# Cool-season turf's Public enemies

***Don't rely on "spray and pray" to bump off this gang of notorious turfgrass killers***

By PATRICIA J. VITTUM, Ph.D.

Of the many problem insects in cool-season turfgrass, two are particularly destructive — white grubs and billbugs. White grubs feed on roots and root hairs in the soil and occasionally forage in the lower parts of the thatch. Billbug larvae feed inside stems and later migrate to the crowns, which they often sever outright. Affected plants can be tugged out of the ground with little or no resistance. Both are a challenge to manage, but for different reasons.

**'Most wanted' grubs**

White grub species have similar life cycles, but crucial differences. Each responds a little differently to turf insecticides:

▶ The *Japanese beetle* is the most widely distributed white grub in the eastern United States, preferring sandy or loamy soils and thriving in well maintained (i.e., irrigated) turf. It is easy to manage because it's relatively vulnerable to most turf insecticides.

▶ The *European chafer* is a problem in upstate New York, the coasts of Lakes Ontario and Erie, eastern Massachusetts and parts of Michigan. It thrives in poorly maintained turf like unirrigated lawns and golf course roughs. Its life cycle occurs two or three weeks earlier than the Japanese beetle in a given location, and it is less sensitive to cold (these grubs stay in the rootzone late in autumn and return to the roots earlier in spring than do other species).

This means more widespread and severe damage than with other species. And the European chafer is much less vulnerable to insecticides than most other grub species, so time your application carefully. For example, if the adults have already laid most of their eggs, these insecticides may not work very well and you may have to switch to a faster-acting product.

▶ The *oriental beetle* is a major pest throughout the Northeast and is closely related to the Japanese beetle, but has some striking differences. The life cycle usually is about one or two weeks ahead of the Japanese beetle, and the grubs may move into the soil profile more readily when conditions get hot or dry — and return with a vengeance when conditions improve in fall.

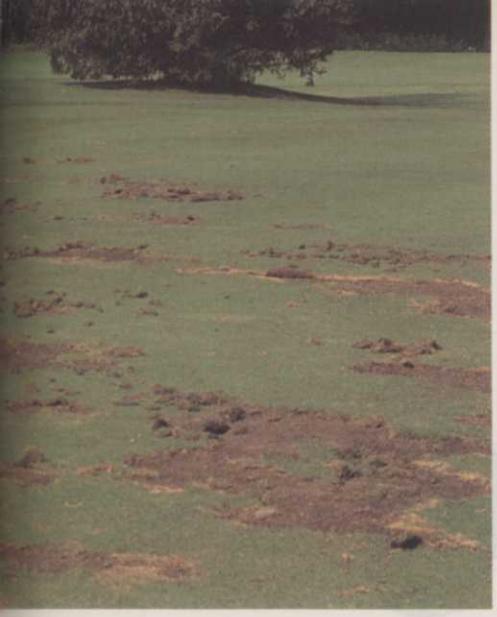
Oriental beetles are much less susceptible to many turf insecticides than are Japanese beetles and must be treated more precisely — give more care to timing applications based on the characteristics of the insecticide. You may need a followup treatment.

▶ *Asiatic garden beetles* are slowly becoming more common throughout the Northeast and appear to be less sensitive to many turf insecticides, so treatment of other grub species opens up opportunities for these tiny grubs to move in and get established. So far they have been little more than a nuisance, but that could change!

▶ *Northern* and *southern masked chafers* are grubs native to the United States, with a life cycle similar to the Japanese beetle. They sometimes feed in organic matter rather than directly on roots, but can cause significant damage by breaking off roots and root hairs mechanically. So far, most turf insecticides seem to work reasonably well.

**Targeting the perpetrators**

Managing grub populations becomes problematic, particularly in areas of the Northeast where three or four species of grubs may occur at the same time in the same lawn. Determine which species is most prevalent or causing the most damage (two different things) and target your controls accordingly.



**Grub damage in turfgrass can be exacerbated by hungry skunks looking for an easy meal. This type of damage isn't uncommon.**

It's essential to water in any grub insecticide as soon as possible after application — it's virtually impossible to overwater a grub insecticide, although avoid puddling. One main reason for inadequate grub control is insufficient watering. Ensure that the product is watered in quickly and thoroughly to improve the performance of the product.

