Forest Health

Kentucky's Least Wanted Tree Pests

by Jody Thompson and Alice Mandt

Kentucky is unfortunately "blessed" with numerous pests that negatively affect our trees. They may be caterpillars, beetles, aphids, or innumerable others, but in Kentucky's woodlands, two stand out as the most notorious. The hemlock woolly adelgid and the emerald ash borer first appeared in Kentucky in 2006 and 2009 respectively. Since that time, they have been moving through the state, attacking our hemlock and ash trees.

Hemlock Woolly Adelgid

Within the mountains and coves in eastern Kentucky, you will find the hemlock trees. Hemlock trees make up the picturesque landscape of dark evergreens and lush woods that shade streams even through the winter. Unfortunately, those areas no longer exist in some parts of the eastern United States due to the invasive, exotic insect, hemlock woolly adelgid, also known as HWA. The insect itself seems inconsequential with a length of less than one-eighth inch, but its effects are catastrophic. HWA feeds on hemlock needles by inserting its piercing mouthparts into the base of the needles and depleting the tree of essential nutrients. When fully infested, the result is needle drop, limb dieback, crown thinning, and tree death in just a few years. The eastern hemlock tree is considered a foundation species; the entire hemlock forest ecosystem depends on its existence. There is no other species that can replace the hemlock tree and assume its ecological role.

A single adelgid can produce up to 300 eggs and is so small that it can be spread by wind and birds. With no natural predators of HWA, populations in the eastern United States are spreading at an alarming rate. A single tree can hold millions of adelgids. In Kentucky, HWA was first found in Harlan County in 2006 and has since been found from the Red River Gorge south to the Cumberland Gap and from the Big South Fork east to Pike County. Though Kentucky has not yet experienced mortality, some areas are on the verge of seeing hemlock trees die. Unfortunately, even though efforts are made to get the word out about HWA, most attention will come when trees begin to die.

The hemlock woolly adelgid is a tiny insect that is causing big problems for hemlocks in Kentucky and beyond. The insect gets the "woolly" part of its name from the white cottony wax masses (left) found at the base of needles of infected trees. While small in size they make up for it in numbers as a single hemlock woolly adelgid can lay hundreds of eggs (right).

Photo courtesies: Above: Chris Evans, River to River CWMA, Bugwood.org Right and EAB photo above: Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org

Emerald Ash Borer

Emerald ash borer

Moving from eastern Kentucky to northern and central Kentucky you will find ground zero for dead and declining ash trees. Whereas HWA was introduced in the eastern United States almost 60 years ago, the emerald ash borer, also commonly known as EAB, entered the United States less than 20 years ago and was found in the state in 2009.

A female EAB will lay eggs in the bark crevices of an ash tree. After the eggs hatch, the juvenile beetles (larvae) chew their way into the tree. The EAB larvae feed on the inside of the tree, and when many beetles are feeding in one ash tree, it leads to tree death. The juveniles eventually develop into adult beetles and chew their way out of the tree.

EAB is one of the most dynamic and devastating tree pests that the United States has seen. It doesn't care if an ash tree is healthy or sick; it attacks in force and can kill a tree in just a couple of years. It has been found from Louisville east to Greenup County and from Lexington north to the Ohio state line. EAB moves its greatest distance with human help. Multiple EAB introduction points in Kentucky were due to firewood movement from infested areas.

What Can You Do?

The most important thing any individual can do is become educated about these pests and make sure that they are not contributing to their spread by the long-distance movement of their host material. Firewood movement is one of the most common pathways for the spread of EAB, which can survive in downed ash wood for up to 18 months. Additionally, avoid transplanting hemlock trees from a woodland setting to your yard.

When treating for HWA and EAB, just spraying the trees will not kill these pests. HWA is well protected most of the

year because of the woolly mass that protects it. EAB is well protected because its juvenile stage, which is the damaging stage, feeds on the inside of the tree.

Because both of these pests cause damage in the internal tissues of their host trees, it is essential to get the insecticides inside the tree. Systemic insecticides do this by moving through the internal tissues of a plant, such as those that transport water. This delivery method ensures that HWA and EAB are directly exposed to the insecticide when they feed.

Treatment Methods for Hemlock Woolly Adelgid and Emerald Ash Borer		
Soil Drench		The most common application method for a homeowner to use is the soil drench. Remove leaves and other non-soil material away from the base of a tree to expose the soil. The insecticide, mixed according to label directions, is then poured onto the soil. Look for products containing imidacloprid and dinotefuran at retail stores carrying garden products, co-ops, and farm supply stores. *Photo courtesy: Great Smoky Mountains National Park Resource Management Archive, USDA National Park Service, Bugwood.org*
Soil Injection		Soil injection uses a probe-like injector that is pushed into the soil near the base of the tree. The insecticide is pumped directly into the root zone. Look for products containing imidacloprid and dinotefuran. *Photo courtesy: Great Smoky Mountains National Park Resource Management Archive, USDA National Park Service, Bugwood.org*
Trunk Injection		Holes are drilled into the trunk of the tree near its base at a distance particular to the size of the tree. Capsules filled with the insecticide or fittings attached to a supply of insecticide are inserted into the holes and the chemical is delivered into the tree. This method typically uses imidacloprid for HWA, but imidacloprid and emamectin benzoate formulations for EAB. Emamectin is not currently used for HWA. This method should be performed by a licensed and trained professional. *Photo courtesy: Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org*
Basal Spray		The insecticide is sprayed on the bark near the base of a tree. This method, as with the others listed, is not effective in all situations and should be applied by an experienced professional. Certain formulations of dinotefuran are used for this method. *Photo courtesy: Billy Thomas*

Word of Caution
Even though these pesticides can be very effective in the treatment of EAB and HWA, many consider certain insecticides to be overused. Use any pesticide according to the label instructions. Also, using more than is recommended doesn't always mean better results. In fact, improper use can lead to problems with other pests, contamination of water sources, human health hazards, and wasted money.

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