Home and Horticultural

PESTS

K-STATE Research and Extension

Boxelder and Red-Shouldered Bugs

Few insects annoy homeowners like boxelder and red-shouldered bugs. Adults of both species congregate on the south and west sides of homes in late fall. They enter through cracks and openings looking for a place to overwinter but do not sting or transmit pathogenic organisms, damage structures, destroy fabric, infest stored products, or carry filth.

Hosts

Boxelder bugs feed on a variety of hosts including ageratum, apples, ash, asparagus, boxelder, buckeye, cacti, cherry, chinaberry, coleus, crabgrass, foxtail, geranium, grape, hollyhock, honeylocust, honeysuckle, iris, lavender, lilies, linden, mulberry, peach, pears, pigweed, pin oak, plum, silver/soft maple, soapberry, spirea, strawberry, tree-of-heaven, and tulips. Boxelder bugs feed on dead bees and cicadas. They may cannibalize other boxelder bugs, attacking immobilized and defenseless individuals as they molt. The preferred host is the boxelder tree, particularly the female, which produces fruits and seeds.

With a narrower host range, red-shouldered bugs prefer plants of the Sapindaceae family. These include balloonvine, *Ficus* spp., *Althaea* spp., and goldenrain tree, a species common in Kansas, especially in the east. Red-shouldered bugs are sometimes called goldenrain tree bugs. Other hosts include arborvitae, bluebonnets, chinaberry, grain sorghum, and western soapberry.

Developmental Stages

Boxelder and red-shouldered bugs undergo gradual metamorphosis with an initial egg stage followed by immature forms known as nymphs. Nymphs complete several stages of growth (instars) and molt a final time before emerging as adults.

Figure 1. Red-shouldered bug eggs.

Flat, oval eggs are 1.3 to 1.7 millimeters long. They are straw-colored when deposited, soon turning deep brown (Figure 1). Before hatching, eggs appear reddish with the nymph visible through the transparent shell. Boxelder and red-shouldered bugs are red to orange in the nymphal stages (Figure 2). First through third instars are relatively nondescript except for size. Slate-colored, bud-like wing pads appear during the fourth instar and lengthen as the bug develops.

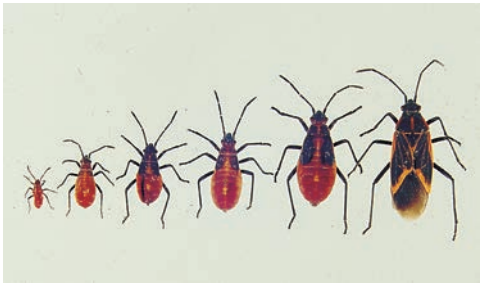

Figure 2. Boxelder bug developmental stages.

The adult boxelder bug (Figure 2) is elliptical with a pointed head and prominent red eyes protruding from each side. Antennae, legs, and overall body color are dark gray to black. Reddish-orange markings include three bold thoracic stripes (two lateral and one median). Bold margins surround the non-membranous portion (corium) of front wings and the thinner veins of the corium. The body area covered by wings retains the red-orange color. The larger abdomen of the female boxelder bug extends beyond the front margin of the forewings, further accenting the colorful outline. Red-shouldered bugs are smoky-gray to black with red eyes, shoulder margins, and abdominal borders (Figure 3).

Figure 3. Red-shouldered bug adult.

Seasonal Life History

In Kansas, boxelder bugs and red-shouldered bugs produce two generations a year. Seasonal developmental patterns and habits are similar. Both species overwinter as adults protected by leaves and debris in hedgerows, ditches, stone, lumber, and woodpiles, hidden beneath bark or in tree hollows, near building foundations, and with access to indoors. On warm winter days, bugs cluster on the sunny sides of buildings. When warm weather returns, boxelder and red-shouldered bugs adults migrate to tree hosts,

traveling up to 2 miles from overwintering sites. Adults settle on the ground until trees leaf out and feed on litter from the previous year. In a couple of weeks, bugs mate. Females can be seen carrying around the smaller, passive males (Figure 4). Egg-laying (oviposition) peaks between April 20 and May 10. The female boxelder bug produces 10 to 11 eggs on average, whereas the red-shouldered bug produces an average of 19. Eggs are deposited indiscriminately on stones, leaves, grass blades, tree bark, and shrubs.

