

TURFGRASS TRENDS

INSECT CONTROL

Identifying Billbugs Means Better Control Opportunities

By David J. Shetlar

Billbugs are some of the most commonly misdiagnosed insect pests on golf courses. Their damage is usually mistaken for disease symptoms, drought or other insect attack.

Billbug damage often goes undetected, especially when turf is regularly irrigated. The legless, grub-like larvae can cause cut sod to be quarantined or rejected, especially when transported across state lines.

Turf grown on slopes (around golf bunkers, for example) often exhibits billbug damage, but turf managers expect that turf in these areas is "naturally under drought and sun stress." Billbug damage can look similar to chinch bug, white grub and sod webworm activity (Vittum, et al., 1999; Niemczyk & Shetlar, 2000).

Billbug species

Cool-season, transition and warm-season turf species are all susceptible to billbug attack. These species of billbugs can be divided into two main groups — those that can overwinter as larvae (usually the species attacking warm-season/transition turf) and those that overwinter primarily as adult beetles (usually the species attacking cool-season turf).

There are about 50 species of billbugs that are recognized as inhabiting the United States and Canada, but most of these use wild grasses and sedges, or grain crops as hosts.

Mature bluegrass billbug larvae pupate in the soil and new adults emerge in July.

All the species are placed in the genus *Sphenophorus* (formerly known as *Calendera*), and almost any species may be found wandering across turf, especially if the turf is located near wetland or prairie habitat, or where nutsedge weeds are present.

By far, most published information on billbug seasonal biology is based on the bluegrass billbug, *S. parvulus*. This species is found across most of North America (Niemczyk & Shetlar, 2000; Kindler & Spomer, 1986), including the southern states. Though

most damage caused by bluegrass billbug appears in cool-season turf, this billbug has been found in noticeable numbers in several of the Gulf states.

Damage from bluegrass billbug has also been reported in transition zone zoysiagrass where the hunting billbug, *S. venatus*, is more commonly present.

Bluegrass billbugs typically overwinter as adults in and around turf. In April and May, these adults become active — feeding, mating, and seeking out suitable turf for egg laying. While named after Kentucky bluegrass, this billbug regularly infests perennial ryegrass, fine and tall fescues (if they don't contain endophytic fungi). The larvae burrow

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The hunting billbug appear to have prolonged adult activity periods that result in both the adults and larvae being present during the season.

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down the seed stems in late May into early June and can completely destroy crowns and new tillers by late June. Mature larvae pupate in the soil and new adults emerge in July.

If the turf is actively growing and conditions are not too dry, a second generation may be attempted by these new adults. However, in most cases, the summer-emerging adults appear to maintain themselves by periodically feeding at the bases of grass stems. They then seek out sheltered sites in the turf thatch or underlying soil in late September into October to overwinter.

Other billbugs

The lesser billbug, *S. minimus*, is commonly found in the Northeastern states, but its native range appears to be most of North America. This pest is often found with the bluegrass billbug, and it has a similar life cycle.

It is my belief that the lesser billbug prefers finer stemmed grasses, especially the fine fescues and bentgrass. It may also be associated with roughstalk bluegrass and nimblewill.

The hunting, Phoenician, and Denver billbugs (*S. venatus*, *S. phoeniciensis*, and *S. cicatris-triatus*, respectively) have annual life cycles that are quite different than the bluegrass billbug's. These three billbugs appear to have prolonged adult activity periods that result in both the adults and the larvae being present over much of the season (Morishita, et al., 1971). Larvae of these billbugs commonly remain active dur-

ing the winter as they continue feeding on dormant or slow-growing stolons and crowns.

Because of the dormancy in bermudagrass and zoysiagrass, the extent of billbug damage will not be evident until the next spring.

At this time, hunting and Phoenician billbug damage is commonly mistaken for spring dead spot (an actual disease) or "delayed spring green-up syndrome." As the larvae mature, from February into early May, they pupate and the new adults actively lay eggs for most of the summer months. Since bermudagrass and zoysiagrass grow so rapidly during the summer months, billbug larval damage is largely undetectable during the summer and early fall unless one digs for them or cuts sod.

The Denver billbug is most common in bluegrass and perennial ryegrass, especially in the irrigated turf of New Mexico and Colorado.

