

## Squash Bug

The squash bug (*Anasa tristis*) is a major insect pest of field and garden-grown squash and pumpkin. Although they prefer summer and winter squash and pumpkin, squash bugs may also feed on other cucurbit plants such as melons and cucumbers.

### Life History

Squash bugs overwinter as unmated adults and are active from late-May through June in search of suitable host plants such as squash and pumpkin. After mating (Figure 1), squash bug females deposit eggs in clusters of up to 20 on the underside of leaves between the veins (Figure 2) and on the stem. Egg-laying continues from June through mid-August, with each female producing up to 250 eggs. The eggs are  $\frac{1}{16}$ -inch in diameter and

initially light-brown (Figure 3) before turning dark red (Figure 4) several days later.

Nymphs hatch from eggs in 7 to 14 days, undergoing five developmental stages (instars) before maturing. Development takes from 4 to 6 weeks depending on temperature and food availability. First instar nymphs have a pale-green abdomen with head, thorax, legs, and antennae initially red (Figure 5), then turning black (Figure 6). Young nymphs gather near eggs from which they emerged to feed. Older nymphs are distributed over the entire plant. The second through fifth nymphal stages are gray, becoming darker gray with each successive molt (Figure 7). The nymphs are  $\frac{3}{16}$  to  $\frac{1}{2}$  inches long and do not have fully developed wings; consequently, they cannot fly.

### Adult squash bug



Figure 1. Male and female mating.



Figure 2. Female laying eggs.

### Eggs



Figure 3. Newly laid eggs.



Figure 4. Eggs turn dark red after several days.

### Squash bug nymphal stages



Figure 5. Early first instars.



Figure 6. Later first instars.



Figure 7. Second through fifth nymphal stages.





Figure 8. Adult squash bug on leaf.



Figure 10. Initial plant damage caused by squash bugs.



Figure 9. Black and orange markings on body of adult squash bug.



Figure 11. Later plant damage.

Adult squash bugs are somewhat flattened and  $\frac{1}{2}$  to  $\frac{3}{4}$  inches long. At this stage, squash bugs are dark-brown and have wings (Figure 8) with brown-to-black and orange markings along the outer edge of the body (Figure 9). Adults emit a foul odor when disturbed or crushed. Squash bug nymphs and adults are active throughout the growing season but are mostly concealed on the undersides of leaves. Squash bug adults move from plant to plant in fields and gardens and are generally located near stems and on leaf undersides. Adults overwinter in dead leaves, under rocks, stones, or wooden boards. They may seek protection in wood piles or plant debris, or move into nearby fields to overwinter. There are at least two generations per year in Kansas.

## Damage

Squash bug nymphs and adults use their piercing-sucking mouthparts to withdraw plant fluids from leaves, stems, vines, and fruits. Damage severity depends on plant size and squash bug population levels. For instance, heavy-feeding early in the season may kill seedlings and delay plant growth. In general, squash bug feeding is more harmful to smaller plants than larger plants, but larger plants may be killed when squash bug populations reach high levels.

Squash bugs damage plants directly by feeding on leaves, vines, and stems. On leaves, damage appears as small, yellow specks that eventually turn brown (Figures 10 and 11). Vine and stem

feeding leads to wilting, followed by darkening and drying of leaves. High adult populations can severely damage newly transplanted or emerged seedlings and may cause mature plants to wilt under hot, dry conditions. Nymphs and adults feed on the fruit of squash and pumpkin (Figure 12). Direct feeding on the fruit causes distortion, scarring, and sunken areas and may reduce marketability. Heavily damaged fruits do not keep well and often collapse and rot during storage. During feeding, squash bugs can also transmit the bacterium that causes cucurbit yellow vine disease (CYVD).



Figure 12. Squash bug nymphs and adults feeding on pumpkin.



## Management

Implementing a variety of plant protection strategies is recommended to alleviate problems with squash bugs during the growing season. Management techniques include scouting, sanitation, physical control, exclusion, trap plants, biological controls, and insecticides.

