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Hitchhiking **BUGS**

Tree-killing insects spread by taking advantage of free rides.

by Rob Lawrence



More than 20 million ash trees have died in the Midwest. They were killed by a half-inch long, metallic-green beetle that tunnels underneath bark. The **emerald ash borer**, a beetle native to Asia, threatens to completely remove ash trees from U.S. forests.

EMERALD ASH BORER (ACTUAL SIZE) STEVEN KATOVICH, USDA FOREST SERVICE, WWW.FORESTRYIMAGES.ORG



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USDA port inspector examines wood crating for pests in international cargo.

This is not the first time our forests have been devastated. During the early 1900s, chestnut blight ravaged our forests by killing almost every chestnut tree, and in recent decades, Dutch elm disease has caused the widespread death of elms.

The emerald ash borer is only one example of many non-native insects that have invaded North American forests. These invasive species are efficient hitchhikers on a variety of wood packing and other plant materials. Increasing international trade has provided more opportunities for non-native insects to travel to places where they've never existed before.

On Its Way

The emerald ash borer was first detected in the U.S. in 2002 when large numbers of ash trees began dying in southeastern Michigan. The beetle had arrived several years before, probably by hitchhiking within wood crating or other wood materials in a shipment from Asia.

By the time the infestation was discovered, it was already too late to contain it. The beetle had spread across Michigan's Lower Peninsula and into Indiana, Ohio and Ontario.

More recently, populations have been found near Chicago and in Maryland. In southeastern Michigan, where nearly all ash trees have been killed, communities and homeowners are struggling to deal with the costs of removing the many hazardous standing dead trees.

These beetles continue to spread across the Midwest. Humans unknowingly transport emerald ash borers when they haul infested ash logs, firewood or nursery stock, because the insects spend much of their lives hidden beneath ash bark.

The beetle's worm-like larvae feed just under the bark and create wandering S-shaped tunnels that disrupt the flow of water and nutrients within the tree. When large numbers of larvae are present, they completely

girdle and kill trees within one to three years. All ash trees—from small to large—are susceptible, even healthy ones.

Missouri's Ashes at Risk

Ashes, including white ash, green ash, blue ash and pumpkin ash, comprise about 3 percent of the trees in Missouri's rural forests, and about 13 percent of the trees in our urban forests. In some places, they comprise as much as 30 percent of park and street trees. Cultivars of white and green ash are among the most commonly planted trees in urban landscapes.

Even before the emerald ash borer arrived, ash trees in the Midwest were battling native pests. It is common to see ash trees with symptoms of ash yellows (a disease) or ash decline, a condition caused by a variety of diseases or other stresses. Native wood-boring insects frequently attack ash trees stressed by injury, transplanting, soil compaction or poor tree location. All of these problems can result in branch dieback, sparse leaves and gradual decline of tree health over several years.

Because of these ongoing problems, it's not easy to know if a tree has been attacked by the emerald ash borer. One of the most distinctive clues to look for is a 1/8-inch diameter, D-shaped hole in the bark that the adult emerald ash borer creates when it exits a tree.

Pathways for Invaders

Once an invasive insect species gains a foothold in North America, it can move by many pathways across the continent. Emerald ash borers traveled in firewood from Detroit to recreation sites throughout Michigan and nearby states. They hitchhiked in logs transported to sawmills and in nursery stock shipped from Michigan to Maryland.

Asian longhorned beetles, another non-native wood borer, traveled in firewood from infested trees cut down in Brooklyn to uninfested forests on Long Island.

Gypsy moths, which defoliate oaks, temporarily established themselves in northwestern Arkansas in the early 1990s, possibly after hitchhiking from the northeastern U.S. as egg masses attached to recreational vehicles. Aggressive action by state and federal authorities eradicated the gypsy moth population in Arkansas, but the infested area of the northeastern U.S. continues expanding westward and will eventually reach Missouri.

Asian longhorned beetle populations have been nearly eradicated in Chicago, and eradication efforts continue against populations in New York, New Jersey



NOPPADOL PAOTHONG

Is It Emerald Ash Borer?

QUESTION 1: Is the tree an ash species?

- Emerald ash borers attack only ash trees.
- For help identifying ash trees visit www.emeraldashborer.info/identifyashtree.cfm or you can purchase the *Trees of Missouri Field Guide*. The book includes easy-to-understand descriptions and color illustrations for 147 native and 27 non-native tree species found in Missouri. This item is available for \$7.50 plus shipping and handling, and sales tax (where applicable). To order, call toll free 877/521-8632 or visit www.mdcnatureshop.com.

QUESTION 2: Is the tree in poor health?

The following symptoms can be caused by native pests, emerald ash borers or other stresses:

- Branch dieback in upper crown
- Sparse leaves
- Splits in bark
- New sprouts on trunk or limbs

QUESTION 3: Do you see any of the following?

- 1/2-inch-long, metallic-green, bullet-shaped beetles
- 1/8-inch-wide, D-shaped holes in bark
- Tapeworm-like larvae with bell-shaped segments under bark
- S-shaped larval tunnels under bark

It's NOT Emerald Ash Borer if you see:

- Round or oval holes in bark
- Brown papery insect "skins" in bark holes (clearwing moths)
- Round holes in rows on bark (yellowbellied sapsucker)
- Larval tunnels deep into wood or not S-shaped

Check these Web sites to be sure

- www.emeraldashborer.info
- www.missouriconservation.org/forest/features/firewood.htm



NOPPADOL PAOTHONG

Transporting firewood from other states to Missouri campgrounds could bring devastating new pests to our forests.

and Ontario. However, eradicating the emerald ash borer is not likely because of its wide distribution and the lack of effective means to detect and control it.

