

THE PURDUE LANDSCAPE REPORT

Revisiting Ash Tree Protection

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Recently, there has been an uptick in questions related to one of Indiana's most notorious invasive pests: the emerald ash borer. Homeowners, businesses, even professionals have asked if ash trees are still present in Indiana, and if the insect is still a threat to our ecosystem. Emerald ash borer wreaked significant havoc among Indiana's hardwoods, and a person could be forgiven for believing that there are no ash trees at all in our state, but this is simply not true. Ash still survives in Indiana and can be found both as ornamental plantings and in untended woodlots; unfortunately, emerald ash borer is also still present and just as deadly to them as ever. The question of protecting ash versus removal them is complex, but entomologists and tree specialists have learned from this insect's invasion.



Figure 1. Side view of EAB, John Obermeyer

The emerald ash borer (*Agrilus planipennis*), a wood-boring insect native to Asia, is responsible for decimating ash (*Fraxinus* spp.) throughout the United States and elsewhere. In Indiana, this insect's presence was confirmed in 2004, though it had probably been in the state for some time before then. Since its arrival, Hoosiers have been forced to watch as ash trees have rapidly declined and died due to the insect's feeding and life cycle. The insect lays its eggs in crevices in the bark of an ash that is 8 to 10 years old, and after hatching, the new larvae begin to bore through the tree's cambium tissue. The tree relies on its cambium tissue to transport water and nutrients and supply cells for new growth. Often, the only signs of the insect's presence are a reduction in canopy coverage and D-shaped exit holes in the

bark, indicating adult emergence. As time goes on, however, the tree will continue to lose canopy, experience limb death, and often have large chunks of bark detach. Unprotected trees will typically die within 2 to 5 years of infestation. Dead and dying ash trees represent a serious hazard to health and property as infestation will leave them extremely brittle. Brittle ash will often fall during weather events or even collapse over time as limbs fall off.

While emerald ash borer did significant damage to ash tree populations in Indiana, they did not destroy the population entirely. While virtually all untreated trees will eventually become infested, saplings with a trunk diameter of ½ to 1 inch will remain untouched, allowing annual replacement of trees to continue. Since the initial invasion killed so many trees, the borer's populations have been proportionally reduced as well due to a lack of a food source. This combination of factors has created a cycle of growth and infestation that allows both populations to survive, but at significantly lower levels as compared to the period of the initial infestation. Unfortunately, this also means that emerald ash borer is now a permanent fixture in the hardwood ecosystem in Indiana.

While many may believe ash trees are a total loss, there are still options to protect ash tree and even rescue ash that have already been infested. The first step in this process is to determine the extent of damage in a given tree. As the cambium tissue is consumed by ash borer larvae, the tree will experience a steady loss of canopy and limb death. The proportion of lost canopy makes a great indicator for treatment viability. For example, a tree that has only lost 10% of its canopy will normally respond well to treatment. As more canopy is lost, recovery is more challenging, until the tree has lost 30% of canopy coverage. After that point, there is very little chance that a rescue treatment will be successful, and removal will most likely be necessary. It is also important to remember that limb death may occur; these limbs will not recover and will need to be removed to avoid any potential hazards.

There are several insecticides with varying ranges of efficacy that can be used to manage emerald ash borer. These include

imidacloprid, dinotefuran, azadirachtin, and emamectin benzoate. Several studies have been conducted to find the best combination of chemical and application type, such as the difference between using a soil drench compared to a trunk injection. While all of the above chemicals can be effective against the insect, the combination of emamectin benzoate applied through a trunk injection offers the best, longest lasting protection from infestation. This combination has a durable effect lasting for two years under dense infestations. However, the reduction in emerald ash borer populations have spread the distribution of the insect thinner, and longer intervals between treatments are possible. A ten-year study conducted by Purdue University demonstrated that treating trees once every three years provided sufficient protection from the beetles, while also showing that 4 to 5 years after last treatment coincided with an increase in damage to the trees. This same study also found that by six years post-treatment, the trees would decline to the point of making removal a necessity. This research concluded that increasing time between intervals after three years increased the risk of catastrophic damage due to emerald ash borer activity, thus the recommendation for three-year intervals.



Figure 2. This photo illustration shows three ash trees in Bloomington, Indiana, with different levels of canopy lost to the emerald ash borer. (Purdue Tree Doctor app illustration/Cliff Sadof)

Ultimately, many will see this as a financial issue: the cost of treatment over time against the cost of removal to avoid potential damages. The above study estimated the cost of treating a single tree with an emamectin benzoate injection at \$300 per treatment. Since treatment only needs to happen once every three years, the cost per year per tree would be \$100, approximately. Tree removal was estimated between \$1800 and \$3600, depending on tree location and other factors. Also consider replacement costs if you wanted to continue to grow ash in that area, and how long the tree would need to grow to match the size of the tree you just replaced. Additionally, add in any treatment costs to make sure it survives infestation. When looked at from this angle, maintaining regular treatment on rescuable trees would appear to be the most cost-effective route for managing ash. Any treatment plan should be discussed with a professional, such as a certified arborist.

Even though emerald ash borer is here to stay, we can still keep small populations of ash safe from infestation with monitoring and proper treatment. Check the resources below to get more information and help with identification and management of emerald ash borer and other pests.

Special thanks to Dr. Cliff Sadof

Resources

Purdue Plant & Pest Diagnostic Laboratory:

<https://ag.purdue.edu/departments/btny/ppdl/>

Purdue Entomology's Emerald Ash Borer Info Page:

<https://extension.entm.purdue.edu/EAB/>

ReportInvasive:

<https://ag.purdue.edu/reportinvasive/>

Emerald Ash Borer University:

<https://Emeraldashborer.info>

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