**The usual suspects**

Billbugs may be the most misdiagnosed insect pest in the Northeast and are well established in the Middle Atlantic states, Midwest and Plains. Until recently, the bluegrass billbug (*Sphenophorus parvulus*) was assumed to be the primary species in the Northeast and other species less common.

There now are several billbug species that can occur in turf, each with a slightly different life cycle:

- The little billbug (*S. minimus*) feeds on the same grass species and has a similar life cycle to the bluegrass billbug.
- The uneven billbug (*S. inaequaliis*) occurs in the eastern United States and feeds on bermudagrass, Kentucky bluegrass, perennial ryegrass and fescues. Adults are active earlier in the spring and later in the fall than bluegrass billbug.
- The Denver billbug (*S. cicatristriatus*) lives in the Rocky Mountains and northern Plains states and has the least synchronized life cycle of cool-season billbugs. It may overwinter as medium or large larvae or as adults. (Spring activity may be delayed if the winter was spent as larvae.)

**Bring 'em in for questioning**

The most reliable management approach for billbugs appears to be to target adults just as they emerge from hibernating sites, killing them before they have a chance to lay eggs. The application timing is challenging because there are so many different species that might be present. A degree-day model for the bluegrass billbug, indicates applications targeting adults should be made between 560 and 625 degree days (50°F base temperature).

Applications directed at larvae (after they have begun to feed and damage the plant) often do not work very well, in part because some of the larvae are still in the stems and somewhat protected, while others have dropped to the soil and are hard to reach. Summer application timing becomes even more challenging if more than one billbug species is present.

**The life stages of the turf-damaging white grub: two stages of the pupa, adult, larvae.**

**The lineup**

Other insects that also damage cool-season turfgrasses include *hairy chinch bugs*, active in the Midwest and Middle Atlantic, which are often misdiagnosed because their damage occurs when turf can be under summer heat or moisture stress. Several insecticides can reduce their populations, but the damage may remain, especially if the turf is in summer dormancy.

*Webworms* also abound; several species occur in the United States, each with a different life cycle. While webworm damage can be severe, it normally is sporadic and seldom needs attention. Treatments are most effective two or three weeks after peak moth flight. This allows time for eggs to hatch and small, susceptible caterpillars become active.

**Book 'em Danno**

Some perennial ryegrass and fescue cultivars contain endophytes, fungi that grow inside the plant and produce materials toxic to certain insects. These cultivars provide a significant level of resistance to bluegrass billbugs (and apparently some other billbug species), hairy chinch bugs and some webworms. Many endophytic cultivars also are more drought tolerant than their closely matched endophyte-free cultivars.

While Merit™ and Mach 2™ have been so effective, spinosad (Conserve™), a derivative of an actinomycete, a natural soil bacterium, also appears to be very effective against several of the turf caterpillars, including black cutworms and sod webworms, while much less toxic to vertebrates than traditional insecticides. Conserve also has been tested and seems to work well against many of the caterpillars that feed on ornamentals, such as eastern tent caterpillar.

Pay attention to detail and determine the life cycle of the insect, then use an insecticide that is best suited to that pest. **LM**

*The author is in the Department of Entomology, University of Massachusetts, Amherst, MA.*

# Warm-season insects: Predicting the crime

***New insect problems will challenge us to be detectives to prevent injury and costly remedial control***

By RICK L. BRANDENBURG, Ph.D.

Many landscape managers would love to see a system to predict the timing and abundance of pests.

To some degree we can do this. For example, by monitoring the temperature, we can predict with reasonable accuracy when Japanese beetles will emerge in the summer. But the greatest challenge is to predict those pests that occur sporadically — the ones we don't expect each year. They catch us by surprise and cause significant damage before we can react.

**Predicting criminal activity**

The appearance of sporadic pests is usually related to the weather, but they may still be hard to predict. The last three winters in the Southeast have been quite mild, but this doesn't mean that any specific insects will be more abundant this summer.

The fall armyworm caused severe damage to turf in the Southeast in 1998. Most years its damage is spotty, but in 1998, populations as high as 100 armyworms per square yard were recorded. Infestations like this caused severe damage. Sod farms, in particular, suffered, as did many home lawns, golf courses and athletic fields. The questions is, how did the population get so high and why was it so difficult to get rid of them?

