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# Managing Flatheaded Borers in Fruit and Nut Trees

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## Biology and Life History

Flatheaded borers, also called "metallic woodboring beetles" or "jewel beetles," are generalist pests of deciduous ornamental, fruit, and nut trees. Most flatheaded borer attacks in nurseries and orchards have been attributed to the flatheaded appletree borer (*Chrysobothris femorata*) or Pacific flatheaded borer (*Chrysobothris mali*), two beetles that are native to Texas. Flatheaded appletree borer adults are 0.3 to 0.75 inches long and are typically a metallic bronze or copper color (Fig.1). Males have a metallic green face. The larvae are cream or white, legless, and have a large flattened "head" that is actually part of the thorax (Fig. 1). Mature larvae are 1 to 1.5 inches in length. Pacific flatheaded borer adults are 0.2 to 0.5 inches long and brownish-black or copper with a reddish tint (Fig. 2). The larvae are 1 inch in length and morphologically similar to flatheaded appletree borer larvae (Fig. 2). Known hosts include many hardwood trees, such as apple, pear, peach, pecan, persimmon, maple, oak, and elm. However, the flatheaded appletree borer is part of a species complex of several beetles that are very similar in appearance (Table 1). Therefore, researchers are still learning about the host tree preferences of these different species.

Flatheaded borers rarely attack healthy trees, but newly planted or stressed trees are highly susceptible to infestation. Adult flatheaded borers typically emerge during the spring and summer, during which time they mate. Females lay oval-shaped eggs under bark or in the crevices of the trunk and large branches throughout the spring and summer. Egg coloration can

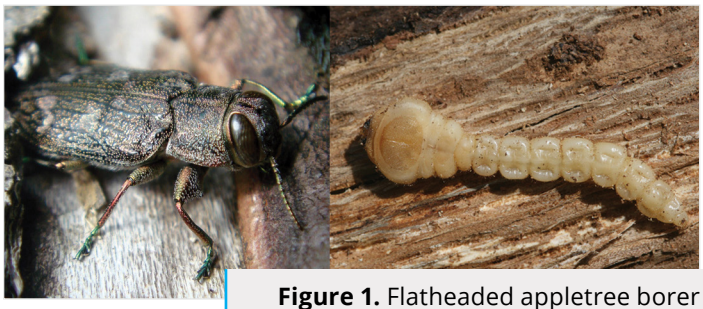

**Figure 1.** Flatheaded appletree borer (*C. femorata*) adult (left) and larva (right). *Photo Credit: Katherine Parys, USDA-ARS, Bugwood.org (left); Whitney Cranshaw, Colorado State University, Bugwood.org (right)*

**Figure 2.** Pacific flatheaded borer (*C. mali*) adult (left) and larva (right). *Photo Credit: Oregon State University Special Collections & Archives Research Center, Oregon State University. (07 Aug 2025). Chrysobothris mali (Pacific flatheaded borer). Retrieved from https://www.oregondigital.org/concern/images/df717h41q (Both)*

**Table 1. The *Chrysobothris femorata* complex**

| | |
|---|---|
| *Chrysobothris adelpha* | *Chrysobothris caddo* |
| *Chrysobothris comanche* | *Chrysobothris femorata* |
| *Chrysobothris mescalero* | *Chrysobothris quadriimpressa* |
| *Chrysobothris rugosiceps* | *Chrysobothris seminole* |
| *Chrysobothris shawnee* | *Chrysobothris viridiceps* |
| *Chrysobothris wintu* | |

**Note:** These beetles are so similar in appearance that only an experienced taxonomist can tell them apart. The Pacific flatheaded borer (*Chrysobothris mali*) is not part of this group.

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differ between species, ranging from yellow to orange to reddish-brown, and they are often well camouflaged and difficult to spot against the bark surface. As female flatheaded borers can lay eggs on multiple hosts, the larvae found in multiple trees can potentially come from a single female. Eggs hatch about a week from oviposition. After hatching, larvae bore beneath the bark and begin feeding on the vascular layers below it—phloem, cambium, and xylem (i.e., sapwood), in that order. In young trees, larval tunnels are typically located within 12 inches of the trunk base. The larvae remain in their tunnels until the following spring, when they tunnel into the heartwood and form a pupal chamber. Pupation lasts about 1 to 2 weeks, after which the adult beetle emerges to repeat the cycle. There is one generation per year. Adults leave a D-shaped exit hole upon emergence (Fig. 3).

