Virginia Cooperative Extension

PUBLICATION 444-040

Bluegrass Billbug Pest Management in Orchardgrass

William Kuhn, graduate student, Entomology, Virginia Tech
Roger Youngman, Professor, Entomology, Virginia Tech
Curt Laub, Research Associate, Entomology, Virginia Tech
Kenner Love, Extension Agent, Agriculture and Natural Resources, Rappahannock County
Timothy Mize, Associate Extension Agent, Agriculture and Natural Resources, Fauquier County

Introduction

The bluegrass billbug, *Sphenophorus parvulus*, is a weevil native to Virginia. Weevils belong to the family Curculionidae, which is contained within the order for beetles, Coleoptera. Like most weevils, the bluegrass billbug has a relatively narrow range of host plants, feeding on a handful of cool-season grass species.

This billbug species was first reported to cause injury to Virginia orchardgrass (*Dactylis glomerata*) in 1953, but caught little attention until recently. In a 2005 survey of more than 800 acres, orchardgrass stands in northern Virginia showed 40 to 100 percent injury levels due to billbug feeding. Such losses can be reduced, however, through timely pest management decisions targeted at the egg-laying adult.

Description of Life Cycle

The bluegrass billbug typically produces one generation per year. It begins as an egg, sheds its larval skin four times, pupates, and finally emerges as an adult. Most adults overwinter outside of the orchardgrass field in nearby rock walls or leaf litter, although some seek refuge in soil within the field. The adult becomes active as soil temperatures – at a 1-inch depth – rise to around 67 to 69°F (typically in late March to early April) and begins its walk back into the orchardgrass field.

The female feeds briefly and then begins egg laying by chewing holes near the bottom of orchardgrass stems, depositing one to three eggs into each hole, and sealing them off. The eggs hatch in about six days, and the first-stage larvae begin feeding up and down inside the stem. Once the larvae grow too large to fit within the stem, they chew their way out, drop to the ground, and begin feeding internally and externally on the crown and roots of the plant. Larvae pupate in the soil after about 35 to 55 days of feeding.

After eight to 10 days as pupae, new adults emerge, beginning the next cycle. Most adults emerge from mid-August through September. Adults feed for a few days and then seek out overwintering sites nearby. Although adults are capable of flight, this behavior is rarely seen.

Description of Life Stages

Egg: The egg is bean-shaped, off-white, and approximately 1/16 inch by 1/48 inch in size.

Larva: The larva (figure 1) is soft-bodied and legless. Most of the body is off-white in color except for a hardened head capsule, which ranges in color from yellowish when first emerged to darker reddish after several days. A fifth-stage larva ranges in length from 3/16 inch to 1/4 inch.

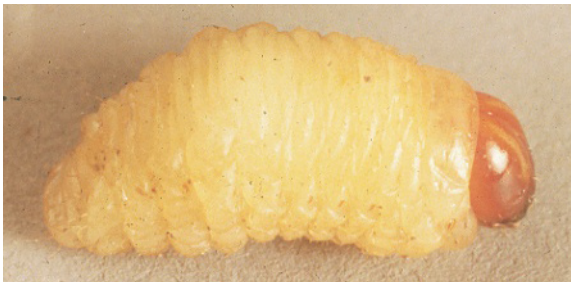

Figure 1. Billbug larva.

www.ext.vt.edu

Produced by Communications and Marketing, College of Agriculture and Life Sciences, Virginia Polytechnic Institute and State University, 2010

Pupa: The pupa is approximately 5/16 inch in length and is initially off-white in color, then darkens to rusty brown. It is somewhat adult-like in appearance, having a snout, six legs, and wing pads.

Figure 2. Bluegrass billbug adult, showing top and side views. (Photos: William Kuhn.)

Adult: The adult (figure 2) has a characteristic "weevil-like," tubular snout on the front end of a somewhat elongated body. It has hardened wing coverings and six stout legs. Its two antennae are attached to the base of the snout (near the head) and are elbowed and clubbed. The adult ranges in color from rusty brown, when first emerged, to black, and in length from 1/4 inch to 5/16 inch. When examined under magnification, the top of the segment behind the head is lined with evenly spaced pits, and the wing covers have a pattern that resembles chains running down their lengths. Often, the segment behind the head will have a dark, hairline ridge running down its middle. Adults are frequently covered in soil, making their identification difficult.

Injury

Billbug feeding causes three characteristic injury symptoms to orchardgrass (figure 3).

In the spring, adults feed on orchardgrass leaves, which later grow and unfurl. This feeding creates the first

Figure 3. Billbug plant-injury symptoms: *left*, paired feeding holes; *center*, feces-filled stems; and *right*, brown patches. (Photos: *left and center*, William Kuhn; *right*, Kenner Love.)

injury symptom: a series of paired holes that are somewhat oval-shaped and range in size from 1/16 inch to 3/16 inch on orchardgrass leaves. These holes can usually be seen in infested fields beginning in early April.

