
Thiophanate-methyl	S	Fungo 50, Spot-Kleen, Clearys 3336, Topsin M, Proturf Systemic Flugicide
Thiophanate-methyl + mancozeb	S + C	Duosan
Thiophanate-methyl + iprodione	S + S	Proturf Fluid Fungicide
Thiram	C	Tersan 75, Spotrete, Thiramad, Lesco Thiram
Triadimefon	S	Bayleton, Proturf Fungicide VII, Lebanon Turf Fungicide
Triadimefol + metalaxyl	S + S	Proturf Fluid Fungicide II
Triadimefon + thiram	S + C	Proturf Fluid Fungicide III
Vinclozolin	S	Vorlan
Zineb	C	Zineb

[1]Products may be available only through specialized dealers or only in large quantity. Some products can be purchased and applied only by licensed pesticide applicators. This list is presented for information only. No endorsement is intended for products mentioned, or is criticism meant for products not mentioned.

SMOOTH ON THE MOVE

Introducing the Case 550 long track–our newest, most agile crawler. With 4-speed transmission, torque converter and independently powered tracks, it allows you to carry a load through a turn. That's something the competition can't do. Plus, the torque converter automatically matches ground speed to the load on the blade, giving you more drawbar pull. And its 78-inch track on the ground provides more traction and better blade control. Backed by the service, support and reputation of Case, this smooth machine will be on the move for a long time to come.



J I Case
A Tenneco Company
TENNECO
POWER TO GET THE JOB DONE.

case

Circle No. 105 on Reader Inquiry Card

TABLE 3.
METHODS OF DISEASE CONTROL

DISEASE	CULTURAL	CHEMICAL	RESISTANT SPECIES/ VARIETIES
Anthracnose	Fertilize to maintain vigor, improve drainage, verify, and raise mowing height during periods of heat stress.	benomyl, chlorothalonil, mancozeb propiconazole, triadimefon	Bentgrasses are less susceptible than annual bluegrass on putting greens.
Brown patch	Avoid excess N in summer, increase air circulation, avoid excessive watering.	anilazine, benomyl, chlorothalonil iprodione, manocozeb, maneb thiophanates, thiram, vinclozolin	Kentucky bluegrasses are less susceptible to brown patch than other turfgrasses.
Dollar spot	Avoid N deficiency, maintain good soil moisture, remove guttation and dew from leaf surfaces, avoid night watering.	anilazine, benomyl*, cadmium* chlorothalonil, fenarimol, iprodione mancozeb, propiconazole thiophanates, thiram, vinclozolin	Resistant Kentucky bluegrass varieties include Adelphi, America, Aspen, Challenger, Eclipse, Escort, Nassau, Somerset, & Wabash.**
Fairy ring	Use clean fill during establishment, improve water infitration, or mask symptoms with N-fertilizer or iron.	None effective, must fumigante with soil sterilant to eradicate the fungus (this will also kill grass).	No resistant species or varieties are available.
Grey leaf spot	Avoid excessive N fertilization and overwatering	chlorothalonil thiram	Perennial ryegrass is resistant.
Leaf spot/melting out	Avoid excess N applications in early spring, mow≥2″ in height, avoid light, frequent irrigation. Do not use benomyl, thiophanates, or triadimefon to control this disease.	anilazine, chlorothalonil, iprodione maneb, mancozeb, vinclozolin	Resistant Kentucky bluegrasses include: Adelphi, Bristol, Destiny, Eclipse, Enmundi, Glade, Ikone, Leberty, Majestic, Mona, P-104, Rugby, and Somerset.**
Necrotic ring spot	Manage turf for maximum root growth, irrigate to maintain good soil moisture, maintain mowing height at 2″ or above.	benomyl, fenarimol, propiconazole	Perennial ryegrasses are resistant.
Powdery mildew	Reduce shade and improve air circulation.	benomyl, fenarimol, propiconazole triadimefon	Use grasses adapted to shaded areas such as fine fescues and rough bluegrass. Resistant Kentucky bluegrasses include: A-34, Glade, Touchdown, & Eclipse.**
Pythium blight	Improve drainage, increase air circulation, avoid excess N, reduce irrigation.	chloroneb, etridiazole, metalaxyl* phosethyl, Al propamocarb	Kentucky bluegrass is less likely to be damaged by Pythium blight than other turfgrasses.
Red thread/ pink patch	Maintain adequate fertility of turf (especially N), remove and destroy clippings.	alilazine, benomyl***, cadmium chlorothalonil, iprodione propiconazole, thiophanates*** triadimefon, vinclozolin	Resistant perennial ryegrasss include: Allaire, Commander, Delray, Manhatten II, Palmer, Pennant, Prelude, Regal, Regency, SR 4000, SR 4100, and Yorktown II.**
Rust diseases	Avoid N-deficiency and drought-stress (especially in late summer/early fall)	maneb, mancozeb, fenarimol propiconazole, triadimefon	Some resistant Kentucky bluegrasses include: Kenblue, Parade, Rugby, A-34, and Classic**.
Slime molds	Remove spores by spraying water on leaves or brushing turf.	None required.	Not applicable since grasses are not infected.
Snow molds:			
Gray snow mold	Avoid excess N in fall before grass goes dormant, mow until top growth ceases in fall, prevent accumulation of snow in sensitive areas, rake up mats (patches) in spring to speed recovery.	Fungicides should be applied in late fall before snow cover. cadmium chloroneb fenarimol iprodione mercury fungicides PCNB thiophanates thiram triadimefon vinclozolin	Some resistant Kentucky bluegrasses include: Adelphi, Aspen, Enmundi, Plush, and Vantage**.
Pink snow mold	(Same as for gray snow mold)	benomyl, fenarimol, iprodione mancozeb, mercury, fungicides PCNB, thiophanates, thiram vinclozolin	Most fine fescues and Kentucky bluegrasses are moderately resistant to this disease.
Spring dead spot	Avoid low mowing heights, thatch, compaction, and excessive N fertility.	benomyl, fenarimol, propiconazole	Use grasses other than bermudagrass where this disease is a problem.
Stripe smut	Avoid excess N in early spring, avoid drought stress in early summer.	Apply fungicides in early spring or late fall, water-in for good root uptake. Benomyl, fenarimol propiconazole, thiophanates triadimefon	Ryegrasses, tall fescues, and the fine fescues are less susceptible to this disease than Kentucky bluegrass.
Summer patch	Avoid low mowing heights, reduce compaction, avoid overwatering in summer, and improve drainage.	benomyl, fenarimol, propiconazole thiophanates, triadimefon	Resistant Kentucky bluegrasses include Adelphi, Enmundi, Sydsport, and Touchdown.

