



# Is My Ash Tree Infested with Emerald Ash Borer?

John Ball

Extension forestry specialist, SDSU  
Forest Health, Department of Agriculture

The emerald ash borer (*Agrilus planipennis*) is a beetle recently introduced from northeastern Asia. This borer is responsible for the loss of millions of ash trees in North America since its accidental introduction into Michigan during the 1990s. Many tree owners observing dieback and decline of an ash tree, or seeing holes in the tree's trunk, may wonder whether the tree may be infested with emerald ash borer. There are many other boring insects native to our region that are associated with dying ash trees. This guide will help you determine whether your ash tree *may* be infested by the emerald ash borer.



Figure 1



Figure 2



Figure 3

## THE FIRST STEP IS TO BE SURE YOUR TREE IS AN ASH TREE

The emerald ash borer *only* infests ash trees, so identifying the tree species is an important first step in the process. Emerald ash borer attacks black ash (*Fraxinus nigra*), blue ash (*F. quadrangulata*), European ash (*F. excelsior*), green ash (*F. pennsylvanica*), and white ash (*F. americana*), along with their many cultivars. The Manchurian ash (*F. mandshurica*) is also attacked and killed in this country.

All ash trees found growing in South Dakota will have opposite branching; when one leaf or twig appears, another one will be opposite it on the twig or branch. The leaves will also be pinnately compound, meaning the leaves will be composed of leaflets. Ash leaves have at least five, typically seven, and occasionally nine leaflets (fig. 1).

Other trees and shrubs that have ash as part of their name—such as ash-leaf maple (*Acer negundo*), which is also known as boxelder, mountainash (*Sorbus* spp), and prickly-ash (*Zanthoxylum americanum*)—are **not** attacked by the emerald ash borer. Boxelder will have opposite, pinnately compound leaves, but only 3 to 5 leaflets per leaf (fig. 2). In addition, the tips of boxelder shoots are often covered with a bluish bloom. Mountainash has alternately arranged pinnately compound leaves. The leaves will typically have 9 to 15 leaflets (fig. 3). Prickly-ash also has alternate, pinnately compound leaves, but each leaf usually has between 9 and 11 leaflets. Prickly-ash also has spines at the base of each leaf.



Figure 4



Figure 5



Figure 6

### IF THE SUSPECT TREE IS AN ASH

The next step is to determine if the symptoms seen on your ash tree are consistent with those associated with emerald ash borer. Dead and dying ash trees are a common sight in South Dakota, and there are many possible reasons for their decline, ranging from drought to attack by native insects.

Common symptoms associated with attack by boring insects, including the emerald ash borer, are thinning canopies (fig. 4) and epicormic branching. The canopy of the tree may have only the lower branches still full of foliage and the top with only a scattering of leaves. In addition, the lower branches and trunk may have single or clusters of upright shoots (fig. 5); these are called *epicormic shoots* and occur along the branches or trunks of stressed trees. These shoots should not be confused with shoots produced in response to the disease *ash yellows*. The leaves on the sprouts associated with ash yellows have only simple leaves, rather than the typical compound leaf of a healthy ash. These symptoms, pockets of declining ash, thinning canopies, and epicormic shoots, while common symptoms associated with emerald ash borer, are also found with a number of other stressors.

A symptom common with ash trees infested by emerald ash borers is bark shredded off (fig. 6) by woodpeckers searching for the larvae. Fresh missing bark, particularly over an extensive area of the trunk, is one of the best indicators that the tree may be infested by the emerald ash borer. However, the presence of woodpecker activity may also be due to an infestation of carpenterworms.

If the tree has at least several of the following symptoms, there is a possibility that the tree may be infested with the emerald ash borer:

- The tree is in a grove containing several dead or dying ash trees.
- The dying tree has a thinning canopy that contains epicormic branches.
- The bark is shredded off due to woodpecker activity.

If the above indicators are present, look for signs of activity of a boring insect in the trunk or dying branches. Sometimes only the upper branches will show insect activity, and if possible these should be the first examined. Signs to look for are the size and shape of exit holes on the bark and the pattern of any insect tunnels beneath the bark.

## IDENTIFICATION OF BORING INSECT BY EXIT HOLES AND TUNNELS

There are many insects that infest ash trees in South Dakota, and each makes a characteristic exit hole and galleries beneath the bark.

