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Billbugs in Turfgrass

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Billbugs are weevils (commonly called snout beetles) that belong to the family Curculionidae that commonly infest high-cut turfgrass species. The bluegrass billbug, *Sphenophorus parvulus* Gyllenhal, is the most frequently encountered billbug in the state of Ohio, while the lesser billbug, *S. mimimus*, and hunting billbug, *S. venatus*, are known as occasional pests. The bluegrass and lesser billbugs seem to prefer Kentucky bluegrass, but they have been found infesting perennial ryegrass, red and tall fescues, as well as small grain crops such as corn, rye, and wheat. The hunting billbug seems to prefer zoysiagrass. Billbug damage may resemble drought stress, and therefore, often escapes detection which can result in extensive turf death.

Damage

Damage to turf is caused by the larval stage of this pest, as they burrow down through the grass stem toward the crown and roots. Destruction of turf crowns, especially during periods of drought, will kill the entire grass plant. Billbug damage usually first appears in mid- to late June in Ohio but

a second generation can damage turf in late July through August. Often the damage first appears as irregular mottling or thinning of the turf, as if the turf was going into drought and heat dormancy or disease attack was occurring. If left untreated, heavy infestations of billbugs can result in extensive browning and eventually turf death. To diagnose billbug infestations, grasp the dead stems of affected turf and pull upward (tug-test). If the stalks break off easily at ground level and the stems are hollowed out and packed with sawdust-like material, billbugs are the culprit.

Descriptions of Stages

Adult billbugs are robust black or grey beetles, $\frac{1}{4}$ – $\frac{3}{8}$ inch in length with distinct grooves running longitudinally down their hardened forewings. Their chewing mouthparts are located at the end of a long, gently curved snout in addition to their elbowed antennae. Adults are slow moving and are frequently observed walking on driveways and sidewalks on warm, sunny days. Adults rarely fly and will often play dead when disturbed. Adult females



Bluegrass billbug adult and mature larva.



Billbug damage to a lawn in early July.



Frass-filled grass stems pulled out of damaged lawn.

lay white, elongate eggs (0.6 inches in length) inside a hole they chewed in the stem near the base of the turf plant. Larvae are grub shaped, but legless; they have cream-colored bodies, brown head capsules, and a slight curve to their bodies. Mature fifth instar larvae can reach up to ½ inch in length and may be mistaken for white grub larvae. However, white grubs have three pair of legs, and are more c-shaped when disturbed.



Bluegrass billbug life stages: egg, five larval instars, pupa, adult.

Life Cycle and Habits

Billbugs overwinter as adults in thatch, cracks and crevices in the soil, worm holes, and in leaf litter near turf. The hibernating adults become active in late-April to mid-May when the soil surface temperatures rise above 60°F. The adults wander in search of grasses on which to feed, including small grain crops in agricultural fields. After feeding for a short period, females begin to insert one to three eggs in a feeding hole made in grass stems. The overwintered females may continue laying eggs into late June but most eggs of the first generation are laid by early June. Laboratory kept females have been known to lay over 200 eggs, usually two to five per day. The eggs hatch in six days depending on the temperature and the young larvae begin to tunnel up and down the stem. If a stem is hollowed out while the larva is small, an exit hole may be formed and the larva will drop out and bore into another stem. After undergoing four to five instars (molts), the larvae become too large to fit inside the grass stems. They then drop to the ground to begin feeding externally on the grass crowns and roots. This is the point at which significant damage to the turf is noticed, especially if little rainfall or irrigation has occurred at this time. After 35 to 55 days, the larva is full grown and pupates in a cell of soil under the thatch. The pupae gradually darken and the reddish-brown, teneral (newly molted) adults emerge in 8 to 10 days. The new adults appear to be common in late-July through September. In some years, the new

adults may lay more eggs and a partial second generation can occur in August through mid-September. First and second generation adults appear to feed on grass blades and stems, but this doesn't produce noticeable damage. Eventually, the adults seek out suitable sites for overwintering. Some adults have been observed trying to fly but no great distances were covered. Any billbug larvae that do not finish development by the first hard freeze appear to die.

Billbug Management

Billbugs are some of the most difficult turfgrass insects to control because the adults' armor-like bodies do not readily absorb insecticides. They also do not ingest much insecticide when they chew into a grass stem while feeding. The larvae are also difficult to control because they are boring inside grass stems for much of their lives. Bluegrass billbugs seem to cluster in neighborhoods, especially where Kentucky bluegrass is being used as the primary lawn grass. Neighborhoods with mixed-grass lawns or lawns established using resistant varieties are often less severely attacked. Wise turf managers take time to observe all the turf in an area and watch for the beginnings of billbug attack in a neighborhood. Although bluegrass billbugs rarely fly, they may rapidly spread through continuous lawns of a neighborhood.