**Gang related?**

These are difficult questions to answer. Fall armyworms overwinter only in Florida and the Gulf Coast. Did the mild winter allow them to overwinter a little farther north and give them a "jump start" as they began their spring migration? It's possible, but there were probably other factors, including the right weather conditions as the moths laid their eggs.

Severe pest outbreaks usually require a combination of factors, which is why we don't see them happen too often for any one pest. And, although we had a serious outbreak last year, this season could be significantly different. That's why we must depend on surveys and close monitoring as the season progresses because our predictive ability is insufficient. However, we can learn from last year's problems.

**If you detect turfgrass insects early enough you can control them before damage occurs.**

Many areas frequently suffer from one kind of caterpillar or "worm" problem or another. While they are easy to control if found while still small, the infestations usually surprise us. The first sign of a problem is either brown turf and bare patches or the presence of birds in the turf, feeding on the worms. Keep good records of where you find worms — it can be a time saver.

**The secret informer**

To detect turfgrass caterpillars, use a soapy water flush (two tablespoons of liq-

*Cont. on page 44*

**A soapy water flush brings these fall armyworms to the soil surface.**

*Cont. from page 42*

uid dishwashing detergent mixed in two gallons of water in a sprinkling can), poured over a square yard. Watch for the next five minutes as sod webworms, cutworms and armyworms crawl to the surface and wriggle around. Even the most cautious caterpillars can't stand soapy water and will come out of hiding. Once you detect a problem, act rapidly if the population of worms is high enough to cause turf damage. Irrigate first, then treat late in the day since they feed at night. Don't irrigate for at least 24 hours and don't mow for a day or two after treating.

It's hard to be ready for all the potential problems that may come our way in 1999. White grub problems in 1998 were normal in many locations, but weather extremes made good control difficult. While we have good pesticides to use, we can only expect so much of these products; weather extremes have their own effects. **LM**

*The author is Professor of Entomology at North Carolina State University, Raleigh, NC.*

## HOW TO DETECT WARM-SEASON INSECT PESTS

**Early pest detection is critical to effective management. Watch for signs of insect presence or use the appropriate scouting tools.**

### CUTWORMS, ARMYWORMS

**Hosts** all warm-season grasses
**Damage Symptoms** turf clipped off at soil level; severe infestations may leave large bare areas where turf has been consumed
**Scouting Method** use "soap flush" to detect
**Control Practices**

- treat late in day
- do not mow or remove clippings for 1-3 days
- may be present from early spring to late fall

### FIRE ANTS

**Hosts** all warm-season grasses
**Damage Symptoms** ants create unsightly mounds which may also damage mowing equipment; painful stings a concern in high traffic areas
**Control Practices**

- best controlled in spring and fall when workers are actively foraging for food
- mound treatments generally most effective, but are labor-intensive
- controls must be continued once program is started (fire ants will return at higher levels if treatments are stopped)
- do not disturb mounds during treatment
- use baits prior to contact insecticides to allow workers to return baits to mound

### MOLE CRICKETS

**Hosts** prefer bahiagrass and close-cut turf
**Damage Symptoms** extensive tunneling is unsightly; root feeding causes dieback, thin spots
**Scouting Method** use "soap flush" to detect
**Control Practices**

- treat in June/July as soon as eggs hatch
- follow-up treatments usually necessary
- look for adult activity in March/April to define areas of high risk for egg hatch

### GROUND PEARLS

**Hosts** most commonly attack bermudagrass and centipedegrass
**Damage Symptoms** yellowing and then complete dieback of turf with no new regrowth the following season
**Scouting Method** dig 2 to 4 inches deep in soil; sift and look for "pearls"
**Control Practices**

- no known effective control measures
- practice good turf management to increase turf tolerance
- irrigate during dry weather

### SOUTHERN CHINCH BUGS

**Hosts** all warm-season grasses, prefer St. Augustinegrass
**Damage Symptoms** feeding results in turf becoming yellow and eventually turning reddish-brown
**Scouting Method** pull back leaf sheath, look for nymphs; use a large cylinder (e.g. coffee can with both ends cut out), press into soil, fill with water and watch for floating chinch bugs
**Control Practices**

