Emerald Ash Borer Update

by Joe Collins and Jennie Condra

Adult EAB sitting on an ash leaflet.

Photos courtesy: Joe Collins

merald ash borer (EAB) is an exotic beetle that was found for the first time in Kentucky in May 2009. The initial find turned out to be two separate locations: Jessamine and Shelby counties. Since that date, EAB has also been found in 19 additional counties in Kentucky.

How did EAB get to the United States?

It is believed that EAB first arrived in the United States in the early to mid-1990s in wood packing material originating from China. The wood packing material, or crating, was not heat-treated, and EAB larvae were hidden inside the wood. Once the crating was taken off the shipment, the insects emerged and flew to the native ashes that are a common plant species in that part of Michigan. The beetle population went undetected for several years until, in an area near Detroit in the summer of 2002, adult beetles were collected and determined to be an exotic beetle originating from Asia. Since that initial discovery in 2002, EAB has been discovered in 18 states and 2 provinces in Canada.

How did EAB get to Kentucky?

We will never be 100 percent positive on how EAB got to Kentucky, but we believe that some of the EAB locations in Kentucky are directly related to the movement of infested firewood. When EAB was first found in Michigan and later in Ohio, it was discovered that EAB could emerge from infested ash firewood that had been cut the previous fall. As EAB began to be found in more and more states, it became apparent that several of these new locations were campgrounds. The correlation was made that campers were bringing infested wood to the campgrounds and the beetles were emerging and establishing in the woodlands surrounding the campground.

Photo courtesy: Doug McLaren



Firewood transportation is believed to be one of the leading ways that the emerald ash borer and other tree insects are moved from location to location.

Where is EAB in Kentucky? Currently EAB is k

Currently EAB is known to be established in all or parts of these counties. The number behind the county represents the year that EAB was first detected in that county. Anderson (2011), Boone (2010), Boyd (2010), Boyle (2011), Bracken (2011), Campbell (2009), Fayette (2009), Franklin (2009), Garrard (2011), Greenup (2009), Hardin (2011), Henry (2009), Jefferson (2009), Jessamine (2009), Kenton (2009), Oldham (2009), Owen (2009), Scott (2011), Shelby (2009) and Woodford (2009). Based upon the 2012 purple trap survey, we can now add Pike County to the list of counties with EAB.

Where did we look for EAB this year?

As beetles are found in Kentucky, the trapping front moves further south and west. Trapping efforts for 2012 were concentrated in the southern portion of the state. The northern border for traps in Eastern Kentucky was Pike, Floyd and Breathitt counties. This line extended westward to Larue and Grayson counties, the northernmost counties in central Kentucky containing traps. The entirety of Western Kentucky contained traps.



This map shows the location of EAB traps in 2012, the counties that EAB has been found in, and the counties that are currently under the EAB quarantine. For more information about the EAB and the quarantine please visit <u>www.ca.uky.edu/forestryextension/EAB.php</u>



These ash trees have a thin crown and epicormic sprouting as a result of EAB.

What are the hosts for EAB?

Luckily EAB only attacks ash trees. University research has shown that EAB is unable to feed on any other species of tree and survive. Unfortunately all North American species of ash are susceptible to attack from EAB. Green ash is the most preferred, followed by black, white and then blue ash. There does appear to be some resistance in some of the Asian species of ash, which is understandable because EAB and the Asian ash trees have evolved together.

How does EAB kill an ash tree?

Beetles begin to emerge from ash trees

about the same time black locust trees are in full bloom. which is usually around the first two weeks of May in Kentucky. The beetles fly to the branches and feed on the leaves of the ash tree before mating. The amount of leaf feeding done by the beetles will not be very noticeable to the casual observer. After mating, the female seeks out



This ash tree is under heavy attack from EAB.Larvae feeding under the bark disrupts the flow of water and nutrients to the top of the tree causing dieback in the crown of the tree.

living ash trees and lays her eggs on the bark. EAB will not lay eggs on dead trees or on wood that has already been cut. These eggs will hatch in one to two weeks, then tiny larvae (or the caterpillar stage) will burrow underneath the bark and begin feeding. The larvae feed in a serpentine pattern, and this feeding disrupts the flow of water and nutrients to the upper portions of the tree. The tree begins to die from the top down. EAB prefer to first attack an ash tree in the upper canopy then move down-

> ward in subsequent years as the tree begins to die. EAB are also known to attack ash tree roots that are exposed along the ground. The larvae feed from July through October, then they suspend feeding for the winter. In the spring the larvae finish feeding then pupate, changing from a larva into a beetle. There is only one generation of

Top: Tunneling caused by a single EAB larva. Right: EAB larvae will be creamy white with bell-shaped segments.

How do I know if my tree has EAB?

Trees being attacked by EAB will sometimes have bark splits that reveal the larval tunneling beneath the bark. Other times ash trees may send out epicormic shoots along the trunk as a last ditch effort of survival. It should be pointed out that these are not definitive diagnostic tools to use as other borers of ash may cause similar symptoms.

However, the presence of 1/8-inch D-shaped holes in the bark of ash trees is a definitive sign that the tree is being attacked by EAB. Other borers of ash will make holes that are oval or round, but only EAB makes a distinctive D-shaped hole. Unfortunately EAB begins to infest a tree from the top down, so by the time the holes are visible at eye level, the tree has been under attack for several years and may be near death.



beetles per year.

Characteristic 1/8-inch D-shaped EAB exit holes in bark of ash tree.

What is being done?

It is only practical to chemically treat individual trees in the landscape but not ash stands in a forest setting. That doesn't mean the trees in the forest are without hope. There is a considerable amount of effort going into releasing biological control agents to try and combat the EAB. Currently in Kentucky there are three different species of parasitic wasps being released in various locations. These wasps have undergone extensive testing to ensure that they will not host shift and attack native U.S. borers, and that they are not harmful to species that may ingest them. People may be alarmed that wasps are being released into the environment but these wasps are so tiny, about 1/8-inch in size, that they are incapable of stinging a human.

The species we are releasing include two larval and one egg parasitoid that have been found to be effective at keeping EAB populations at a manageable level in their native range of China. A parasitoid lays an egg either on or in its host. The egg then hatches and the wasp larvae feed off of the host until pupation occurs. All that is left of the host larvae at that point is an empty skin. Parasitoids are effective biological control agents partly because they tend to be very host specific compared to a predator. This cuts down on non-target species being affected.

Potential locations for parasitoid releases are screened to make sure the site gives the best chance for parasitoid establishment. One criterion is that EAB has been found in the area but the trees are still actively growing and not showing extensive decline. Areas in Kentucky that have passed this and other criteria put forth by the USDA include natural areas in the following counties: Fayette, Kenton, Boone, Franklin, Shelby and Jefferson. There has not yet been any follow-up work to determine if the wasps have established in these areas.

About the Authors:

Joe Collins is a senior nursery inspector and the project leader for emerald ash borer in Kentucky. He coordinates the trapping, biological control and quarantine efforts at the University of Kentucky in the Office of the State Entomologist.

Jennie Condra is a nursery inspector at the University of Kentucky in the Office of the State Entomologist. She works with plant nurseries across the state.

Office of the State Entomologist, Department of Entomology, University of Kentucky, S-225 Agricultural Science Center North, Lexington, KY 40546-0091; E-mail: joe. collins@uky.edu; jennie.condra@uky.edu Phone:859.257.5838; Fax: 859.257.3807 www.KyStateEnt.org

bark.