**Figure 3.** These peach trees sustained heavy borer attacks as a result of stress due to "southwest injury." While the borer damage was extensive, the attacks were a secondary issue. *Photo Credit: Kyle Slusher, Texas A&M AgriLife Extension Service*

## Damage

Larval tunneling slows or stops water movement, disrupting the tree's vascular system (Fig. 4). Over time, this can girdle the trunk of small trees and the branches of large trees, leading to death of the area distal to that point (Fig. 4). Damage is often noticeable the year following attack. Early symptoms include sunken, discolored, or split bark (Fig. 5). Dead limbs on an otherwise healthy canopy may also be signs that a borer has fed at the base of a branch the previous season. This can be confirmed by examining the branch for signs of symptoms or D-shaped exit holes. Over time, the bark may fall off to reveal serpentine-shaped wounds, sawdust, and frass (i.e., insect excrement). This damage can be fatal to small trees. Larger trees may sustain multiple attacks to the trunk and branches but are more likely to survive (Fig. 5).

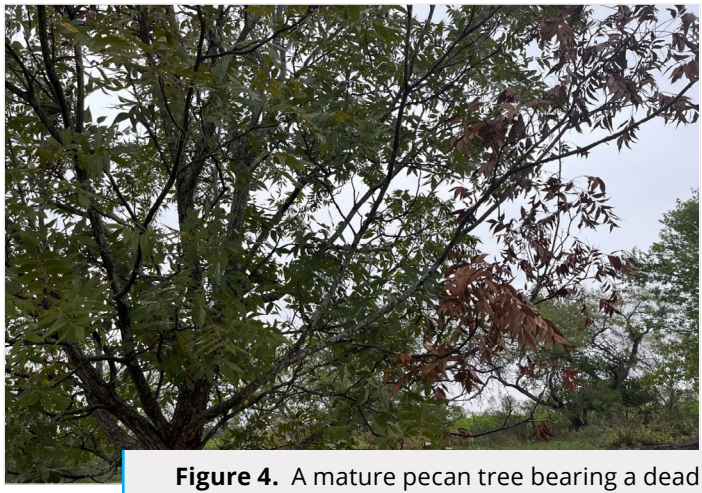

**Figure 4.** A mature pecan tree bearing a dead limb that was girdled by a flatheaded borer larva. The branch was likely drought-stressed, which encouraged the beetle attack. *Photo Credit: Monte Nesbitt, Texas A&M AgriLife Extension Service*

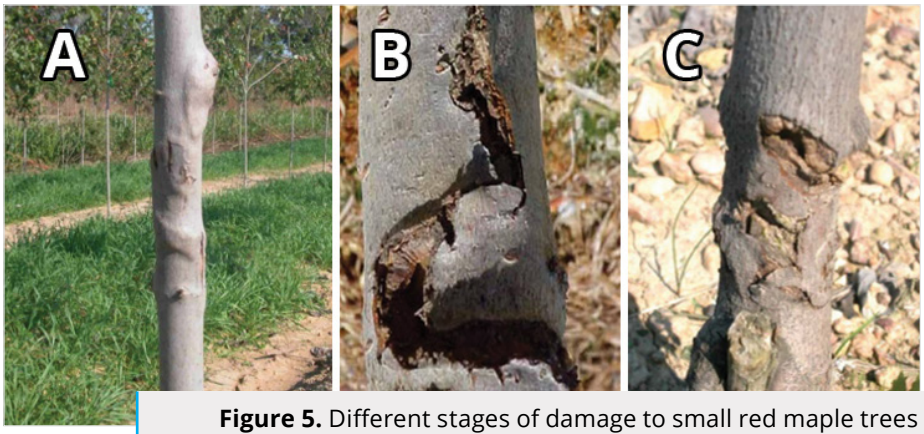


**Figure 5.** Different stages of damage to small red maple trees infested with flatheaded borers. A) A young tree with sunken and cracking bark is a sign of flatheaded borer infestations. B) Severe cracking of the bark from older damage. C) Girdling in a young tree from flatheaded borer tunneling and feeding. *Photo Credit: Jason Oliver, Tennessee State (A & C); Frank Hale, University of Tennessee (B)*

## Management

**Monitoring.** When a flatheaded borer infestation is suspected, the most important first step for growers is to confirm that the damage is indeed caused by a flatheaded borer. This can be especially important if attacks are observed on an already dead branch, as numerous non-pest, wood-feeding insects will begin to feed on the branch as it decays. In addition,

bark beetles, longhorn beetles, and sapsuckers (birds closely related to woodpeckers) can also cause damage to trunks and branches of trees.