Insects are not the only forest pests that can be transported in firewood and other plant parts. Tree diseases such as oak wilt and Dutch elm disease can easily hitchhike, too, and are even more difficult to detect.

Protecting Our Forest Resources

New national and international regulations specify treatments for solid wood packing materials that will reduce the threat of hitchhiking pests in international trade. Incoming cargo is examined for potential pests at U.S. ports by federal inspectors, although only a small fraction can be inspected because of the huge volume.

Working together, the Missouri departments of Conservation and Agriculture, the U.S. Department of Agriculture and other agencies annually conduct surveys to detect new forest pests. Surveyors examine ash trees for evidence of the emerald ash borer at high-risk sites such as public and commercial campgrounds where campers bring in their own firewood. They also check ash trees in urban parks and streets, particularly where large numbers of ash trees have been planted since the mid-1990s. Nursery inspectors examine thousands of trees in Missouri's commercial nurseries each year.

When harmful non-native plant pests become established in the U.S., the U.S. Department of Agriculture Animal and Plant Health Inspection Service and state departments of Agriculture are responsible for quarantines and eradication activities.



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Wandering S-shaped galleries (top) made by emerald ash borer larvae beneath the bark of an ash tree. A few D-shaped holes made by adults are visible near the top. Emerald ash borer larvae with distinctive bell-shaped segments (above left) tunneling within an ash tree. Emerald ash borer adult emerging from a distinctive D-shaped hole (above right), the most important sign for identifying the emerald ash borer.

A federal quarantine is now in place to limit the spread of emerald ash borers. All ash nursery stock, logs and wood with bark attached, and all deciduous firewood is prohibited from being transported out of Illinois, Indiana, Ohio and Michigan's Lower Peninsula, unless specific actions are taken to reduce the risk of the borers surviving in the ash material.

Operations to control isolated populations of emerald ash borers have been attempted at the edges of their known distribution. Treatments are expensive and involve cutting down all ash trees within an infested area and chipping them into one-inch pieces to destroy the borers and their food source. No insecticide treatments are 100 percent effective in eradicating an emerald ash borer population. Much research is underway to find better ways to detect and control emerald ash borers.

What You Can Do

Many state and federal agencies are working together to protect our forest resources from these insect

invaders, but they need your help. The most effective thing you can do to prevent the arrival of invasive forest pests is to avoid moving firewood long distances. Buying firewood from local sources supports local economies and reduces the threat of introducing new pests.

You can also help by keeping an eye open for new pests. The emerald ash borer has not yet been found in Missouri as of early 2007. But we need to be alert for its arrival. Areas where it is most likely to appear include campgrounds, homes or businesses receiving ash logs or firewood from outside Missouri, and residential or commercial sites where large quantities of ash were planted since the mid-1990s.

All of us working together can help keep the emerald ash borer and other invasive insects out of Missouri as long as possible. Reducing firewood movement and thinking about other ways that pests might hitchhike into our forests will go a long way toward preventing the arrival of the next new pest. ▲

Help Stop Invasive Bugs

- Do not bring firewood from other states. Use local sources.
- Examine vehicles and outdoor gear for gypsy moth egg masses after summer visits to Great Lakes states or the northeastern U.S. If you find egg masses, destroy them.
- Start replacing ash trees in urban landscapes with other tree species to avoid having to replace them all later at one time.
- Plant a diversity of trees and shrubs (no more than 10 percent of any one species).
- Use proper planting, mulching and pruning methods to improve plant health. See www.missouriconservation.org/forest/helpcare.htm.
- Do not use insecticides to prevent emerald ash borer attacks where borer populations have not been detected.
- If you find what you suspect is a non-native pest, contact your local Department of Conservation forester. Please visit www.missouriconservation.org/forest/myforester-search.html to determine the forester in your region.



ROB LAWRENCE

Other Invasive Insects

Gypsy Moths

- Caterpillars feed on leaves of oaks and other woody plants and can kill trees during outbreaks.
- Velvety brown egg masses (1 to 2 inches wide) can be deposited on vehicles, outdoor equipment, firewood and nursery stock in July and August.
- Species is spreading from Wisconsin, northern Illinois, Indiana, Ohio and northeastern U.S.

Asian Longhorned Beetles

- Larval tunneling in trunk and branches kills maples, elms and other deciduous trees.
- Species can spread when firewood and logs are taken from infested areas.
- They have entered North America multiple times in international shipments.

Sirex Woodwasps

- Female injects a fungus and toxic mucus that kill pines while her offspring tunnel in the wood.
- The species can be spread by moving infested logs.
- They are present in New York, Pennsylvania and Ontario, but the extent of their range is unknown.

For more information, see www.missouriconservation.org/forest/features/firewood.htm.



Female gypsy moth with egg mass.

JIM RATHER



Asian longhorned beetle with tunnels made by larvae in host tree.

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Adult female Sirex woodwasp.

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