Option 1: Cultural Control—Use Resistant Turf Varieties

Kentucky bluegrass varieties 'Touchdown,' 'Merion,' 'Nugget,' 'Adelphi,' 'Baron,' 'Cheri,' and 'Newport' are often susceptible to billbug attack. The varieties 'Park,' 'Arista,' 'NuDwarf,' 'Delta,' 'Kenblue,' and 'South Dakota Certified' are often resistant or tolerant to attack. Most perennial ryegrasses, especially those with endophytes, are resistant to billbugs as are the fescues. Non-endophyte protected ryegrasses and fescues can be heavily infested and killed. It is strongly recommended that if a lawn must be renovated after billbug damage, use bluegrass that has resistance or use a blend of turfgrasses containing resistant varieties or species. For Ohio, high-endophyte ryegrasses and turf-type tall fescues are an ideal method of avoiding billbug damage.

Option 2: Biological Control—Fungal Diseases

Billbug adults and larvae seem susceptible to the entomophagous fungus, *Beauveria*. However, this fungus rarely attacks enough billbugs to have a

significant effect on the population. If commercial preparations of *Beauveria* are used, it is recommended to keep the turf moist by regular irrigation for 10 to 14 days after an application.

Option 3: Biological Control—Parasitic Nematodes

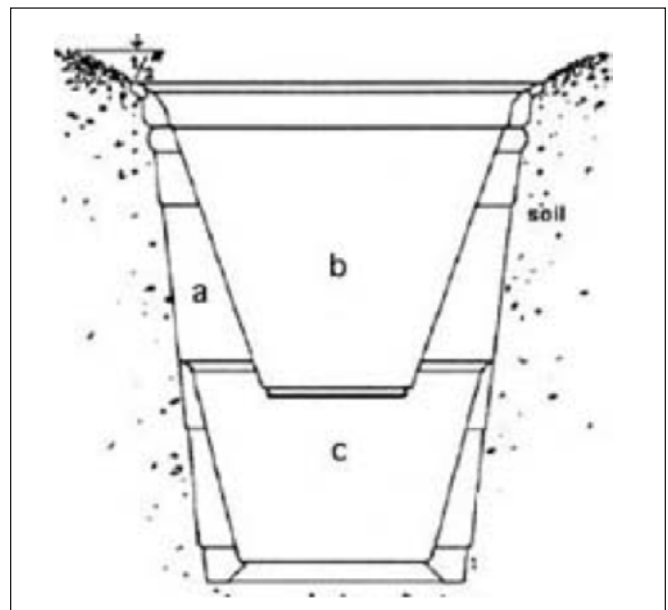
The entomophagous nematodes, *Steinernema carpocapsae*, *S. glaseri*, and several *Heterorhabditis*, have been used to infect billbug larvae in the laboratory and in small field trials. These nematodes, as well as other strains, can be purchased and used on a small scale. It is highly recommended to contact an insect parasitic nematode supplier before you plan to use them. This will allow the producer to select the best species and/or strain for billbug control and provide you with fresh nematodes. The best efficacy has occurred when the turf is watered prior to application of the nematodes, the nematodes are applied late in the day (to avoid direct sunlight), the nematodes are immediately irrigated in after the application, and the turf soil is kept moist for 10 to 14 days after the application. Additional information on use of the insect parasitic nematodes can be found at <http://www.oardc.ohio-state.edu/nematodes/>.

Option 4: Chemical Control—Preventive Control of Spring Adults

This is a commonly used strategy when surface, contact insecticides are preferred. Applications are made when adults first come out of hibernation and are feeding and moving about in search of oviposition sites. Studies in Ohio show that adults may begin to migrate in late April. Recent research shows that adults become active when the soil surface temperature approaches 65 to 68°F. Pyrethroid insecticides often have seven to 10 days of residual action against adult billbugs. There is good evidence that some of the neonicotinoids are able to eliminate adult billbugs, possibly by contact or by ingestion if residues are in grass stems when the adults are feeding and/or laying eggs. Turf managers using programmed rounds of contact insecticides should make applications to those neighborhoods that have experienced billbug damage in the past. These neighborhoods should be routed when the first billbug movement is expected and continued for no more than three weeks after migration is confirmed. The first migration in Ohio normally occurs in late April in southern Ohio and mid-May in northern Ohio. After this period, any remaining lawns or

neighborhoods should receive treatments that target billbug larvae.