Monitoring for adult flatheaded borers can be done by deploying purple, yellow, or red panel or tree pole traps in orchards. These colors have been shown to attract flatheaded borers for capture and monitoring. Studies are being done to see if there is a species preference for certain colors. However, these traps should be used to confirm the presence of flatheaded borers in the area and are not a reflection of potential damage. One can also easily catch other species that may not be tree pests. The best way to confirm the presence of the flatheaded borer in an orchard is to dissect branches with potential injury symptoms and to look for larvae.

**Cultural Control. The best tactic for minimizing flatheaded borer attack threat is to maintain tree health.** Flatheaded borers are secondary pests that rarely attack healthy trees. The presence of borer infestations in trees is often a symptom of a bigger issue. If in an area where sunscald is an issue, paint trees with latex paint (1:1 paint to water ratio) to mitigate damage. Select cultivars or species that are adapted to the area where the orchard will be established. Maintaining soil health can help prevent trees from being under stress from nutrient deficiency. In addition, use adequate irrigation and pruning practices to mitigate stress related to overcrowding, lack of water, and excessive crop loads. These practices are especially important for newly established orchards as they adjust to their new environment.

For orchards with small trees, there is evidence that the establishment of cover crops/ ground cover near the base of plants can significantly reduce attacks comparable to insecticide applications. While the mechanisms for this are not fully understood, some hypothesized reasons include changes in microclimate, obstruction of egg-laying sites, and an increase in predators and parasites in the area. This method loses its effectiveness as trees get taller. For larger trees, where damage is localized to a single branch, removal and destruction of infested branches can help reduce future populations.

**Biological Control.** Several parasitic wasps, predatory checkered beetles, mites, robber flies, and woodpeckers prey on adults and larvae. However, none of these are commercially available, and the impact of natural enemies on flatheaded borer control is not greatly understood.

**Chemical Control.** Currently, chemical control methods for the flatheaded borer in commercial orchards are limited, as most insecticides labeled for flatheaded borer are for ornamental or non-bearing trees. For example, while Batallion 2 EC (Bifenthrin) is labeled for pecan, use on flatheaded borers is only listed for ornamentals. Therefore, it is important to read the label carefully to make sure the insecticide being used is labeled for use in a specific operation. Fortunately, in most scenarios, insecticides are not necessary to manage flatheaded borers. Insecticide use for control of flatheaded borers is not an effective or economically feasible long-term solution. The only truly effective solution to eliminating flatheaded borers from an orchard is to eliminate what stressors are causing the tree(s) to attract borers. As long as that stressor remains, borers will continue to move into the orchard from the surrounding environment. Therefore, stress management should be the primary focus of any flatheaded borer management plan. Using insecticides to manage flatheaded borers should primarily be reserved for protecting newly planted orchards during their establishment period.

For newly planted orchards, a trunk spray of a pyrethroid or acetamiprid applied bi-weekly to the trunk or branches can prevent adults from laying eggs. However, the timing of spray applications can be difficult. For larvae, systemic insecticides in the neonicotinoid group, such as imidacloprid or dinotefuran, can be applied as chemigation or through another label-approved method. When applied this way, the insecticide is taken up by the roots and moved through the tree, killing any larvae feeding on the tissue. The best time to apply these products is in the spring when trees are breaking dormancy and producing a flush of new leaves. There is a limit on how much of an insecticide can be applied to the field per acre, so it is always important to read the label and understand how much can be applied and what coverage can be expected in an orchard. (Please see this article for more information on soil drench application: *Controlling the Flatheaded Appletree Borer in Nurseries with Soil Applied Systemic Insecticides* by Adam Blalock and Jason Oliver, Tennessee State University.)

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