Virginia Cooperative Extension

PUBLICATION 444-041

Hunting Billbug Pest Management in Orchardgrass

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Introduction

The hunting billbug, *Sphenophorus venatus vestitus* – also known as the "zoyzia billbug" – is a weevil native to the southeastern United States. Weevils belong to the insect order, Coleoptera, and are in the family Curculionidae. Most of the approximately 51,000 species of weevils are host-specific herbivores, meaning they feed on only one or a select few plant species. The hunting billbug, however, feeds on a variety of both cool- and warm-season grasses.

The hunting billbug was only first reported as a pest of Virginia orchardgrass, *Dactylis glomerata*, in 2005. In the same year, a survey of 800 acres of orchardgrass stands in Northern Virginia showed injury levels of 40 to 100 percent due to billbug feeding.

Description of Life Cycle

Beginning as an egg, the hunting billbug sheds its larval skin four times, pupates, and finally emerges as an adult. In Virginia, this species typically produces one generation per year. In mid-March to early April, adult billbugs begin to emerge from overwintering sites, such as wooded areas and rocky outcrops near orchardgrass fields, and walk into the neighboring orchardgrass fields. This movement is brought on annually by warming of the soil at a 1-inch depth to approximately 67 to 69°F (typically in late March to early April). In addition, a small percentage of adults overwinter in the ground within existing orchardgrass fields.

The adults feed for a short period of time, and then each female prepares an egg-laying site by chewing a hole in the stem of an orchardgrass plant. The female deposits one to three eggs in the hole and seals it. In about six days, the eggs hatch and the larvae feed inside the orchardgrass stem. As larvae feed and grow, they drop out of the stem and begin to feed both inside and outside of the plant's crown and roots. This later feeding causes the most detrimental and noticeable injury to the orchardgrass plant. Larval feeding typically lasts a span of 35 to 55 days, after which the larvae pupate within the soil.

The next cycle begins as new adults emerge eight to 10 days later. The greatest emergence of adults occurs from late August to September. Adults feed briefly in the field and then walk to overwintering sites (flight is rarely seen in the adults).

Description of Life Stages

Egg: The egg of the hunting billbug is bean-shaped, off-white in color, and 1/16 inch in length by 1/48 inch in width.

Larva: The larva (figure 1) is legless and somewhat curved in shape. It has a soft, white body and a hardened head capsule that ranges from yellowish, at first,

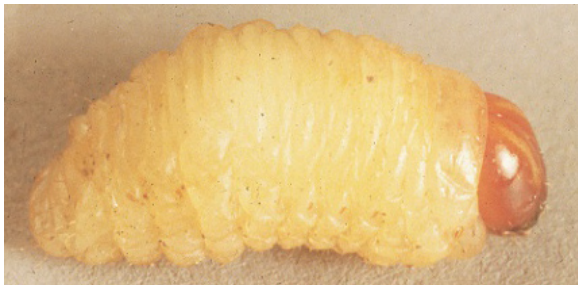

Figure 1. Billbug larva.

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

to rusty brown in color as the larva matures. A larva that has reached the fifth larval stage ranges in length from 3/16 inch to 1/4 inch.

Pupa: The pupa begins as off-white, gradually darkens to a rusty brown color, and has an approximate length of 5/16 inch. At this stage, a snout, six legs, and wing pads can be readily observed.

Adult: The hunting billbug adult (figure 2) has an elongated, somewhat oval body shape, with a long, thin snout at the front of the head. In addition, it has six robust legs and hardened wing coverings. Its antennae begin at the base of the snout and are elbowed with clubbed ends. Body length ranges from 1/4 inch to 7/16 inch. The top of the thorax has pits and black smoothed areas that form a characteristic "V" or "Y" shape that is framed by parenthesis-like markings. The wing coverings have lines of pits that run lengthwise along them. Coloration ranges from rusty brown, when first emerged, to black as it approaches the end of its life.

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

Injury

Three typical plant-injury symptoms are attributed to hunting billbug feeding in orchardgrass (figure 3).

The first is spring adult feeding on new leaves, which creates paired feeding holes that become evident as leaves unfurl. These paired holes vary in length from

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.)

1/16 inch to 1/8 inch, are slightly oval in shape, and often occur as a series. Paired holes are typically noticeable beginning in early April, when the first adult feeding occurs for the season.

The second type of injury occurs when larvae feed inside the stem, hollowing it out and filling it with excrement. The hollowed stems break off easily when pulled and sometimes will emit this excrement, which resembles sawdust.

The third type of injury can be noticed later in the summer. As larvae mature and grow to their maximum size, they cause the greatest amount of injury by feeding on the crown and roots of the orchardgrass plant. The appearance of irregularly shaped areas of brown orchardgrass becomes evident in infested stands and is a good indicator that this type of injury has taken place.

Monitoring and Management

Knowledge of the hunting billbug life cycle is crucial to effective control of this pest. The eggs, larvae, and pupae of the hunting billbug are well-sheltered inside the orchardgrass plant or within the surrounding soil, but the spring migrating adults do not have such protection. As adults are migrating into the orchardgrass fields to feed and lay eggs, they are exposed to contact insecticides. Proper timing of spring adult-targeted treatment is key to managing billbugs in orchardgrass.

Useful tools, called predictive models, have been developed to help assess when adults will become active as temperatures warm in the spring. One such model is a degree-day (DD) model that was first designed for a

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:

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

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.

related orchardgrass pest, the bluegrass billbug. This model also appears to fit well with the life history of the hunting billbug. The formulas used in this DD model as shown above.

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 start accumulating DD from March 1, adults will begin to emerge between 280 and 352 accumulated degree-days.

Currently, the best way to monitor for billbugs is to install standard or barrier pitfall traps approximately 10 to 15 feet inside an orchardgrass field. Instructions for construction and servicing of these traps can be found in VCE publication 444-416, "Using Pitfall Traps to Monitor Insect Activity" (*http://pubs.ext.vt.edu/444/444-416/444-416.pdf*). Traps should be installed at around 200 ADD (about mid-April) and should be checked weekly for billbugs.

If billbugs are detected using pitfall traps, control measures should be considered. 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 most current list of insecticides labeled for orchardgrass, consult the "Insects: Grass Hay and Pasture" section of the *Virginia 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.

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 *2009 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*.