- avoid overfertilizing
- manage thatch
- irrigate during dry spells
- apply pesticides with plenty of water
- multiple treatments often necessary

### TWOLINED SPITTLEBUGS

**Hosts** all warm-season grasses
**Damage Symptoms** results in yellowing of infested turf and severe infestation; have noticeable unsightly "spittle masses"
**Scouting Methods** look for spittle masses near base of plant; will be higher on plant on cloudy days; count number of nymphs in spittle masses
**Control Practices**

- control adults on ornamentals like hollies
- treat on cloudy days when possible, since spittlebugs are higher up on turf
- begin monitoring in early summer

### WHITE GRUBS

**Hosts** all warm-season grasses
**Damage Symptoms** grubs feed on roots and cause drought stress and turf dieback; may attract moles or skunks which damage turf searching for grubs
**Scouting Method** dig squares of sod 4-6 inches deep in late August to detect small grubs; grubs will be closer to the surface following rainfall or irrigation
**Control Practices**

- attracted to low-cut, highly maintained turf
- treatments most effective in late August/early September
- avoid ornamentals attractive to adult stages of Japanese beetles or green June beetles

### BERMUDAGRASS MITES

**Hosts** only bermudagrass
**Damage Symptoms** initial yellowing of leaf tips, followed by shortening of internodes, causing a tufted growth; may die under severe infestations
**Scouting Methods** use a hand lens to look for small worm-like mites on grass and under leaf sheath, blades, etc.
**Control Practices**

- irrigate during dry spells
- proper fertilization helps turf outgrow damage
- resistant cultivars include Floratex, Midiron and Tifdwarf
- multiple treatments often necessary

### BEES & WASPS

**Hosts** all turf types
**Damage Symptoms** holes, mounds, tunneling in turf area, insects flying over turf area
**Control Practices**

- maintain a healthy, lush stand of turf; most bees and wasps that live in the soil prefer a thin stand of turf
- mulch areas under shrubs and trees, and keep mulch fresh to discourage nesting □

# Ornamental insect controls: Changes to come

***Why you should look at alternative controls for insect pests that damage trees and other ornamentals.***

By DAVID SHETLAR, Ph.D.

The combination of economics and the Food Quality Protection Act seem to be working together to reduce the number of chemical controls for ornamental pest insects and mites.

With this in mind, you may want to try alternative products to treat major insect and mite pests. You don't need to switch to them today, but try them on a limited basis to see which ones fit your needs.

**Outside jobs**

Exposed foliar-feeding insects (caterpillars, sawflies and aphids) are easy to knock down with broad spectrum organophosphate and carbamate insecticides like Dursban®, diazinon, Orthene®, Sevin® and malathion. More recently, pyrethroid chemistry (especially Astro®, DeltaGard®, Scimitar®, Talstar®, Tempo®) has begun to replace the OPs and carbamates. The pyrethroids are an excellent choice for most operations, though exposed applicators often get skin sensitization problems.

Least toxic alternatives are insecticidal soaps (2%) and horticultural oils (1.5%), but the target pests must be "hit" by the spray; there is no residual effect. Newer insecticides such as Merit® and Conserve® are effective, but the target insects need to be in the younger stages for maximum efficacy. This is also true for *Bacillus thuringiensis* (Bt) which can control numerous caterpillars *if* the caterpillars ingest the material when they are less than half grown.

**Inside jobs**

One strategy for control of leafminers is adulticides. The traditional products have been Dursban, Sevin and Dylox® (flies only). Alternative products include the pyrethroids Astro, Scimitar and Talstar.

The other strategy is to control the larvae with systemics, which have included Cygon® (=Dimethoate®), Di-Syston® and Orthene. Cygon and Di-Syston are usually applied to the soil for root uptake. Orthene is commonly sprayed, though it can also be soil injected for root uptake. Products containing azadiractin (e.g., Azatin® and BioNEEM®) can be sprayed. Merit® is the only really new systemic insecticide available but has very slow root uptake, so it's best used as preventive leafminer control, not as a curative. Most people recommend that the Merit soil applications be made a minimum of 40 to 50 days prior to when the leafminers are expected. For leafminers expected in May (e.g., birch and holly leafminers), good control has been achieved by making the Merit soil injection in the previous October or November.