Eggs incubate for about two weeks before hatching. Nymphs develop in 50 to 78 days depending on temperature and food availability and may cluster to feed on a single seed (Figure 5). Some first-generation adults climb or fly into trees to mate and lay eggs for a second generation. But with an ample supply of fallen fruits and seeds, many adult boxelder and red-shouldered bugs remain on the ground to produce the second generation. By the end of September, second-generation nymphs are fully developed and ready to migrate. Most have reached overwintering sites by mid-October when adults appear on the sides of homes and buildings.

Figure 4. Red-shouldered bugs mating.

Figure 5. Nymphs clustering on fallen seed.

Life stages overlap considerably because of the variation in migration times. Late instar first-generation nymphs (offspring of late-spring migrants) coexist with early instar second-generation nymphs (offspring of adults that migrated in early spring). Extended development of first-generation nymphs means that adults mate anytime between July 1 and August 29. With prolonged egg production, large populations of second-generation nymphs remain active well into winter and may be abundant into January during mild winters. Nymphs can survive brief cold spells but not more than few days and nights of extreme temperatures. Adults in protected sites have a better chance of survival.

Boxelder and red-shouldered bug outbreaks are more likely following hot, dry years. High temperatures accelerate nymphal development, maximizing the number of migrating and overwintering adults. During mild winters more adults survive to reproduce the following season. A lack of rain may also contribute to population growth. Nymphs and adults that would normally drown during heavy rains survive and are able to reproduce. Fungal pathogens, which thrive in high humidity are not active to keep bugs in check.

Control Methods

Although feeding may damage certain fruit commodities, boxelder bugs typically are not considered economically important. Tree damage is not noticeable, so the goal is to reduce the number of migrating individuals to keep bugs from becoming a nuisance around homes and buildings in the fall.

The effectiveness of natural, biological controls is not well known. Research has shown boxelder bugs to be free of insect parasites. In one study in which eggs were monitored closely, none were blackened to indicate the presence of parasites, no parasites emerged, and the boxelder bug nymphs hatched. Research also suggests that birds do not catch or eat the bugs, but spiders do.

Around Homes and Buildings

Attempts to combat boxelder and red-shouldered bugs around homes and buildings are often disappointing and may not be worth the effort. The following practices should help keep bug populations in check:

Modify habitat. Adult boxelder and red-shouldered bugs seek protected sites where they can survive the winter, so start by eliminating potential overwintering sites. Rake leaves and lawn debris. Remove accumulated leaf litter in and under hedges and bushes. Remove leaves, debris, woodpiles, lumber, equipment, and trash around homes and buildings that provides protection.

Seal cracks and crevices. Repair ill-fitting doors and windows. Place small mesh screens over louvers and air exchange systems.

Remove bugs by handpicking. This limits the number of adults that can reproduce. Remove small numbers of overwintering adult boxelder and red-shouldered bugs as they appear in fall, winter, and spring. If handpicking is impractical, use a vacuum cleaner and repeat the process as adults arrive in the fall or reemerge before spring migration. A forceful stream of water from a garden hose is effective for removing bugs from outsides of homes and buildings.

Apply insecticides. To reduce the number of bugs congregating in the spring and fall, use insecticides registered for use as perimeter treatments. Be vigilant and reapply as long as boxelder and red-shouldered bugs are active.

Breeding and Feeding Sites

Remove the food source. Determine the location of accessible tree hosts. Tree removal may be recommended to reduce problems with boxelder and red-shouldered bugs. But because boxelder bugs can fly up to 2 miles, if you remove the host tree(s) to eliminate a breeding site, spring migrants can move to other nearby trees and back to your home in the fall. It is dangerous for an inexperienced homeowner to remove a large tree, but hiring a professional arborist may be costly. With tree removal, the property owner loses a shade tree or landscape component.

Sanitation deprives spring migrants and offspring of food. Clear fallen seeds from areas beneath and near trees. Use a broom or shop vacuum on driveways, sidewalks, patios, decks, parking lots, and walking paths. A shop vacuum can be used to remove most seeds and litter from the ground in grassy areas.

