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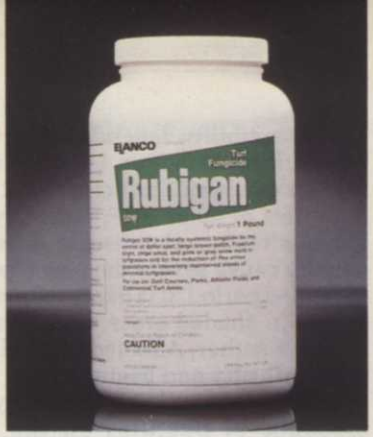

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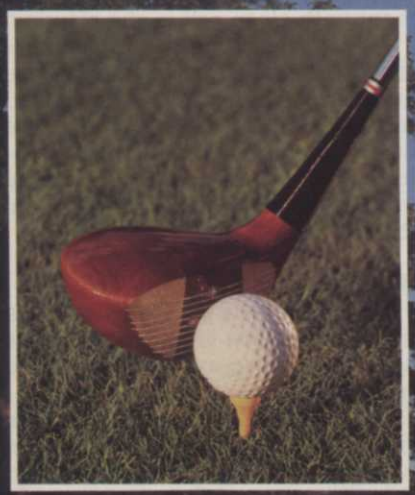

From sweet spot

...to dollar spot (!?%%!)

grasses.

Susceptibility depends on the variety. Fungus infection is favored by minimum and maximum temperatures of 50 to 70°F, respectively. For this reason, the disease does not usually cause severe damage over an extended period. It is likely to be more severe in shaded areas during rainy, humid weather. Affected turf will appear unthrifty and begin to thin.

The disease is characterized by the presence of pustules on the leaf blades. These pustules range from bright orange to cinnamon-brown in color, depending upon the species of fungus present.

Certain varieties of ryegrass are extremely susceptible to rust, and sometimes severe damage can occur. Zoysiagrass, especially Meyer and Emerald, are most severely infected by rust.

Fertilize to stimulate grass growth, mow on a four- to five-day schedule and catch clippings. If necessary, a fungicide may be applied to help reduce the amount of disease present. Triadimefon, chlorothalonil and mancozeb are effective in controlling rust.

Spring dead spot

Spring dead spot is a serious disease of Bermudagrass in certain parts of the upper sunbelt. It is found generally on Bermudagrass or zoysiagrass under high maintenance.

Damage to the turf apparently occurs during the dormant season. When green-up occurs in the spring, areas a few inches to several feet in diameter appear where the sod is completely dead.

Spring dead spot's causal agent has not been identified. The only control procedures recommended are good cultural practices and limiting the use of nitrogen fertilizer, especially late in the growing season.

Research has shown that fungicides can limit the damage. However, at the present time only benomyl and Rubigan are labeled, and these may be of limited use in certain states.

St. Augustinegrass decline

St. Augustinegrass decline (SAD) is caused by a virus. The symptoms are a mosaic-type chlorosis of the leaf blades that resemble nutrient deficiency or mite feeding. Evidently there are several strains of the virus since there is a great range in damage to St. Augustinegrass.

To this point, the disease has only been recorded in Arkansas, Texas, Louisiana and Mississippi. No chemicals are available for the control of SAD.

Several varieties of St. Augustinegrass, however, are resistant to the virus. These can be planted in areas where the disease is a potential problem. Floratam was the first variety released with resistance to SAD. It is also resistant to chinch bugs. It has poor cold tolerance and should be used only in the lower South. Seville is resistant to SAD and is more shade tolerant than common St. Augustinegrass. Raleigh has both SAD resistance and good winter hardiness.

No amount of fungicide will compensate for poor fertility and cultural practices. Knowing when the most common diseases occur will greatly assist landscape managers in scheduling fungicide application.

Downy mildew

Downy mildew of St. Augustinegrass was first described on common St. Augustinegrass in Texas in 1969. Since then the disease has spread and has been identified in Arkansas, Louisiana and Mississippi.

Downy mildew appears as white, raised, linear streaks that develop parallel to the mid-veins of the leaf. Streaks appear in the spring and remain throughout the summer, giving the leaves a yellow appearance with some death toward the tips. Severe disease occurs in grass grown in flood plains or poorly drained areas.

The white-streak symptom is easily confused with the virus disease, SAD. However, the virus symptoms are more yellow in color and more mottled than striped. Downy mildew has been difficult to control with most common turf fungicides. Good drainage is recommended for cultural control.