**The escape artists**

Borer control remains difficult, and the best control is to keep the plants healthy and avoid water stress conditions. As with leafminers, borer control insecticides are targeted against the adults and their invading larvae (preventive control). Or, systemics are used to kill the larvae already within the plant (curative control). Dursban and lindane trunk sprays have been the traditional preventive insecticides. Di-Syston and Dimethoate have been the principal systemics used, though injection systems that use Orthene, Bidrin® and Metasystox-R® are well known.

Unfortunately, there are few real alternatives to Dursban and lindane which, when applied to the corky bark of trees, provide 30 to 50 days of effective residual action. Scimitar, Talstar and Turcam® can provide protection, but require two to three applications to cover the same 30 to

50 days. Merit has also been discussed for borer control (both as soil injection and tree injection), but results have been inconsistent. Again, it appears that Merit has to be applied 30 to 40 days *prior* to when the borer invasion is expected.

**Sucking the system dry**

Scale control has always been difficult to achieve, most likely because landscape managers do not make their applications at the optimum time — when the crawlers are active. Traditional crawler control products have been diazinon, Dursban, malathion, Orthene and Sevin, with dimethoate and Di-Syston being soil-applied systemics. The pyrethroids DeltaGard, Scimitar, Talstar and Tempo are excellent alternatives for crawler control. Insecticidal soaps and horticultural oils also do well if they're applied as high-volume cover sprays that contact the crawlers or recently settled crawlers. Merit (sprays and soil applications) only seems to affect the soft scales, not the armored scales, and is best applied after the crawlers have settled, usually in July or August (except for the magnolia scale that may have crawlers emerging in late August).

**This spider is no hero**

Almost everyone considers "spider mites" to be the notorious twospotted spider mite. In fact, in most landscapes, only viburnum, winged euonymus and perennials are the common hosts of this mite. Mites on other trees and shrubs are likely some other species of spider mite. Most conifers are likely to be infested with the spruce spider mite though there is also an arborvitae spider mite.

Why is it important to know which mite you are dealing with? First, twospotted spider mites are often resistant to registered miticides, and second, mites may be cool-season or warm-season pests.

When dealing with twospotted spider mites, insecticidal/miticidal soaps and horticultural oils are almost the only choice. Thorough coverage, especially on leaf undersurfaces, is essential. Treat early when the first signs begin, usually in mid- to late May, and retreat if the mite does not appear to be coming under control.

Cool-season mites are best controlled in late September through mid-November or in late April and May. The spruce spider mite is the most common mite in this category, though the southern red mite is fairly common on certain shrubs. Warm-season mites are best controlled when their populations first begin, mid- to late May.

Most spider mites (except for the twospotted spider mite) overwinter as eggs attached to the bark of host plants. True dormant oils can kill these eggs and reduce the mite risk (see "Winter is Good for Hort Oil," LM, Feb. '99). As far as miticides are concerned, Bayer has announced that it is no longer producing Morestan® so once existing stocks are gone, that's it! Kelthane® or dicofol is also very difficult to find and is also likely to be lost.

That leaves dimethoate (very limited plant listing) and Orthene (especially soil applied) as the only traditional chemistry with miticidal activity. The pyrethroids DeltaGard, Scimitar and Talstar have "mite suppression" on their labels but repeat applications are needed to achieve good control. Avid® is still available and is quite good on most spider mites. Conserve is the newest ornamental miticide though repeat applications are also needed to achieve control. Soaps and oils may be the best alternative but thorough coverage of the plants' upper and lower leaf surfaces is essential for success.

If you haven't already started looking at alternative pesticides, especially the pyrethroids, Merit and Conserve, now is the time to start. You should also try using insecticidal/miticidal soaps and horticultural oils as general-use controls for most exposed insects and mites. **LM**

*The author is Associate Professor of Landscape Entomology at The Ohio State University, Columbus, OH.*

(top) Birch leafminer early mines. One mine opened to show larva that is susceptible to systemic insecticides.

(bottom) Rhododendron borer adult. Apply preventive treatments in May and June when adults fly.

(top) Twospotted spider mites which are often resistant to miticides but susceptible to soaps and oils.

(bottom) Euonymus scale settled crawlers. These are still susceptible to sprays because they haven't formed their waxy coverings.