Entrapment. Place sticky bands around tree trunks (Figure 6) to keep first-generation adults from moving to trees to deposit eggs for the second generation by trapping them as they climb. Drawbacks to this method include:

- Messy, hazardous materials must be placed out of reach of children and pets. To apply bands you may need a ladder that can be placed so it is firm and steady.
- Applying bands is labor intensive. Dirt and debris carried by wind gusts, and flowers shed by goldenrain trees may coat sticky bands, reducing effectiveness. Old material must be removed each time a fresh band is applied.
- Band tackiness varies depending on conditions. When boxelder and red-shouldered bugs are active during cooler times of the day, sticky materials are less tacky. Red-shouldered bugs may cross the barrier. Bands intercept only a small number of second-generation individuals moving up and down trees. Once full of trapped individuals, bands may serve as a bridge for others to cross. They need to be removed and replaced with fresh bands.
- Sticky bands can be bypassed. First-generation adults can fly into trees without contacting the sticky bands. They do not deter first-generation adults that remain on the ground for mating and egg deposition.

Figure 6. Sticky bands attached to a tree to trap bugs.

Physical removal. A powerful stream of water works to remove boxelder and red-shouldered bugs massed on tree trunks. Lawns beneath trees should be watered heavily throughout the season to drown first- and second-generation boxelder and red-shouldered bugs feeding on fallen seed. Maintain moist conditions to encourage naturally occurring fungal pathogens such as *Beauvaria bassiana*, which help to reduce insect populations.

Insecticide applications. Insecticides can be applied to reduce the number of boxelder and red-shouldered bugs migrating to overwinter near residential sites but must be applied to breeding and feeding sites beneath host trees repeatedly from late March through October. Applications must be applied simultaneously to trees where boxelder and red-shouldered bug populations develop, which may be difficult given the length of the season.

Despite best efforts, boxelder and red-shouldered bugs may hide beneath ground debris, litter and grass, shielding them from contact with insecticide treatments. Insects must be directly exposed to insecticide for the application to be effective. Total coverage of boxelder and red-shouldered bugs on all limbs, branches, and leaves of large trees is difficult to achieve. Insects hide in cracks, crevices, and beneath loose bark, and may survive insecticide treatments (Figure 7).

Numerous insecticides are registered for use against boxelder bugs. Insecticides are chemical products that when applied to targeted pests, disrupt normal physiological processes causing their deaths. The active ingredient (AI) is the actual component or "killing agent" in the insecticidal product. Many companies purchase the same AI and use it to formulate a product or product line. The manufacturer may offer the same product in various formulations such as dusts, granules, baits, emulsifiable concentrates, RTUs (Ready-To-Use products) or hose-end applicators. Retail outlets may not sell every product. Users may need to search for specific products registered for use against boxelder and red-shouldered bugs. With the number of products available, it is impractical to list all registered for use in Kansas. For example, a recent search found one active ingredient listed in 624 different products registered with the Kansas Department of Agriculture. The user is responsible for reading the product label to ensure safe and proper use against the intended pest.

Figure 7. Red-shouldered bugs hiding under tree bark.

Kansas Pesticide Law

While not all pests may be specifically listed on a product label, under Kansas Administrative Regulation 4-13-28 of the Kansas Pesticide Law, any pesticide may be applied for the purpose of controlling a pest which is not specified on the pesticide's label or labeling provided that: (a)(1) the pesticide's label or labeling authorizes application of the pesticide to the same crop, animal or site requiring application; (2) the pest to be controlled belongs to the same general group of pests intended to be controlled by the pesticide to be applied; (3) the pesticide's label or labeling does not specifically prohibit its application to the target pest to be controlled, or to the crop, animal or site to which the pesticide is to be applied; and (4) the application of the pesticide to the target pest, or to the crop, animal or site, has not been prohibited by rules and regulations promulgated by the secretary. (b) Each pesticide that is applied in accordance with the provisions of the abovementioned subsection (a) of this regulation shall be deemed not to cause any unreasonable adverse effects on the environment, nor to endanger the health, safety or welfare of the citizens of this state.

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MF2580 January 2016