Fairy rings

Fairy rings generally appear in lawns and other turf areas as circles or arcs of dark green, fast-growing grass during the spring and early summer. A ring of thin dead grass may develop on one or both sides of this circle.

The disease is caused by one of several soil-inhabiting fungi that commonly produce mushrooms. Mushrooms that sometime appear in the ring are the fruiting bodies of these fungi. Stimulation of the grass is due to release of nutrients from the organic breakdown of the thatch by the growing fungus.

No chemicals are labeled for the control of fairy ring. Two general approaches may be considered: removal and suppression. Although relatively impractical, removing infected soil and grass to a depth of 12 inches or more in a band several feet on each side of the infected area and replacement with clean soil is one solution.

Another approach is to suppress the disease. For low-maintenance grass areas, increase the water and fertilization program to stimulate the declining grass inside the ring. Symptoms of fairy ring can be masked by pumping large quantities of water into this area.

Slime molds

Slime molds are a group of organisms that cover above-ground plant parts with a dusty gray-black or dirty yellow mass.

When you look closely at this growth, you see small round balls scattered over the plant. If you rub these between your fingers, a sooty powder emerges. This consists of spores of the fungus.

Slime molds do not feed on living plants. They only use them to assist distributing spores during reproduction. Slime molds occur during wet weather throughout the spring, summer and fall. They disappear rapidly as soon as it becomes dry. Chemical control is usually not necessary.

Nematodes

Although nematology is a fairly new field, it has seen rapid development in the past 10 years. Nematodes, small eel worms, belong to a group of microorganisms which scientists call obligate plant parasites. This term simply means that the organism lives and obtains its food only from living plants. This fact is both good and bad. On the good side, the nematodes very rarely kill the plants that they are feeding on. On the other hand, nematodes feed on the roots of the grass and take the nutrients that would normally be used by the grass. Also, this feeding activity destroys a portion of the root system and makes them much more susceptible to other disease organisms.

In many cases, increased fertilization and water will offset some of the symptoms of a light infestation of nematodes. However, this usually

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simply postpones the problem. Eventually a point is reached where no amount of water or fertilizer will substitute for the lack of a root system, and other steps must be taken to remedy the problem.

Normally, favorable conditions for turf development are also favorable for nematode development. This is particularly true in areas where highly maintained turf has a long growing season.

Heavy nematode infestation comes from an inadequate root system. Generally a yellowing or off-color of the foliage is the first symptom. This is followed by a general stunting and thinning out of the grass. Also, the turf frequently will wilt during the hot periods of the day and will respond little to fertilizer or water.

The only positive way to diagnose a nematode problem is to assay the soil around the root system of a plant. Laboratory techniques and assay procedures have been developed over the years to accurately detect not only the number of nematodes present but also the types of nematodes that are causing the problems.

A large number of different nematodes damage turfgrasses. Of course, some are more damaging than others and at different population levels. Usually in a random soil sample from a golf course or home lawn, several different types of plant parasitic nematodes may be present. For example, the single most damaging type of nematode found on Bermudagrass is known as the sting nematode (*Belonolaimus*). This very large nematode causes a great deal of mechanical damage to the root system, making it more susceptible to other types of problems.

The lance nematode (*Hoplolaimus*) is also very potent in its damage of turfgrass. The root-knot nematode (*Meloidogyne*) causes considerable damage to turfgrass. This nematode is probably best known on field crops, vegetables and on ornamentals. It causes galls and swelling of the root system, making it very easy to recognize. The lesion nematode and stubby root nematodes are also found frequently parasitizing grasses.

Ring nematodes have been found in well over 50 percent of the turf samples from the Southeast assayed by our laboratory. Other nematodes that are found in association with the unhealthy turf samples include stunt, dagger, and spiral nematodes. All of these are forms of parasitic nematodes that feed on turfgrass and probably cause some type of damage to the turf. However, they are not as economically damaging as are the first five mentioned.

Nematodes very seldom occur in an area as a single species but rather appear as mixed populations. Mixed populations normally compound the problem since each type contributes its share toward weakening the plant. Some guidelines can be set as to the amount of individual damage by nematode species; however, it is difficult to say how much damage occurs in these populations. This then becomes a matter of judgement.

Spring dead spots' causal agent has not been identified. The only control procedures recommended are good cultural practices and limiting the use of nitrogen fertilizer, especially late in the growing season.

