

Insect control guide:

Follow the clues to identify pests

Turf managers who seek to classify insect pests must follow the clues and use the process of elimination.

North

by PATRICIA J. VITTUM, Ph. D./ University of Massachusetts

The keys to successful insect control are: (1) identifying the pest insect; (2) determining when the insect will be in its most vulnerable stage for control; and (3) choosing an insecticide which is best suited for the conditions.

The clues

- 1) Are there any insects in the area?
- 2) What do they look like? Insects are able to damage turf when they are in both the adult and immature stages.
- 3) Are these insects active in the daytime or only at night?
- 4) Are they found near the surface, well into the thatch or in the soil?
- 5) Do you find obvious signs of damage?
- 6) What time of year is it?
- 7) Are just certain species of turf affected, or all species?
- 8) Location and soil type. Are sunny areas or slopes affected? How about sandy soils?

Biological controls

In recent years, several biological control agents have been developed commercially, which can be applied to turf settings to reduce insect pest populations.

Bacillus thuringiensis is a bacterium which paralyzes the target insect's gut system. This bacterium exists in several different strains, each of which is effective

against certain kinds of insects. *Bt var. kurstaki*—available as Dipel, Javelin, Steward; all trademarks—is used to control caterpillars in turf and ornamentals, as well as in fruit and vegetable production. *Bt var. israeliensis* is used to control mosquito populations in aquatic settings, and to control fungus gnats in greenhouses. A newly-discovered strain, *Bt var. japonensis*—of the strain *buibui*—looks to hold some promise for white grub control.

Entomopathogenic nematodes, which cause diseases in insects, can be applied to turf with standard hydraulic sprayers. These nematodes, available as Vector, BioSafe and others, can move short distances in search of their intended victims. The nematodes are sensitive to cool or cold temperatures, and are sensitive to desiccation, so applications must be watered in immediately.

Some perennial ryegrasses and fescues contain endopytes—fungi growing inside the plants—which provide a level of resistance to certain kinds of insects such as chinch bugs, greenbugs, webworms, cutworms or billbugs. These cultivars also tend to be more drought tolerant. So in areas where these insects have been a problem, consider renovating the areas using endophytic grasses.

One chemical product consideration is speed of efficacy, or how quickly the product works. Proxol, Dylox and Triumph

begin to affect target insects within a day or two after applications, while others, such as Oftanol and Merit, may take two or three weeks before target insects begin to die.

If an application is made when most of the target insects are very small and there is a chance that some of the eggs have not yet hatched, you should use one of the slower-acting but longer-lasting materials, such as Oftanol or Merit. If an application is made when most of the target insects are already quite large and feeding actively, you probably should use one of the faster-acting materials, such as Proxol, Dylox or Triumph.

Some materials, such as Dursban, are tied up in the organic material in the thatch, and are less likely to penetrate the thatch and reach the rootzone. Such materials are usually very effective against some of the surface feeding insects (cutworms, webworms, chinch bugs), but are not as effective against root insects (white grubs) when used in areas where there is measurable thatch.

Some materials such as Proxol or Dylox are quite soluble in water and move through the thatch quite readily. These materials are good choices for control of white grubs and other soil insects because they can penetrate the thatch, but may be less well-suited to control surface feeders.

Some insecticide applications should be watered in immediately after application,



Japanese beetle grubs feed on turfgrass roots, causing considerable damage.

often to help move the material through the thatch toward the rootzone and to draw the target insects up into the thatch. Other applications should not be watered in or should receive only small amounts of water to move the material off the blades and into the upper thatch. Some materials (for example, Proxol, Dylox, Orthene, Triumph) break down very rapidly when the water pH is greater than 8.0 alkaline.

Most field trials seem to indicate there is no consistent or measurable difference between formulations of the same material. In other words, if a turf manager decides to use "chemical x," the sprayable formulation and the granular formulation should provide the same level of control.

New materials

Several insecticides have been available to the turf market for only a year or two.

Merit has proven to be very effective, particularly on several species of white grubs. However, as with any insecticide, you should resist the temptation to rely on Merit alone, but include that material as one of several in the arsenal.

Several synthetic pyrethroids, such as Tempo and Talstar, have received turf registrations in the past couple of years and appear to be quite effective against a range of surface insects.

