

## PREPAREDNESS FOR EMERALD ASH BORER: WHAT IS AN EFFECTIVE APPROACH?

Chris Williamson <sup>1/</sup>

American elms succumbed to the Dutch elm disease in 1970s, consequently maples and ash dominate the urban landscape, and account for more than 40% of Wisconsin's urban forest. And history tends to repeat itself; to this end, an invasive insect called Emerald ash borer (EAB) now threatens ash trees in North America. EAB is an exotic insect (beetle) from Asia and was first discovered in southeast Michigan in 2002. Since its discovery, the beetle has destroyed more than 50 million ash trees in the Midwest region, including Wisconsin in 2008.

Only true ash species (i.e., *Fraxinus* spp) such as green ash, white ash, blue ash, and black ash are vulnerable to emerald ash borer. Green ash (*Fraxinus pennsylvanica*) and white ash (*Fraxinus americana*) are the most common ash species in Wisconsin. Emerald ash borer is a small metallic green beetle about 3/8 to 1/2 inch long and 1/16 to 1/8 inch wide that emerge from the inner bark from late May till September, creating a D- shaped exit hole. Its emergence peaks between mid-June till early July, especially during warm sunny days. A female beetle lays 30-90 eggs underneath the bark crevices and the eggs hatch in about 7 to 10 days. The adult beetles have a short life and they survive only for about 3 to 6 weeks. After the egg hatches, a tiny creamy-white colored larva immediately begins chewing through the bark and feeds on the inner bark tissue for several weeks. This is the destructive stage of the beetle's life cycle disrupting the movement of nutrients and water uptake to the tree. A full grown larva averages about 1.5" in length and has series of bell shaped body segments. While feeding, the larva creates a distinct serpentine gallery packed with its own frass (waste + sawdust). Larvae can reside inside the healthy bark for a year or two and begin to overwinter in late autumn in the feeding tunnels that they create on the outer sapwood. Transformation from the larva into the adult (pupation) occurs over the winter months (November-early May) and the adult beetle emerges in late May. Typically EAB has a one year life cycle.

EAB attacks both healthy and stressed ash trees. When populations are high, it can kill large ash trees in less than 3 years and smaller ash trees within 2 years. However, at low population densities or in a newly infested tree, detecting EAB can be very challenging because the symptoms are often subtle and occur mostly on the top crown region of the tree. As its density builds to moderate or high, external symptoms become more prominent. When checking for EAB presence on an ash tree, it is important to consider at least two or more combinations of signs and symptoms.

---

<sup>1/</sup> Professor and Extension Specialist, Department of Entomology, Univ. of Wisconsin-Madison.

**Symptoms:**

Crown dieback – Canopy thinning and dieback of branches on the upper and outer region of the crown

Epicormic sprouts – Excessive shoot growth (suckers) arise from the lower trunk and at the base of the tree.

Bark split – Vertical fissure on the outer bark revealing larval feeding galleries beneath

Wood pecker damage – Sensing the larval presence underneath the bark, a wood pecker strips pieces of bark (flecking) and excavates holes on the trunk

**Signs:**

D -Shaped exit hole – As the adult beetle emerge from underneath the bark in June and July, it creates a D -shaped hole approximately 1/8” in diameter

Serpentine galleries – When loose bark is peeled, distinct S- shaped feeding galleries packed with frass (waste) can be noticed underneath

**What you can do?****A) Prevention and Diversification:**

- 1) To limit the spread of EAB, do not move any hardwood firewood, ash nursery stock, unprocessed wood waste from pruning, removal or storm damage, ash bark and wood chip mulch that are more than 1” size out of Brown County.
- 2) Do not plant ash trees in landscape. Diversify with alternatives to ash and maple such as Kentucky coffee tree, ginkgo, baldcypress, Turkish filbert, swamp white oak, chinkapin oak, dutch elm disease resistant hybrid elms, disease resistant crab apples, Japanese tree lilac, apple serviceberry. To learn more about alternatives to ash, please visit [www.emeraldashborer.wi.gov](http://www.emeraldashborer.wi.gov)

**B) Treatment Options:**

Homeowners living in a quarantined county or within 15 mile radius from a known EAB infestation can treat their high value ash trees using a systemic insecticide which is up taken by tree roots. However several factors influence the effectiveness of the insecticide including the cost of the treatment and the pre-existing health condition of the tree. In general:

- 1) Insecticidal treatments are most effective as a preventive strategy on healthy ash trees that have a full crown and intact bark on its branches and trunk.
- 2) Ash trees that are already infected with EAB and exhibit less than 50% canopy dieback can still opt for insecticide treatment. Any signs of its recovery can be noticed in the second year after treatment. However trees that have lost more than 50% canopy may not recover from its decline. Thus, insecticide treatments are not suggested.

- 3) Most insecticidal products recommended for homeowners need annual application and are applied as a soil drench. The best timing for soil drench application depends on the size of the tree. To determine the amount of insecticide to apply, simply measure the circumference of the tree using a tape at a chest height at 4.5' above the ground to figure out the size of the tree. Trees less than 47" circumference are best treated in early spring (mid April – mid May) and larger trees (greater than 47" circumference) are best treated either in fall (September) or spring (mid April- mid May). Research findings suggest that spring insecticide treatments are favored over fall, however fall applications are acceptable.
- 4) The following systemic insecticides containing imidacloprid as the active ingredient are effective as a soil drench in treating ash trees less than 47" circumference – Bayer Advanced Tree and Shrub Insect Control, Ferti-lome Systemic Tree and Shrub Drench, Optrol, Bonide Tree and Shrub Insect Control, Ortho Max Tree and Shrub Insect Killer, Gordon's Tree and Shrub Insect Killer.
- 5) Make sure to read the product label to determine the rate of application and safety protocols. Before drenching, rake up any mulch, leaf litter or landscape cloth around the base of the tree trunk to about 18-24" to facilitate a direct contact of the insecticides with the soil. The soil needs to be in moist condition at the time of application. If the soil is very dry, irrigate around the base of the tree few hours prior to insecticide application or if the soil is too wet, allow it to dry out for few days. Measure the volume of application needed as directed in the label and slowly pour the solution around the base of the tree trunk. Replace the mulch after the solution is completely absorbed in the soil. Click on the YouTube video link below for detail demonstration on soil drench application  
<http://www.hort.uwex.edu/articles/protecting-your-tree-emerald-ash-borer>
- 6) Trees larger than 47" circumference can still be drenched by homeowner using Optrol (imidacloprid) or contact professionals for other treatments. You can find the list of certified arborist for hire at <http://www.isa-arbor.com/faca/findArborist.aspx>
- 7) Professionals have access to additional products with unique application techniques. A trunk injection technique with Treeäge (emamectin benzoate), a restricted use product (RUP) available only to certified and licensed applicators, has quicker uptake by the tree (irrespective of soil condition) and effective for at least 2 years. However, trunk injection can create wounds on the tree and repeated application can cause potential injury. Other products that can be applied via trunk injection method are IMA-jet (Imidacloprid), Imicide (Imidacloprid), Inject-A-Cide B (Bidrin), Pointer (Wedgle). Soil injection is another method of treatment by professionals where the products (Merit, Xytect) are applied within 18" of the trunk and placed between 2 to 4 inches beneath the soil surface.
- 8) Insecticide treatments are typically cost prohibitive in woodlot areas or for large number of ash trees in communities.