What can be done to combat the high nematode population in turf? Several things can be done. First of all, grass should not be planted in areas where high nematode populations are already present. In other words, if high nematode populations are present in an area where you plan to plant grass, then they must be eradicated prior to seeding or sodding. This can be done by applying a soil fumigant or a nematicide. Also, turfgrass management personnel should insist upon nematode-free planting material.

As with any other type disease, prevention is much better than cure. However, measures can be taken if nematodes are present in established turf: apply a nematicide. A number of nematicides once used in turf are no longer available. All remaining nematicides have been placed on the "restricted pesticide" list and must be applied by a licensed applicator. These materials may be applied in a liquid or granular form, normally either in late spring or early fall.

Be sure to have soil analyzed for nematodes and get professional help *before* using a soil sterilant or nematicide. **LM**

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COOL-SEASON TURF DISEASES

Integrating new ideas and new tools with accepted knowledge and fungicides is the key to successful cool-season disease management.

by Dr. Bill Shane, Ph.D., Ohio State University

Cool-season turfgrass managers face a wide variety of diseases that reduce the quality of their grass. Choosing the proper strategies for managing these diseases depends greatly on being able to identify the disease.

Attention has centered recently on the subject of turfgrass patch diseases. Although much has been learned, confusion still remains in the minds of many turf managers when it comes to determining the cause of patches in their own situation.

This article will focus on the pathogens that infect primarily basal stem, crown and root tissues of plants. The diseases discussed here are summer patch, necrotic ring spot, take-all patch and yellow patch diseases of cool-season turfgrass.

Other diseases associated with patch symptoms, (brown patch, Pythium blight, copper spot) are primarily leaf, sheath, and basal stem problems.

A recent challenge to turf managers is determining the proper way to use the relatively new group of fungicides known as the sterol biosynthesis inhibitor compounds (SBI) (triadimefon, fenarimol, propiconizole).

Another new development is the availability of turf disease diagnostic kits. This is a rapid means to determine the cause of turf decline, but it requires some new thinking to use the tool properly.

As more information is gathered about patch diseases, it is becoming clear that not all patch diseases are prevalent in all areas where cool-season turfgrasses are grown. Necrotic ring spot has been common on Kentucky bluegrass in Washington, Colorado, New York, Wisconsin, and Minnesota but less common in Pennsylvania, Maryland and Ohio.

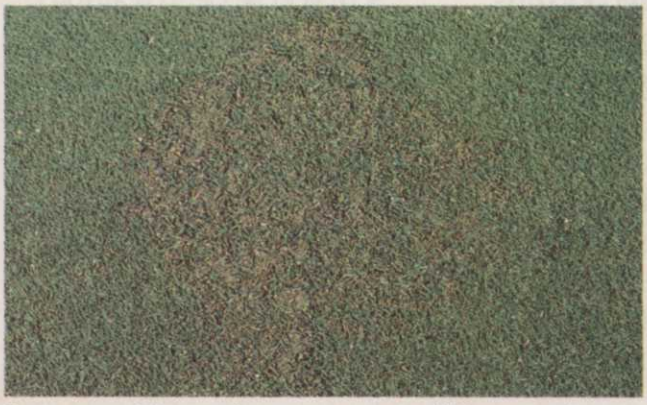
This disease may be prominent for a few years in a region but then become obscure. For example, necrotic ring spot became very scarce in Wisconsin during the summer of 1988, according to Dr. Gayle Worf of the University of Wisconsin.

Summer patch

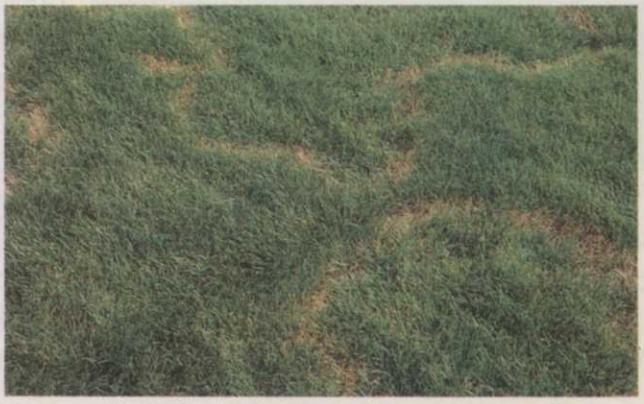
Summer patch, caused by the fungus *Magnaporthe poae*, is common in Kentucky bluegrass in Rhode Island, Maryland, New Jersey and New York, but apparently less so in other areas of the country. The region of the United States where summer patch is important is somewhat wider for the annual bluegrass form of the disease.