Another compound which has been tested in university settings for several years and appears to be nearing registration is *halofenozide* (Mach 2). This compound prevents the target insect from molting

from one immature stage to the next. It is relatively specific to certain kinds of insects and has a very low level of toxicity to other organisms such as people, birds, fish or other vertebrates. It looks promising against several species of white grubs. □

Insects and their treatment

White grubs: Feed on roots of turfgrasses. Turf looks like it is in drought stress.

Cultural control: provide adequate moisture to root zone. Do not mow too low.

Biological control: *Bacillus thuringiensis var. japonensis* strain *buibui* (may be available in 1997). *Heterorhabditis bacteriophora*, certain strains (entomopathogenic nematode).

Chemical: Use products which penetrate thatch well (Dylox, Proxol, Triumph) in areas with more than 0.25 inches of thatch. Merit works very well but must be applied before most of the population is in the middle-sized grub stage. Water any material in as soon after application as possible to improve contact with grubs.

Chinch bugs: Suck plant juices from stems. Usually most severe or noticeable in sandy soils or sunny areas. Usually most active in summer months.

Cultural control: Reduce thatch. Avoid drought stress. Use endophytic grasses.

Biological control: Watch for big-eyed bugs, which are natural predators resembling chinchbugs.

Chemical control: Many turf insecticides are labelled and effective. Consider using products that will remain in thatch (e.g. Dursban). Apply in late spring or early summer, if sampling documents need.

Billbugs: youngest larvae feed inside stems. Larger larvae feed near crown of plant and on roots. Areas turn yellow or brown and die. Perhaps the most misdiagnosed turf insect problem in the Northeast.

Cultural controls: Use endophytic grasses.

Biological controls: *Steinernema carpocapsae* (available as Vector, BioSafe and others); an entomopathogenic nematode; water in immediately after application.

Chemical control: Most applications are directed toward adults as they begin to lay eggs, often May or June. Timing of application appears to be critical, and the application window is only two weeks in some areas.

Webworms, cutworms: Caterpillars hide in thatch during the day and feed at night on tender tissue.

May thin or kill patches of turf. Several species, often several generations per year.

Cultural control: Reduce thatch, avoid drought stress and use endophytic grasses.

Biological control: *Steinernema carpocapsae* (available as Vector, BioSafe and others); an entomopathogenic nematode. *Bacillus thuringiensis var. kurstaki*, available as Dipel, Javelin, Steward and others.

Chemical: Many turf insecticides are labelled and effective. consider using materials which remain in the thatch (e.g. Dursban) or some of the relatively new pyrethroids. Treat as late in the day as possible. □

Disease control guide:

Past experience a guide for new year

North

by JOHN WATKINS, Ph.D. / University of Nebraska

The 1995 growing season was a prime example of the ever-changing environment of the American Great Plains.

For much of the nation—the East and Midwest in particular—the spring weather was

cold and wet, followed by a sudden onset of hot, dry weather that lasted the rest of the growing season. Several areas of the country set records for days without measurable precipitation, making it difficult to maintain quality turf.

Putting greens were thinned

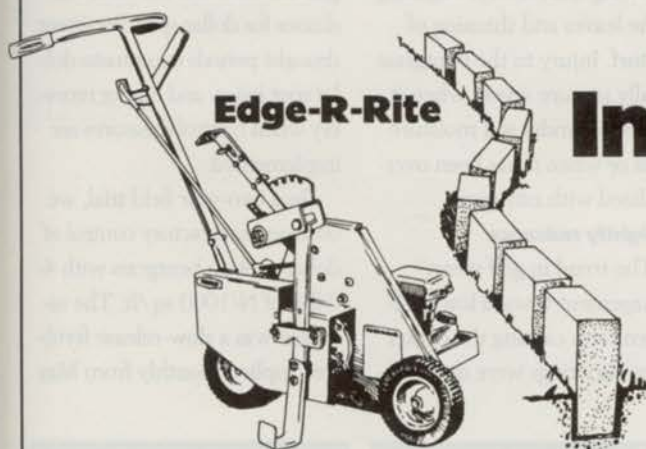
and did not respond to cultural practices. Residential, commercial, sports and other turfs were stressed to the limit, and irrigation bills were out of sight. In addition, the heat, drought and humidity contributed to leaf spot, melting out, dollar spot, fairy ring, necrotic ring spot,

summer patch and nematode injury.