The second symptom is caused when young larvae feed within the plant stems and is characterized by stems that break off easily when lightly pulled. The broken stems often emit fine, sawdust-colored excrement.

Mature larvae cause the most injury by feeding in the crown and roots. This is the third injury symptom, which appears as irregularly shaped brown patches of orchardgrass in infested stands.

Monitoring and Management

Effective management of the bluegrass billbug must be based upon a firm understanding of the life cycle of this pest. Protection is afforded to the eggs, larvae, and pupae, either within the orchardgrass plant or in the soil, but the spring adults are exposed to surface insecticides during their migration back into the field. Treatment of the bluegrass billbug should be properly timed and targeted at the spring adults before peak egg laying can take place.

In order to assess when adults will become active as temperatures rise in the spring, useful tools called predictive models have been developed. One such model is a degree-day (DD) model for the bluegrass billbug that uses the average temperature for a series of days to give a good estimate of when adults will most likely appear. The following formulas are used in this DD model:

Formula 1:

$$Average\ Daily\ Temp. = \frac{Day's\ Max. Temp. + Day's\ Min. Temp.}{2}$$

Formula 2:

$$Degree\text{-}Day = Average\ Daily\ Temp. - 50°\ F\ (lower\ develop. threshold)$$

Formula 3:

$$Accumulated\ Degree\text{-}Days = DD_{day\ 1} + DD_{day\ 2} + DD_{day\ 3} + \ ...$$

Table 1: Example to demonstrate calculation of accumulated degree-days (ADD).

Day	Max. temp. (°F)	Min. temp. (°F)	Daily avg. (°F)	DD	ADD
1	59	43	51	1	1
2	65	47	56	6	7
3	54	42	48	0	7
4	57	47	52	2	9

Note: The lower development threshold used in this model is 50°F.

First, the average daily temperature is computed by adding the maximum and minimum temperatures for the day and dividing by two (formula 1). Next, a lower development threshold temperature, 50°F in this case, is subtracted from this average daily temperature in order to calculate the number of DD for that day (formula 2). If the average temperature for a day is less than 50°F, it counts as zero DD. Finally, DD are added together to get accumulated degree-days (ADD), as shown in formula 3. An example of these calculations is shown in table 1.

According to the bluegrass billbug DD model, when you begin accumulating DD from March 1, adults will begin to emerge between 280 and 352 accumulated degree-days.

The traditional method of sampling for adult billbugs is to install standard or barrier pitfall traps approximately 10 to 15 feet inside the edge of an orchardgrass field. For instructions on building and servicing these traps, please see VCE publication 444-416, "Using Pitfall Traps to Monitor Insect Activity" (*http://pubs.ext.vt.edu/444/444-416/444-416.pdf*). The traps should be installed at around 200 ADD (usually about mid-April) and should be checked weekly for billbugs.

Treatment measures should be considered if billbugs are detected in pitfall traps. Of the six insecticides labeled for orchardgrass in the 2010 *Virginia Pest Management Guide*, only Karate and Warrior II (both members of the pyrethroid class) are labeled for billbug suppression. For the current list of insecticides labeled for orchardgrass, consult the "Insects: Grass Hay and Pasture" section of the V*irginia Pest Management Guide*, located on the Virginia Cooperative Extension website (*http://pubs.ext.vt.edu/456/456-016/Section_4_Insects-4.pdf*).

References

Laub, C., R. R. Youngman, K. Love, and T. Mize. 2008. *Using Pitfall Traps to Monitor Insect Activity*. Virginia Cooperative Extension publication 444-416. *http://pubs.ext.vt.edu/444/444-416/444-416.pdf*.

Satterthwait, A. F. 1931. Key to known pupae of the genus *Calendra*, with host plant and distribution notes. *Annals of the Entomological Society of America, 24*(1): 143-72.

Shetlar, D. 1991. Predicting insect patterns via weather cycles. *Lawn and Landscape Maintenance* 68:68-72.

Shetlar, D. 1995. Billbugs. In *Handbook of Turfgrass Insect Pests*, ed. R. L. Brandenburg and M. G. Villani, 32-34. Lanham, Md.: Entomological Society of America.

Turner, E. C. Jr. 1955. *Calendra parvula* (Gyll.): A pest of orchardgrass. *Journal of Economic Entomology, 48*(3): 335.

Watschke, T. L., P. H. Dernoeden, and D. J. Shetlar. 1994. *Managing Turfgrass Pests*. Boca Raton, Fla.: CRC Press.

Youngman, R. R. 2009. Insects: Grass hay and pasture. In *2010 Pest Management Guide: Field Crops*, Section 4, 13-16. Virginia Cooperative Extension publication 456-016. *http://pubs.ext.vt.edu/456/456-016/Section_4_Insects-4.pdf*.