

Twolined Chestnut Borer

Top-down attacks on oaks can take years to kill

Name and Description—*Agilus bilineatus* (Weber) [Coleoptera: Buprestidae]

Adult twolined chestnut borers are slender, black beetles with a bluish to greenish hue that are 1/5-1/2 inch (5-13 mm) long with two faint, yellowish stripes along their back (fig. 1). Larvae are legless, white, slender, and about 1 inch (2.5 cm) long when fully grown with two spines at the tip of the abdomen (fig. 2) and have an enlarged, flattened front end, characteristic of the Buprestidae. Twolined chestnut borer larvae live under the bark in cylindrical, winding tunnels tightly packed with fine grain sawdust and excrement (fig. 3). Pupae form in chambers at the end of these tunnels. Twolined chestnut borers occur in southern Canada and throughout the eastern United States, including in Kansas, Nebraska, and South Dakota.

Hosts—Oaks, especially bur oak in South Dakota; the word chestnut in the common name refers to the beetle's past status as a principal pest of American chestnut, *Castanea dentata*.

Life Cycle—The twolined chestnut borer has one generation per year. Adults are active from April to August, depending on the location and temperature. After emerging, adults fly to the crowns of oak trees and feed on foliage before moving to the branches and trunks to mate. Females lay their eggs in small clusters in bark cracks and crevices. Larvae hatch within 1-2 weeks. The larvae burrow through the bark to the cambial region where they construct meandering galleries (fig. 3), lightly scoring the sapwood (fig. 4). Galleries may be straight rather than serpentine in host trees that are highly stressed. When fully mature, usually in August to October, larvae burrow into the outer bark and construct individual chambers in which they overwinter. If the bark is thin, the larvae construct chambers in the outer sapwood. Larvae pass the winter in a doubled-over position. Pupation occurs the following spring. Adults emerge soon after through distinctive D-shaped exit holes about 1/5 inch (5 mm) wide that they chew in the bark. In rare cases, it may take 2 years for larvae to complete their growth and development, especially when originating from eggs laid late in the growing season or at the northern extent of the insect's range.

The bronze birch borer, *Agilus anxius* Gory, has a life cycle similar to that of the twolined chestnut borer. It can be a devastating pest of stressed or off-site mature birch trees, and it attacks young birch that have been recently transplanted.

Damage—Adult twolined chestnut borers primarily attack oaks that are weakened by drought or trees that are suppressed or declining. Urban oaks that suffer stress from trunk and root injury, soil compaction, and changes in soil depth are equally vulnerable to attack by this pest. Oaks that have been defoliated by insects or debilitated by root disease may also be attacked by the twolined chestnut borer. Although full-grown larvae are not much thicker than 1/13 inch (1-2 mm), they are able to construct galleries of sufficient depth to girdle and kill branches and trees. The first symptom of borer attack is usually wilted foliage that appears on scattered branches during late summer. The foliage on infested branches wilts prematurely and turns brown but remains attached to the branches



Figure 1. Adult twolined chestnut borer.
Photo: Robert A. Haack, USDA Forest Service, Bugwood.org.



Figure 2. Twolined chestnut borer larva.
Photo: Robert A. Haack, USDA Forest Service, Bugwood.org.



Figure 3. Twolined chestnut borer larvae with galleries on the inside of the bark. Photo: James Solomon, USDA Forest Service, Bugwood.org.

Twolined Chestnut Borer - page 2

for several weeks or months before dropping (fig. 5). Such branches will die and produce no foliage the following year (fig.5). Trees can be killed in the first year of attack; however, death usually occurs after 2-3 successive years of borer infestation. Typically, the crown is attacked during the first year, with the remaining live portions of the branches and trunk being infested during the second and third years. Practically nothing can be done to save infested portions of a tree once symptoms become visible because, at that time, the damage to the host tree is nearly complete.

Management—Because this insect attacks stressed oaks, any action that reduces stress will lower the probability of infestation. This includes thinning overstocked stands to increase vigor, limiting oak defoliation with insecticide application, and watering during drought. Management programs should first attempt to prevent attack from occurring, but if it happens, several control options are available.

Natural controls include limited impact from a parasitic wasp attacking borer larvae and mortality from woodpecker predation that can cause significant population reduction within infested trees. Some direct cultural controls take advantage of the sensitivity of twolined chestnut borer larvae to rapid drying of the host tissues by appropriately timed cutting or pruning of infested material. Infested material can be chipped, burned, solarized, or treated in a way that kills resident borers, including treatment with pesticide. Girdled trees can be used as traps, attracting twolined chestnut borers that lay eggs on hosts that will dry out before larvae can mature. Preventive pesticide treatments can be used to protect high-value shade and ornamental trees from becoming infested but require multiple annual applications. Incorporating knowledge of twolined chestnut borer biology and the local timing of life cycle events into these control and prevention activities is essential for their success.



Figure 4. Outer sapwood on the tree trunk engraved by twolined chestnut borer larval galleries. Photo: Minnesota Department of Natural Resources, Bugwood.org.



Figure 5. White oak infested by twolined chestnut borer; photo shows branch mortality and faded leaves. Photo: Steven Katovich, USDA Forest Service, Bugwood.org.

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1. Haack, R.A.; Acciavatti, R.E. 1992. Twolined chestnut borer. Forest Insect and Disease Leaflet 168. Washington, DC: U.S. Department of Agriculture, Forest Service. 12 p.
 2. U.S. Department of Agriculture, Forest Service. 1985. Insects of eastern forests. Misc. Publ. 1426. Washington, DC: U.S. Department of Agriculture, Forest Service. 608 p.