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Emerald Ash Borer Control for Foresters and Landowners

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Introduction: Emerald ash borer (EAB) is found in all regions of Virginia. Some areas have established populations with a high level of ash tree mortality and other areas are seeing it for the first time. With a wider spread of infestation many homeowners are seeking methods to protect their ash trees.

Control before infestation: Non-infested ash trees can be treated to avoid infestation but it is hard to predict when EAB will arrive in a particular county or city in Virginia. Since many counties are already infested, it is suggested that if you have a non-infested ash tree that you wish to save, consider treating with a systemic insecticide in the late April to mid June time frame, applying as a soil drench or an injection at the base of the tree. Currently registered Insecticide list for emerald Ash Borer:

Systemic Insecticides	*Contact Insecticides*
Imidacloprid	**Permethrin**
Acephate	**Bifenthrin**
Bidrin	**Carbaryl**
Dinotefuran	**Cyfluthrin**
Emamectin benzoate	

Systemics need to be applied in April or May when active uptake from the roots is occurring and **before** the trees show signs of infestation. Imidacloprid should be applied as a soil drench and emamectin benzoate must be applied by direct tree injection by an arborist. Contact insecticides used for branch and trunk sprays need to be applied in early May and early June. Always refer to the label for the specific pesticide product being used.

Biological Control: Ongoing research involves the release and evaluation of parasitoid wasps imported from China, the native habitat of EAB. EAB is the only known suitable host for these wasps. The wasps are being released on public lands and are not available for sale commercially.

Movement of Firewood: Long-distance expansion of the EAB range in the U.S. is largely a result of its movement in firewood. It is important when camping to leave firewood at home and purchase firewood at the campground from local sources. Many state and national parks no longer allow campers to bring their own firewood into their campgrounds. If you do take firewood to your campsite, burn all of it before leaving.

Control after infestation: Once trees are heavily infested, insecticides have limited impact and control may not be successful. Tree removal becomes the best option. The entire state of Virginia is quarantined, therefore it is not illegal to leave an ash tree in place after it dies, but it can become a hazardous tree as limbs or the entire tree may fall and endanger humans and property. It is best to remove and destroy infested ash trees on site. Landowners with large stands of ash should contact a Forester for possible sale of the logs, but this should be done before the trees become heavily infested and lose their timber value. Homeowners with limited numbers of trees should contact an arborist or tree service company for safe removal of the tree. Research suggests that once 25 percent of the crown is dead from EAB attack treatment is not encouraged.

Biological information on the Emerald Ash Borer, *Agrilus planipennis* Fairmaire

Description of Damage: Emerald ash borer (EAB) attacks all species of ash trees that grow in Virginia. Only Asian species of ash trees have shown any resistance to this pest. The first indication of damage by the emerald ash borer is canopy dieback. Tunneling by the larvae cause girdling and death of branches and the trunk. Early feeding damage by EAB will be difficult to detect because trees show few symptoms. As the infestation progresses the trees starts to thin out and branches in the top sections of the tree start to die. Many trees will have a large number of new shoots on the trunk called epicormic branching. Often these branches occur at the junction of the live and dead sections of the trees. Epicormic branching may also occur at the base of the tree after the tree has died. EAB can live in twigs as small as 1 inch in diameter but can also breed in trunks of fully mature trees. It usually takes 2-5 years for the EAB to kill the tree.

Image 1. Bark of tree girdled and killed by emerald ash borer. Note "S" shaped tunnels and adult emerald ash borer. Photo By Eric R. Day, Virginia Cooperative Extension.

Identification: Adult beetles are about 1/2 inch long and bright metallic green in color. When the wings are spread, the exposed abdomen is purple-red in color. The larvae are creamy white and have a tan head. At the end of the abdomen is a pair of pincher like projection. EAB can also be identified by its damage. As the adult beetle exits its gallery from under the bark it leaves a characteristic "D" shaped exit hole about 1/4 inch in diameter. Removing the dead bark near the exit hole will reveal numerous "S" shaped tunnels under the bark in the cambium area. Woodpeckers will often visit infested trees and leave large jagged holes after they have fed on the EAB larvae. Unfortunately they do not provide sufficient control of this pest.

Life History: The emerald ash borer has a one to two-year life cycle. The adult beetles start emerging in May and early June and beetle activity peaks between mid-June and early-July. It is possible to see beetles as late as August. Beetles live from about 3-6 weeks, feed on foliage by making small notches on the outer edge. The female usually lays between 50-100 eggs one at a time in bark cracks and crevices. Eggs hatch in about a week and the newly hatched larvae bore through the bark down into the cambium layer under the bark. Larvae feed under the bark during the summer and they are usually done by fall but stay in the larval stage until spring when they pupate. Newly molted adults remain under the bark for a few weeks until emerging to start they life cycle again. If degree day information is available, EAB adults start emerging at about 500 degree days (base 50 degrees F.) and the peak is at about 1000 degree days.

Remarks: EAB is native to Asia and was first detected and identified in Michigan in 2002. It is not known how it was brought into this country, although it is believed the borers arrived in untreated ash hardwood packing material (pallets) used at that time for shipping purposes. The first infestation in Virginia in 2003 was eradicated. The beetle was detected again in 2008 and survey showed it had spread to many areas in Northern Virginia making eradication impossible. It is now also found in southern and western sections of Virginia.

Image 2. Stands of dead ash trees along the Staunton River. Photo by Jason Fisher, Virginia Cooperative Extension.

Background Image: Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org