The disease has a fairly distinctive appearance on close-cut annual bluegrass/bentgrass greens. The annual bluegrass is affected whereas the bentgrass is essentially untouched.

Unfortunately, summer patch is difficult to distinguish from necrotic ring spot on Kentucky bluegrass. The most useful characteristic to distinguish the two diseases is that spots of summer patch on Kentucky blue-



Summer patch symptoms on an annual bluegrass/ bentgrass green. Only the annual bluegrass plants are affected.



Rings on Kentucky bluegrass in a lawn due to yellow patch, which is caused by *Rhizoctonia cerealis*. Photos courtesy of Dr. Shane.

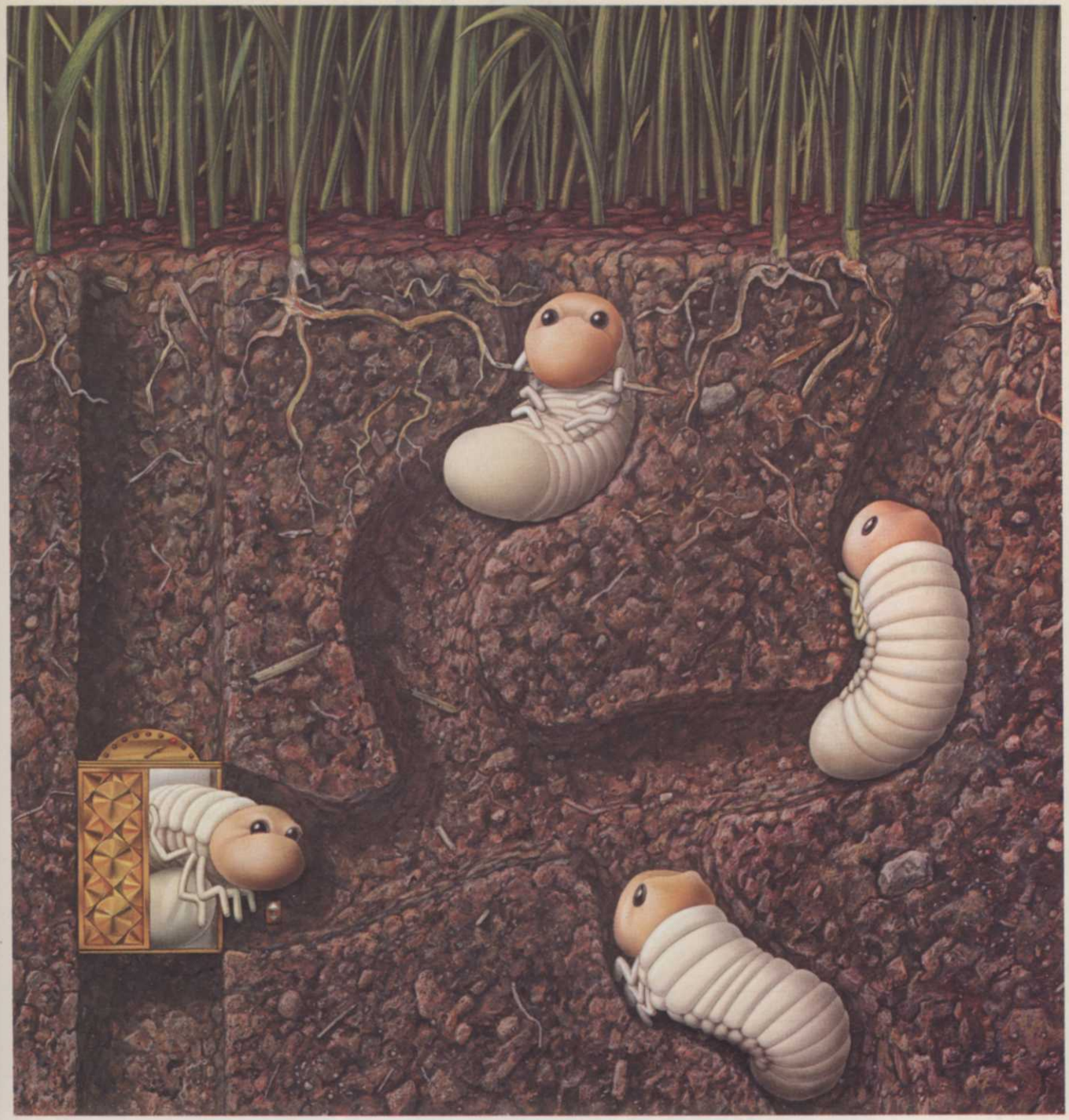


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TABLE 1. TURF Guide DISEASE

COOL-SEASON TURF DISEASES, TURF DISEASE AND CONTROLS

DISEASE	SEASON AND/OR SUSCEPTIBLE TURFGRASS[2]	CULTURAL	FUNGICIDE/NEMATICIDE ACTIVE INGREDIENT[4]
Algae	All tufgrasses	Reduce shade. Avoid excessive fertilization. Improve soil drainage.	Mancozeb
Anthracnose ***(Colletotrichum graminicola)***	July-August; ANNUAL BLUEGRASS, BENTGRASS, Fine Fescue	Fertilize and water to maintain vigor. Syringing may help to prevent stress.	Benomyl[3], Triadimefon Thiophanate-Methyl[3] Propiconizol, Fenarimol, Chlorothalonil
Brown Patch -	See Rhizoctonia blight		
Dollar Spot ***(Lanzia*** **and Moellerodiscus spp., formerly** ***Sclerotinia homeocarpa)***	Late June-Oct. BENTGRASSES BLUEGRASSES Fescues Ryegrasses	Avoid nitrogen deficiency. Remove dew from greens by mowing, dragging with a hose or pole. Choose more resistant grass varieties.	Chlorothalonil, Cadmium[3], Benomyl[3], Anilizine[3], Fenarimol, Iprodione[3], Propiconizol, Thiophanate- ethyl[3], Thiophanate-methyl[3], Thiram, Triadimefon, Vinclosolin[3]
Fairy Rings (Basiodomycete soil fungi)	April-October All turfgrasses	Remove infested sod and soil, replace with clean soil and reseed or sod. Improve water penetration. Increase N fertilization.	Methyl bromide or Formaldehyde fumigation will eradicate fungus but will also kill turf
Fusarium Blight[5] ***8Fusarium poae, F. vulmorum, F. crookwellense)***	July-August Bluegrasses Bentgrasses Fescues	Reduce heat stress during dry periods by light, frequent watering. Do not cut Kentucky bluegrass ro fescues under 2 inches. Reduce excessive thatch (over ¾ inch).	Triadimefon, Fenarimol Benomyl[3], Iprodione, Thiophanate-methyl[3], Thiophanate-ethyl[3]