* Resistance has been recorded.
** Based on National Turfgrass Evaluation Program and Penn State data. No endorsement of cultivars is intended for those mentioned, or is criticism meant for cultivars not mentioned. *** Controls red thread and not pink patch.

Source: Dr. Landschoot

BANOL®

Stops Pythium disease before it starts. . . or even after it's started

If you want to head off the major turf losses that can result from Pythium blight and damping-off, hire on BANOL® fungicide. Then simply apply it every 7 to 21 days when conditions are favorable for disease development. But what can you do if Pythium is already damaging your turf? Apply BANOL at the higher rates, and you'll soon have destructive Pythium diseases under control.

Unlike less-effective contact fungicides that can quickly be washed off by rain or irrigation, BANOL is systemic, so it keeps on working. BANOL is a key component in your resistance management rotation schedule. It is non-phytotoxic, non-leaching and compatible with other fungicides and insecticides.

NOR-AM

NOR-AM CHEMICAL COMPANY

A Schering Berlin Company

3509 Silverside Road. P.O. Box 7495. Wilmington, DE 19803

IMPORTANT: Please remember always to read and follow carefully all label directions when applying any chemical.

for a number of years.

Systemic fungicides are a newer group of chemicals which are absorbed and translocated within the plant. Thus, they are not as likely to be removed from the plant by rainfall and mowing. Systemics may protect the plants for a period of two to four weeks and will protect new growth.

Most systemic fungicides will control both foliar and root/crown pathogens. When attempting to control root/crown pathogens, systemic compounds should be watered into the rootzone for maximum effectiveness.

In general, systemic fungicides tend to have a specific mode of action, thus, they do not have as broad of a spectrum of control as contact fungicides.

Although fungicides are an effective management tool for many turf diseases, they have some drawbacks as well. In some cases, certain fungicides have been shown to promote turf diseases. One notable example involves an increase in leaf spot severity when benomyl or triadimefon is used.

Another potential problem associated with fungicide use is fungicide resistance. Fungi can become tolerant to fungicides when used in succession for long periods. Thus far, resistance has occurred in populations of several common turfgrass pathogens.

To prevent resistance from occurring, fungicides should be periodically alternated or used in mixtures with compounds possessing different modes of action.

Perhaps the primary reason for fungicide failure, however, is using the wrong fungicide because of a misdiagnosed disease.

Species selection

The third means of managing turfgrass diseases is by using disease-resistant species and varieties. While turfgrass breeders have made tremendous strides in developing grasses with improved disease resistance, no turfgrass is resistant to all diseases.