Identifying billbug species

It's nearly impossible to identify billbug larvae to species. Insect taxonomists have not studied these well, and most entomologists simply guess about the species from associations with turf species and geographic location.

Billbug adults are relatively easy to identify by using the shapes, sizes and patterns of pits, furrows and ridges visible on the pronotum and wing covers. The bluegrass billbug has numerous fine punctures on the pronotum, but sometimes there is a medial ridge without punctures that runs down the center of the pronotum.

The wing covers have smooth furrows that border neat rows of small punctures. *S. minimus* is usually a bit smaller than *S. parvulus*, but the pronotal punctures are distinctly of different sizes and the wing covers appear crumpled with irregular ridges and punctures.

Hunting billbugs are usually larger billbugs, three-eighths to one-half-inch long, and characteristically have a raised ridge in the center of the pronotum that divides into a small fork just before reaching the head (Diagram 3). This medial ridge is bracketed on each side with raised ridges that resemble parentheses marks.

Hunting billbugs can vary considerably in color, from a deep red-brown color to completely black. Some believe that the brown forms are ones that have recently emerged, but I'm not convinced of this. Hunting billbugs recovered from New Jersey up to Connecticut are often the same size as the bluegrass billbug,

QUICK TIP

Kentucky bluegrass has been used in cool-season regions in the United States for a long time, but one of its downfalls is survival in summer heat and humidity. The introduction of "Thermal Blue," a new heat-tolerant Kentucky bluegrass developed by The Scotts Co., provides a variety that performs well in even the harshest summer conditions in the transition zone and further north.

but the pronotal markings remain distinct.

In Arizona and Southern California, the Phoenician billbug seems to be more common than the hunting billbug, though both can be found in the same turf. This species looks much like the hunting billbug, except that the raised areas on the pronotum have been expanded and they join to form a wide M-shaped pattern (Diagram 4). I have seen classically marked hunting billbugs and Phoenician billbugs together, and I'm not sure that these are actually distinctly different species. Further research, perhaps using genetic fingerprinting, will be needed to confirm or refute this idea.

The Denver (or Rocky Mountain) billbug, can be locally abundant in cool-season turf from New Mexico into Montana. It is a large species that has a black patent-leather look. The pronotum has numerous small pits, filled with white hairs and the wing covers have rows of heart-shaped pits, also filled with white hairs (diagram 5). Like the hunting billbug, this pest commonly has larvae that feed during the winter months.

To make things more complicated, I often find other billbug species in North American turf, especially in the Southern states, and my fellow entomologists occasionally find additional species of billbugs in cool-season turfs. Of these, the most notable one is a large species that looks much like the bluegrass billbug. This one, *S. coesifrons*, has no common name, but I find it commonly associated with bermudagrass and St. Augustinegrass from Oklahoma to Florida.

Diagnosing billbug attacks

Diagnosis of bluegrass and minimus billbug attack is very simple — use the “tug test.” Simply grasp several of the affected stems and tug upward. Billbug damaged turf will have stems that break off easily, just below the thatch level, and the broken stems will be packed with a fine frass (Picture 1).

Since cool-season turfs are most commonly attacked by these two billbugs, perform the tug test any time that you see random dead grass stems (light infestations) to signs of early summer dormancy, apparently caused by drought conditions (heavy infestations).

Sunny, sloped areas most commonly show visual damage from billbugs. Unfortunately, these are also the areas that turf managers usually “feel” that the turf damage is merely from

drought or heat.

Hunting and Phoenician billbug damage is much more difficult to diagnose. Even in bermudagrass and St. Augustinegrass, a tug test or two can indicate billbug activity.

In bermudagrass and zoysiagrass, look for small to medium patches of turf that appear to be dead, or at least the stems and leaves are straw-colored — especially in early spring when the turf is beginning to green up. If you use the tug test, affected stems will also pull out of the soil easily, but they will rarely be filled with frass. Most typically, the stems will appear to have been severed by something (as evidenced by having brown or black tips) and upon looking with a hand lens the broken ends will be slightly hollowed out. By brushing your hand back and forth in these areas, look for signs of numerous small bits and pieces of stolons.

Pick some of these up and inspect the ends for signs of being chewed off or hollowed out. I usually have to dig around in the soil to determine if billbug larvae are present in order to be absolutely sure that billbugs are the cause of the damage symptoms.