The **emerald ash borer** creates a crisp D-shaped hole (1/8-inch) as it exits the tree (fig. 7). As the larvae tunnel, they form galleries just beneath the bark. These tunnels form a serpentine pattern (fig. 8) and are filled with a sawdust-like material. There is no powdery sawdust on the trunk either adjacent to the holes or on the ground beneath them.

The most common ash borer in South Dakota is our native clearwing **ash borer** (*Podosesia syringae*). This insect makes an exit hole about the size of a pencil (1/4-inch) (fig. 9), and usually the ground beneath the holes is covered with a powdery sawdust. The galleries are often found deep within the wood, rather than just beneath the bark, and are usually clean of material.

The **carpenterworm** (*Prionoxystus robiniae*) is another common boring insect of ash trees. This insect creates an exit hole about 1/3-inch in diameter (fig. 10), slightly larger than a pencil. There will often be sawdust around the hole and on the ground beneath the tree. Sap may also be oozing from the holes, and sometimes the empty pupal case left by the emerging adult insect can be found attached to the bark surrounding the exit holes. The galleries may be 5/8-inch wide, often empty of sawdust, and extend deep into the tree. Trees infested by carpenterworms often have their branches weakened by the extensive tunneling, and affected branches often break off in high winds. Woodpecker activity is also common on trees infested by carpenterworms.



Figure 7

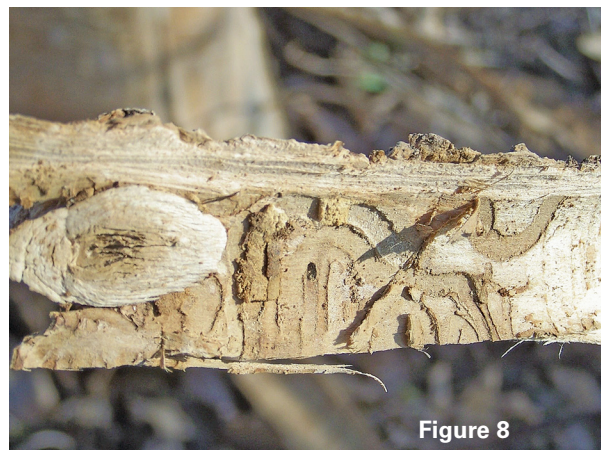


Figure 8



Figure 9



Figure 10



Figure 11



Figure 12



Figure 13



Figure 14

Other common borers of dead or dying ash trees are the **redheaded ash borer** (*Neoclytus acuminatus*) and the **banded ash borer** (*N. carprea*). These insects create an oval exit hole, almost “fuzzy” D-shaped in appearance, and are about 1/4-inch diameter (fig. 11). The galleries beneath the bark are winding (fig. 12), often follow the grain of the wood, and are packed with sawdust-like material. The galleries are similar to those created by the emerald ash borer. The primary difference is that the redheaded and banded ash borer galleries may extend deeper into the wood than those created by the emerald ash borer. If you cut into the wood beneath the bark and galleries are still present, the most likely cause is the redheaded or banded ash borer, not the emerald ash borer.

Another group of insects that can be found boring into dying ash are the **ash bark beetles** (*Hylesinus* spp). There are at least two species in South Dakota, the eastern ash bark beetle (*H. aculeatus*) and the western ash bark beetle (*H. californicus*). These insects create a round exit hole 1/16-inch diameter (fig. 13)—about the size of a BB—and often these holes will encircle a shoot. The galleries beneath the bark consist of a main tunnel with numerous smaller tunnels running off from it and following the wood grain (fig. 14).

These are the most common boring insects that attack ash trees in South Dakota. If you believe you found a tree infested with emerald ash borer, please do the following check:

- Is it an ash tree?
- Is it dying or in a grove of dying ash trees?
- Is the canopy of the suspect tree thinning, and are there epicormic shoots on the trunk?
- Is the bark off the tree in patches due to woodpecker activity?
- Are there crisp 1/8-inch holes in the trunk or branches?
- Are there serpentine galleries just beneath the bark that are filled with a powder?

Infested trees may not exhibit all these symptoms and signs, but it is important to check all these points before reporting any suspected tree. If after completing the checklist you believe the tree is infested with emerald ash borer, please contact your local Division of Resource Conservation and Forestry forester or your local Cooperative Extension educator for further investigation.

Available electronically on the Internet at <http://agbiopubs.sdstate.edu/articles/FS954.pdf>

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