

Follow the clues to identify pests

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

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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?

For example, several species of sod webworms

damage turfgrass throughout the northern half of the United States. The adult moths have tube-like mouthparts which are projected forward. The moths often fly just above the turf at dusk, looking for places to lay eggs. The caterpillars, which often are gray, green or brown and have dark spots scattered over their bodies, stay hidden in the thatch during the day and feed at night. The first visible damage is as small, brown or yellow patches, which grow larger over time, and is most evident during the summer months.

Biological controls

Most healthy turf settings have natural predators or parasites which provide some level of natural control. Birds, skunks or raccoons often scavenge for insects in turf. In addition, there are numerous predatory insects—such as ants, ground beetles, lady beetles and spiders—to feed on pest insect eggs and small larvae.

Some parasitic insects lay eggs on or inside the bodies of pest insects. The young larvae hatch out and feed on the internal tissue, eventually killing the host. Unfortunately, most of these predators and parasites are very sensitive to many of the broad spectrum insecticides used in turf settings, so when we apply an insecticide to control a pest insect, we often also kill some of the beneficial insects.

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.*

Sample the soil

Turf managers in cool-season locations should know at least three sampling techniques for measuring insect populations.

1) A soil sample is used to scout for white grubs. Dig a square six inches square, and about four inches deep. This is equal to 0.25 square feet, so four samples equal one square foot.

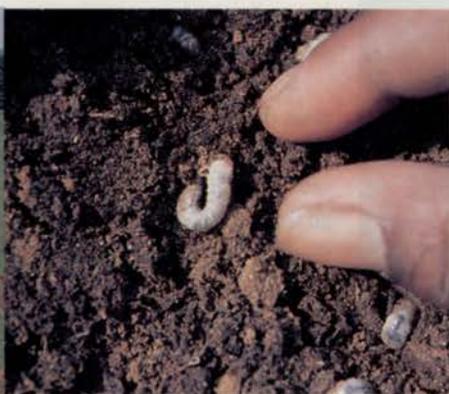
Turn the sample upside down on a piece of plywood and use a small trowel to break up the soil and dislodge it from the thatch. Remove any white grubs and place them in a small dish or pan until they can be counted. An alternative is to use a cup cutter to remove a 4.25-inch diameter core and inspect the soil in the core. The area happens to be 0.1 square ft.

2) Flotation, or flooding, is used to sample for chinchbugs. Remove both ends of a

coffee can, and insert it into the soil to a depth of at least two inches. Fill it with water. Within two or three minutes, insects which were trapped inside the can will float to the surface, where they can be counted.

3) A soap flush can be used to sample for cutworms or webworms. Add one or two tablespoons of a lemon-scented dish detergent to one or two gallons of water and spread the frothy mix over an area two feet per side.

Caterpillars and earthworms will be irritated by the solution and will wriggle to the surface where they can be counted. Do not use this test when the turf is under drought stress; do not use on short-cut bentgrass during heat of the summer unless you can rinse the area with straight water after the test. The soapy water serves as a magnifying glass and can burn the turf. □



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

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 ma-

Insects and their treatment

White grubs: Feed on roots of turf-grasses. 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 1996. *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. □



Chinch bug damage is most severe in sandy soils or sunny areas.

terials, 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, 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, and turf managers are still experimenting

with their use.

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* (referred to as RH-0345 in most trials). This compound is an insect growth regulator which 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. The compound may not be registered in 1996, but should be registered in 1997 and will be a welcome, environmentally-favorable compound for turf insect control programs.

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. There are many insecticides on the market, so check with your local cooperative extension specialist and determine which ones are recommended in your area. □

PARTIAL LIST OF INSECTICIDES AND TARGET PESTS

	billbugs	chinch bugs	cutworms	mites	webworms	white grubs
acephate (Orthene) ¹		x	x		x	
bendiocarb (Turcam)	x	x			x	x
bifenthrin (Talstar)	x	x	x	x	x	
carbaryl (Sevin)	x	x	x		x	x
chlorpyrifos (Dursban)	x	x	x	x	x	x
cyfluthrin (Tempo)	x	x	x		x	
diazinon ²	x	x	x	x	x	x
ethoprop (Mocap) ³	x	x	x		x	x
fluvalinate (Mavrik)		x	x	x	x	
fonofos (Crusade, Mainstay)	x	x	x		x	x
imidacloprid (Merit)	x					x
isazofos (Triumph) ⁴	x	x	x	x	x	x
isofenphos (Oftanol)	x	x			x	x
trichlorfon (Proxol, Dylox) ⁵			x		x	x

1—sensitive to high water pH

2—not for use on golf courses or sod farms

3—see label restrictions

4—not for use in sandy soils

5—sensitive to high water pH

For all products, note that state regulations vary and information may not be completely accurate. Always check the label to confirm that the pest you wish to control is indeed on the label. Mention of a product does not imply endorsement by the author.

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