Hunting and Phoenician billbug damage is most evident in mowed roughs, tee banks, bunker slopes and other highly sloped, sunny areas.

As with the bluegrass billbug, damage in these areas is usually mistaken for lack of irrigation, but it can also look like nematode activ-

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Species Identification

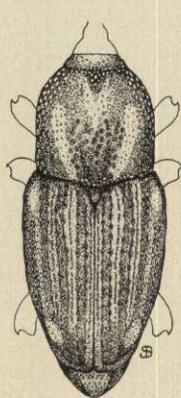


Diagram 3-Hunting Billbug

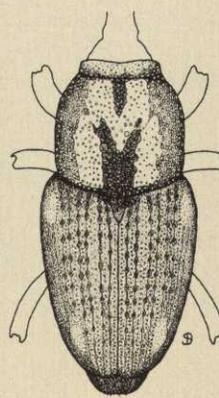


Diagram 4-Phoenician Billbug

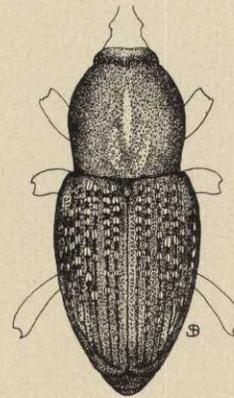


Diagram 5-Denver Billbug

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ity, mole cricket damage, armyworm feeding and disease attack. In any case, you'll likely need to get out a shovel, cut three sides of a large flap of the turf and peel it back to see if any billbug larvae are present. Hunting billbug larvae are often an inch deep or more in the profile.

Another easy way to determine if billbugs are candidates for causing turf damage is to simply be observant. All billbugs seem to like to "stroll" around. I commonly find billbug adults walking across greens and sidewalks, especially in the late afternoon. When I find a half dozen or more on a single green, I begin to look at the surrounding turf, especially the sloped areas.

Billbugs also commonly get trapped in golf course bunkers, especially ones with seep slopes. Walk around the edges of bunkers, and you'll usually find a few billbugs trying to climb out.

Managing billbugs

Control strategies for the bluegrass billbug are well-defined and understood, but hunting billbug management strategies are just now being defined.

For the bluegrass billbug, the full range of options is available: cultural controls (continuous irrigation and good fertilization), use of resistance (endophyte-containing ryegrass or fescues are toxic to billbugs), preventive and curative insecticides.

In cool-season turf, regularly irrigated and fertilized turf seems to outgrow billbug damage or the billbugs commonly become infected with the white fungus of insects, *Beauveria*. Field research has also shown that turf stands that contain 40 percent to 50 percent endophyte-infected stems are lethal to billbugs, and the billbugs rarely build up damaging populations.

To prevent billbug damage, turf managers often apply a surface or thatch targeted insecticide in late April into mid-May to kill the overwintered adults that are finding places to lay their eggs. Chlorpyrifos and most of the pyrethroids are useful in this mode. With the development of imidacloprid (Merit) and halofenozide (MACH 2), it has also been

shown that these insecticides are good at preventing billbug damage if they are applied in May when the adults are laying eggs.

We're not sure whether these insecticides are actually killing the billbug adults or their residues are killing the larvae, but these early applications prevent damage. Note that Merit is to be used at the .4 pounds actual ingredient per acre rate if billbugs are the primary target (there should be enough residual to kill black turfgrass atenius and the normal annual grub species that arrive in July), and MACH 2 labels now recommend using 2 pounds actual ingredient per acre.

Curative control of bluegrass billbugs in mid- to late June is difficult at best. The only product that remains as a potential billbug curative control is carbaryl (Sevin). In the past, we've had isophenfos (Oftanol) and isazofos (Triumph) but neither is currently available. Many turf managers claim success by using trichlorfon (Dylox), but billbug larval control is not on the existing labels.

For hunting billbug control, the recent research from Arkansas (Young & Musick, personal communication) suggests that the majority of the adults are active from late March through July, but adult females may be laying eggs from April into mid-October, so an application of an insecticide that kills the adults or the early stage larvae during April through June should provide protection from the damage observed in the subsequent winter months or the next spring.

It's my experience that imidacloprid applied during this time has eliminated much of the hunting billbug damage observed on tee banks and bunker slopes. One might consider making this application at the time that mole cricket eggs are hatching or the annual white grubs are laying their eggs to reduce the populations of these insects at the same time.

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