Fusarium Patch (Pink Snow Mold) (*Fusarium nivale*)	Nov.-April Bluegrasses Bentgrasses Fescues Ryegrasses	Avoid late fall fertilizing. Rake leaves and cut short. Control drifting snow.	Triadimefon, Benomyl[3], Fenarimol, Iprodione[3], Mancozeb, Mercury chlorides, Pentachloronitrobenzene, Thiram, Thiophanate-methyl[3], Vinclozolin
Grey Snow Mold-	see Typhula blight		
Leafspot/Blight /Melting out (*Drechslera* & *Bipolaris* ssp.)	Leafspot: Spring & fall; Blight & Melting out: June-Aug. KENTUCKY BLUEGRASS BENTGRASSES FINE FESCUE, ryegrasses, tall fescue	Remove clippings. Raise cutting height. Avoid excessive nitrogen. Avoid light, frequent watering.	Cycloheximide, Iprodione, Chlorothalonil, Mameb, Nancozeb, Vinclozolin, Pentachloronitrobenzene
Nematodes	All turfgrasses		Fenamiphos, Ethoprop

grass tend to remain small (3 to 10 inches in diameter) compared to necrotic ring spot (5 inches to 2 feet).

Until recently, identification of summer patch by plant disease clinics has been hampered; the causal fungus displays no consistent distinguishing features when grown on agar in a petri plate.

Formerly, the causal agent was thought to be the fungus *Phialophora graminicola*. This was a major source of confusion to plant pathologists because this fungus was known to be a non-pathogen on cereal crops.

A breakthrough

A major advance in our understanding of summer patch occurred when Peter Landschoot (now at Pennsylvania State University) and Noel Jackson (University of Rhode Island) discovered that there are two mating types, 'A' and 'a', for the causal agent now known as *Magnaporthe poae*. If a suspected *M. poae* strain is paired with the proper mating type, the sexual spore stage (ascospores) is formed and positive identification can be made. Thus, identification of summer patch is now possible, but still takes up to two months.

Yellow patch

Yellow patch, caused by *Rhizoctonia cerealis*, is frequently found on Kentucky bluegrass in Ohio and apparently less frequently in Michigan and Illinois. It is rarely reported in Wisconsin and Minnesota. The bentgrass version of the disease is more often seen in the northern