One way to increase the overall resistance of the turf stand is to plant mixtures of different grass species and/or blends of cultivars of an individual species. If one cultivar or species is damaged by a disease, the others will hopefully fill the voids left by its demise.

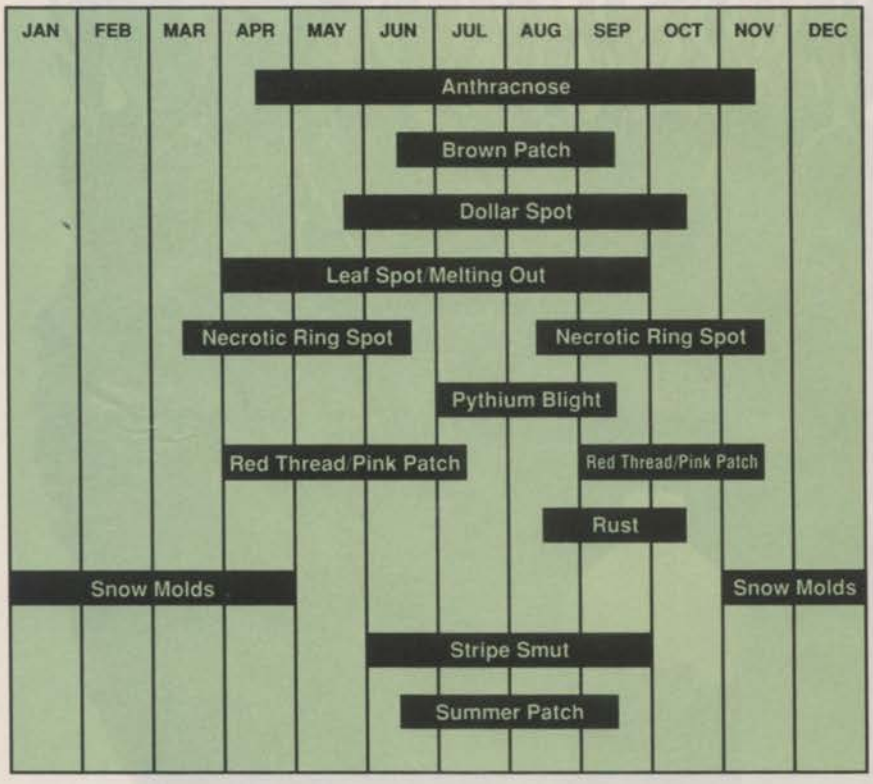
Bio-rational control

Using bio-rationals for controlling turfgrass diseases is relatively new. The most active area of research involves using organic fertilizers for disease suppression.

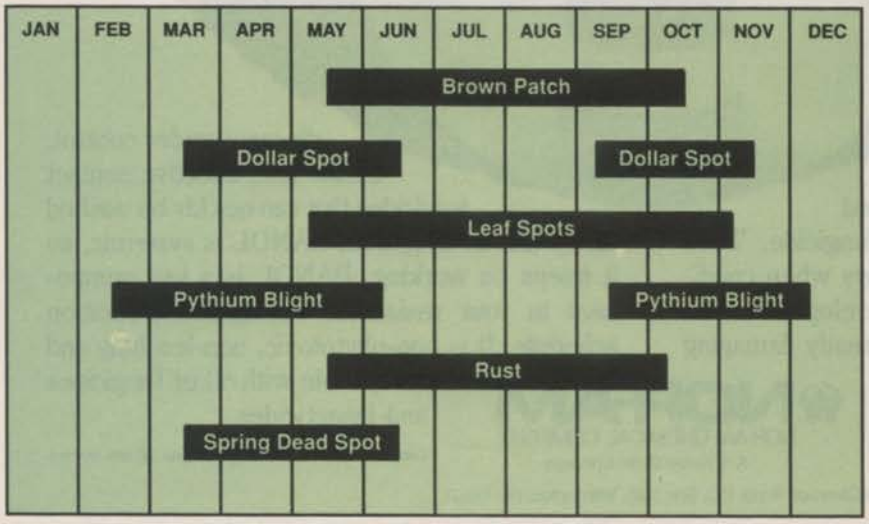
These products are thought to stimulate the development of microorganisms which antagonize turfgrass pathogens. Studies in some areas of the country have shown success with these compounds; however, further testing is required to substantiate their value in the consistent control of turfgrass diseases. **LM**

CALENDAR

COMMON DISEASES OF COOL-SEASON TURF



COMMON DISEASES OF WARM-SEASON TURF



Dr. Peter Landschoot is assistant professor of turfgrass science at Penn State University.