Rare maladies

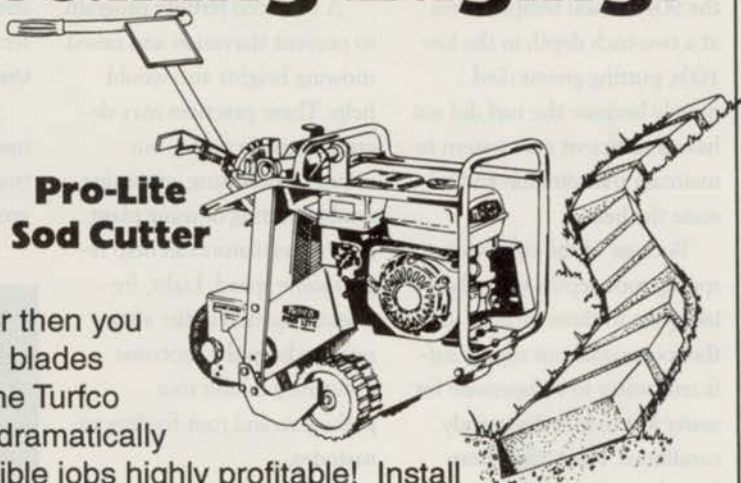
Turfgrass managers were confronted with diseases that previously had not been problems or had rarely occurred in an area.

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Red thread damage, relatively rare in the Midwest, was found on bentgrass greens and ryegrass fairways during summer's heat.

prior to 1995 had I seen red thread. Within a two-week period in May, half a dozen golf course superintendents called to report significant red thread damage to bentgrass greens and ryegrass fairways.

With air temperatures in the 90s and soil temperatures at a two-inch depth in the low 100s, putting greens died merely because the turf did not have a sufficient root system to maintain transpiration and tolerate the heat.

Because of the cold, wet spring, root depths were shallow (two to three inches), and the roots could not supply sufficient water to compensate for water lost to hot, dry, windy conditions. Plants died from drought stress and the greens were thin in areas.

Other factors contributed to the demise of putting greens as well:

- low mowing height;
- nitrogen-starved turf;
- rootzone layering.

Golf superintendents faced with similar problems this year could aerify and topdress with appropriate sand or mixes to overcome rootzone layering and support good root system development going into summer.

A balanced fertility program to prevent starvation and raised mowing heights also would help. These practices may decrease putting speed, but rolling, topdressing, grooming, double-cutting or using plant growth regulators can help regain some speed. Light, frequent irrigation in the afternoon to keep the rootzone moist may inhibit root pathogens and root-feeding nematodes.

Drought strikes

Diseases and plant pathogenic nematodes also injure turf during drought periods.

The symptoms of leaf spot and melting out, which are fungal turf diseases, range from small oval spots on leaf blades

to fading out of the turf, to extensive crown and root rotting. The leaf spot stage is most evident during wet weather with temperatures between 70° and 90° F.

At temperatures above 80° F, necrosis of the entire leaf blade causes leaf blight. As leaf blighting progresses, the turf fades to brown. During hot, dry weather, leaf sheaths, crowns and roots become infected, causing thin, open areas in the turf. Plants with severe crown and root rot usually die from the heat and drought stress.

Symptoms on bentgrass differ from those of Kentucky bluegrass and fine fescues.

When bentgrass golf greens are infected, they have a smoky blue cast that progresses to a yellowing and, finally, blighting of the leaves and thinning of the turf. Injury to the bentgrass usually is more severe when it is growing under soil moisture stress or when it has been overfertilized with nitrogen.

Unightly nuisance

The trend in golf green management toward lower nitrogen rates causing the darker green fairy rings were quite vis-

ible during May and June. They used the peat in the greens mix as a nutrient base and were abundant because of the extended cool, wet spring.

At that stage, fairy ring on the green is more an unsightly nuisance than a threat to the turf. The real problem comes from the fairy ring mushroom's mycelium that infiltrates the soil below the ring. It is hydrophobic and impervious to water, causing the grass immediately above the ring to die from lack of moisture during droughty periods. Aerifying the green and applying the fungicide flutolanil (ProStar) suppresses fairy ring.

Drought stress also can predispose even well-managed turf to dollar spot. Warm days, heavy dews, dry soils and nitrogen-deficient turf are ideal conditions for dollar spot. Persistent drought periods accentuate dollar spot injury and hinder recovery when control measures are implemented.