Billbug Adult Sampling and Monitoring: Prior to applying insecticides for control of billbugs, it is highly recommended that some type of monitoring be used. The simplest monitoring is to keep records of previous damage. If a lawn or neighborhood was damaged in a previous year, it is at high risk of repeating the event, especially if Kentucky bluegrass is being used. However, there are several methods for detecting spring adult activity. The simplest method is to use pitfall traps, with cups or linear traps. Cup traps use plastic cups placed inside holes made by using a 4.5-inch golf course cup changer. Cup traps can be placed along the turf near or in flower beds so that they are out of the way. Adults billbugs can be easily counted by inspecting these traps one to three times a week. Linear traps consist of a three to four foot long section of 1.5–2-inch diameter PVC pipe with a slit cut down one side. This pipe is buried in the turf so that the slit is at ground level. One end of the pipe is sealed and the other is run into a plastic container which is sunk into a larger hole. Billbugs that drop into the pipe walk to the container where they are concentrated. This type of trap is useful in athletic facilities or on golf courses. Another common, but less precise, method of billbug adult sampling is to watch driveways and sidewalks for migrating adults. This works well on hot, sunny days but may miss the first activity period by a couple of weeks.



Pitfall trap. (a) outer cup, (b) funnel cup, (c) collection cup

Degree-Day Timing: A degree-day model using the average method of calculation, a March 1 starting date and a threshold temperature of 50°F predicts that the first adult activity should occur between 280 and 352 DD₅₀ and the 30% first activity (the time that the last surface insecticide would be effective) should occur between 560 and 624 DD₅₀.

Option 5: Chemical Control—Curative Control of Summer Larvae

Many currently available turf insecticides have systemic action that allows for their uptake into turf stems and leaves. Neonicotinoid and athranilic diamides are noted as having this action. Applications of one of these insecticides during the time that billbug larva are feeding within grass stems often results in satisfactory control. This is usually from mid-May into the second week of June over most of Ohio. Once the billbug larvae drop out of the grass stems after several weeks of feeding, they should be susceptible to the normal soil insecticides. But, experience indicates that these larvae may do considerable damage before exiting to the soil and many larvae may remain in the crowns and thicker stemmed rhizomes. Thus, earlier use of stem-systemic insecticides is recommended.

Sampling Billbug Larvae: Early detection of summer larvae is difficult. But, by mid-June, damaged tufts of turf can be pulled out to reveal the sawdust-like frass characteristic of this pest. By late June and into July, the larvae are usually large enough to see in the soil and thatch by cutting open a flap of turf and laying it back. A golf course cup changer is an easy to use tool that can be used to sample billbug larvae. Simply pull a plug where you find frass-filled

grass stems. Examine the area in the soil-thatch interface for the billbug larvae. The cup changer sample covers approximately 1/10th a square foot. Finding one billbug larva or more per cup sample indicates that curative control is needed in order to avoid turf loss.

Degree-Day Timing: The billbug larvae generally feed within the stems from 560 and 925 DD₅₀, at which time they begin to emerge from the stems 925 to 1035 DD₅₀. Systemic insecticides that move into grass stems can be used until larvae emerge from the stems. At this point, soil-thatch-active insecticides should be used. If drought conditions occur, significant visual damage usually occurs between 1330 and 1485 DD₅₀.

Option 6: Cultural Control—Dealing with Damage

With light to moderate billbug infestations, much of the damage can be masked with adequate irrigation and fertilization. The critical period for this irrigation and feeding is when the bluegrass is preparing itself for summer dormancy periods. If a tunneling larva kills the parent plant before the spring-formed tillers have completely established roots, the new plants also will die. However, this lethal stress can be reduced if water is supplied regularly at this time. Obviously, this strategy is a considerable gamble, especially if water is in short supply or if home owners are not willing to irrigate. Areas that are killed by billbugs will need to be reseeded. In Ohio, turf-type tall fescues better match the color and texture of remaining Kentucky bluegrass. If a complete reseeding is needed, perennial ryegrasses, which are usually darker than Kentucky bluegrass, with endophytes are satisfactory.

NOTE: Disclaimer—This publication contains pesticide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author and Ohio State University Extension assume no liability resulting from the use of these recommendations.

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