### Scouting

Scouting or monitoring for eggs and nymphs on squash or pumpkin plants early in the season is important to prevent the establishment of squash bug adult populations later in the season. Check plants for eggs and nymphs on leaf undersides at least once a week.

### Sanitation

After harvest, remove all crop debris and other plant material to eliminate sites for squash bug adults to overwinter. Dispose of plants and fruits to deprive them of food. It is important to remove plants and fruits in the fall because squash bugs will continue to feed on pumpkin fruits after vines have wilted. Food deprivation prior to overwintering compromises squash bug survival and may reduce adult populations the following spring. Remove or eliminate wood piles that may provide squash bugs a place to overwinter.

### Physical Control

The removal of eggs, nymphs, and adults by hand may be impractical in certain situations, especially large plantings. Hand removal may be feasible for small plantings and home gardens with only a few squash or pumpkin plants. Eggs and nymphs can be removed by hand and even vacuumed, and subsequently destroyed. Handpicking and destroying nymphs and adults may reduce squash bug populations and any subsequent damage. Handpick every 3 to 4 days. Another method is to place wooden boards or cabbage leaves throughout the garden, turning them over daily to collect squash bugs hiding underneath, then killing them in a container of soapy water. Also, look under fruits and clumps of soil where large numbers of squash bugs may be hiding.

### Exclusion

Exclusion may be an option depending on the size of the planting area. For small areas with only a few plants, floating row covers (Figure 13) or fabrics can be placed over plants for protection from squash bugs. Covers will need to be removed to allow bees to pollinate flowers for fruit set, but should be replaced quickly to prevent large numbers of squash bugs from feeding on plants.

### Trap Plants

Trap plants are cultivars of squash or pumpkin grown to attract overwintering squash bug adults and keep them from reaching the main crop. Trap plants should be destroyed or sprayed with an insecticide before eggs hatch to reduce squash bug populations.



Figure 13. Floating row cover protecting plants from squash bugs.

### Biological Control

Squash bug adults emit a noxious odor that makes them unattractive to most predators. But they are susceptible to a number of small parasitic wasps (parasitoids) including *Gryon pennsylvanicum* (Figure 14) whose larvae develop and kill squash bug eggs from within. In addition, a tachinid fly, *Trichopoda pennipes* (Figure 15) parasitizes late-stage nymphs and adult squash bugs. Parasitoids may help reduce squash bug infestations, but typically do not kill enough squash bugs to substantially affect the population or prevent plant damage. Parasitoid populations may be reduced or eliminated by regular applications of insecticides targeting squash bugs.



Figure 14. Female parasitoid laying egg into squash bug egg.



Figure 15. Adult tachnid fly parasitoid.

## ***Insecticides***

Insecticides that act on contact are primarily used against squash bugs. Thorough coverage of plant parts and proper timing of insecticide applications are critical in suppressing squash bug populations. Life stages (egg, nymph, and adult) are not equally susceptible. For instance, eggs are less susceptible to insecticides than the nymphs, but horticultural oils (petroleum, mineral, or neem-based) may be applied to kill eggs by means of suffocation. Insecticides should be applied when nymphs are present. Keeping in mind that smaller nymphs are easier to kill than larger ones, insecticides should be applied when nymphs emerge from eggs. Adult squash bugs possess a thickened waxy cuticle (outer covering), which insecticides are not able to adhere to and penetrate. Adults are also protected from insecticide sprays by the leaf canopy of large plants.

Apply insecticides when adult females begin laying eggs in the spring. Squash bugs continue to lay eggs throughout the growing season and weekly applications may be required to keep populations below damaging levels. Insecticide sprays must penetrate the plant canopy to thoroughly cover both the tops and undersides of leaves. Thorough coverage is difficult on large plants with dense canopies but can be accomplished by using multidirectional, high-pressure nozzles. Insecticides should be applied in the early morning or late evening so residues remain present longer on plant parts. To keep from harming pollinators (honey bees and bumble bees) and natural enemies that may be regulating populations of other insect or mite pests, apply insecticides in the early morning or late evening when pollinators are less active. Select products with minimal direct and long-term effects on natural enemies. Consult with your local extension agent about the proper use of insecticides.

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