In a two-year field trial, we obtained satisfactory control of dollar spot on bentgrass with 4-6 lbs. of N/1000 sq./ft. The nitrogen was a slow-release fertilizer applied monthly from May



Summer patch may appear when wet weather is followed by hot, dry periods.



Nematode damage: a non-descript yellowing and thinning of bentgrass and a decline and death of bluegrass.

through October. Although 6 lbs. of actual N per season is too high for a putting green, it is not too high for residential turfs. In this trial, dollar spot suppression at the 6-lb. N rate was comparable to that obtained by fungicides. This illustrates how a balanced fertility program can manage dollar spot.

Turf destroyers

Necrotic ring spot and summer patch are two of the most destructive, stress-related turf diseases. Necrotic ring spot destroys root systems during cool

weather; summer patch destroys them when wet weather is followed by hot, dry periods.

Symptoms of either disease are virtually indistinguishable. Turf will show 6- to 12-inch circular or semi-circular patches, giving the area a pockmarked appearance. The dead grass is light tan and matted, and many of the patches will have a tuft of healthy grass in the center—the “frog-eye” symptom. Diseased roots will appear dark brown.

On established turfs, the most important control is to eliminate plant stresses that



favor disease development. Avoid management practices that promote rapid top growth at the expense of root develop-

ment, and keep adequate moisture in the rootzone by lightly and frequently irrigating.

Keep thatch and rootzones moist. Applying compost materials or organic fertilizers can increase microbial activity, and certain microbes partially inhibit fungus that causes necrotic ring spot or summer patch. Also, other naturally-occurring fungi that compete with the pathogens for food help keep diseases in check. During extended dry spells, beneficial microbe activity is slowed or even suppressed, giving the pathogen a distinct advantage. A moist rootzone helps to reduce the stress of dry spells.

Other practices to control necrotic ring spot or summer patch include a balanced fertilizer program with slow-release nitrogen fertilizers and a fun-

icide program. Benzimidazole-type fungicides can be applied curatively. Other fungicides can be used preventively in early fall or mid-spring. Apply them with sufficient water to drench them into the rootzone.

If you're establishing new turf, avoid planting pure stands of susceptible Kentucky bluegrasses. Use a blend of improved drought-tolerant cultivars or mix in 15 to 20 percent, by weight, of the newer brown-patch-resistant turf-type perennial ryegrasses with the Kentucky bluegrass blend.

The improved drought-tolerant cultivars will be less prone to stress and thus, less prone to summer patch. Remember, blends or mixtures are only as good as their components, so choose your cultivars carefully. □

SYMPTOMS OF COOL-SEASON TURFGRASS DISEASES

Disease	Key symptoms	Control strategy
Leaf spot/ melting out	<ol style="list-style-type: none"> 1) dark spots on leaves 2) yellow, thinning turf 3) brown roots and crowns 	<ol style="list-style-type: none"> 1) use resistant cultivars 2) fertilize properly 3) irrigate properly 4) apply fungicides
Dollar spot	<ol style="list-style-type: none"> 1) bleached lesions on leaves; reddish-brown margins 2) four- to six-inch patches of straw-colored turf 3) silver dollar-sized, bleached spots on bentgrass greens 	<ol style="list-style-type: none"> 1) use resistant cultivars 2) increase the nitrogen level 3) irrigate properly 4) apply fungicides
Fairy ring	<ol style="list-style-type: none"> 1) circles of dark green grass some with dead areas in the ring 	<ol style="list-style-type: none"> 1) remove infested sod and soil; replace with clean soil and reseed 2) aerify and irrigate 3) spot treat with flutolanil
Necrotic ring spot	<ol style="list-style-type: none"> 1) pockmarked circular depressions in turf with healthy tufts of grass in centers 2) brown to black roots and crowns 	<ol style="list-style-type: none"> 1) use resistant cultivars 2) raise mowing height 3) use light, frequent irrigation 4) apply organic fertilizers 5) aerify 6) apply fungicides
Nematodes	<ol style="list-style-type: none"> 1) yellow, wilted, thinning turf 2) reduced root system with brown lesions on roots 	<ol style="list-style-type: none"> 1) sample the affected area, obtain a nematode analysis 2) fertilize properly 3) irrigate properly 4) raise the mowing height 5) apply a non-fumigant nematicide, if available