

○ Ash Borer

PREPARING FOR EMERALD ASH BORER

By Pam Zipse, Outreach Coordinator and Jason Grabosky, Urban Forestry Coordinator, Rutgers Urban Forestry Program of NJAES

Emerald Ash Borer is officially here. This exotic invasive beetle that attacks all species of true ash trees (*Fraxinus* species) was finally confirmed in New Jersey in summer of 2014. It was found infesting trees in Bridgewater and Hillsborough Townships in Somerset County, and caught in traps in Ewing Township, Mercer County and Westampton Township, Burlington County. EAB has killed hundreds of millions of ash trees since arriving in the United States in 2002, costing billions of dollars in removals, replacement plantings, and chemical treatments. We expect that New Jersey's experience with Emerald Ash Borer will be no different from that of the other states that have seen this insect move through their tree resource. As such we can assume that, in the landscape, all untreated ash trees will die. It is estimated that 80% of the costs related to EAB will be borne by municipal government and homeowners (Aukema et. al., 2011). Are you ready?

Representatives from the NJ Department of Agriculture, NJ State Forestry Services, USDA Animal & Plant Health Inspection Service, and Rutgers University have formed a task force to help consolidate and disburse information and resources relevant to EAB. The unanimous recommendation of this task force is that municipalities need to have a plan for managing EAB. It is agreed that there is no one correct answer to fit every municipality – but every municipality needs to develop a plan. At the core of this plan, and if you only do one thing this year to prepare for EAB... inventory your ash trees!

Management options for EAB in street trees can be boiled down to a few basic approaches. You can remove your ash trees, either when they die or preemptively (the latter being less costly and safer, as dead ash trees dry out quickly becoming brittle and difficult to remove), remove ash and replace with appropriate, non-host species, or treat healthy ash with appropriate insecticides (these treatments must be maintained for 15-25 years). Most municipalities will adopt a plan based on some combination of these basic options. Regardless of the options employed, municipalities will need to know the exact locations of all ash trees (to know where to send removal or treatment crews), and the size of these trees - at least grouped by diameter class (for determining cost estimates for removal and/or treatment).

There are several tools already in place to assist municipalities in making management decisions. The task force has prepared a web site (emeraldashborer.nj.gov) where you can find a template for developing a municipal EAB plan, tips for ash tree identification, a description of the various chemical treatment options, and a list of saw mills in NJ and the surrounding states who can utilize ash logs. You can also find contact information for task force partners, and for reporting EAB sightings. New information is added as it becomes available, so we encourage you to check this website often.

Another tool that we think can be very useful to municipalities is the Emerald Ash Borer Cost Calculator, which was developed by Purdue University to help municipalities with long term planning for EAB management (<http://extension.entm.purdue.edu/treecomputer/index.php>). This cost calculator allows you to enter your ash tree inventory along with tree removal, planting, and treatment costs (get quotes based on your inventory from local contractors), and compares the approximate short and long term costs associated with a variety of management options projected over a 25 year timeline. The calculator provides graphs and charts, along with descriptions of the various management options, to illustrate the costs in both dollars spent and diameter inches lost (or saved) for the different management strategies. This can be a powerful tool for shade tree commissions to use to convey the urgency and severity of this problem to local governments and decision makers.

Rutgers University used an existing street tree inventory to run basic management options through the Purdue EAB Cost Calculator for one New Jersey municipality. In this example, there are about 200 publicly maintained ash trees, making up less than 4% of the total public tree resource. Using tree removal and treatment costs generated by an anonymous poll provided by members of the NJ Arborists Chapter of the International Society of Arboriculture, it was projected that even the least expensive management options totaled in about \$250,000.00 over the 25 year management period.

EAB is a complicated issue, and there is much more to consider. For now we leave you with one more thought in support of developing a comprehensive plan. It is likely that costs for both removals and treatments can be significantly reduced by contracting in bulk. Coordinating management efforts throughout your municipality, including your residents, and partnering with neighboring municipalities, has the potential to significantly influence the overall costs of EAB management. This all starts with a reliable inventory of your ash trees.

Please check out New Jersey's EAB website at www.emeraldashborer.nj.gov. You can find a link to the Purdue EAB Cost Calculator on the "for communities" page.





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For Communities-Emerald Ash Borer

- [EAB Management Plan](#)
- [Cost Calculator](#)
- [NJ Department of Agriculture EAB Threat Response](#)
- [Ash Tree Inventory](#)

■ EAB Management Plan

Draft management plan for use by communities in preparation for future EAB population increases.

[Emerald Ash Borer Management Plan for Municipalities Template](#) [48K DOC]

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■ Cost Calculator

[Responding to an EAB Invasion -- Calculating the cost of removing ash trees](#)

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■ NJ Department of Agriculture EAB Threat Response

Since 2010, the New Jersey Department of Agriculture, working with USDA-APHIS and NJ Forest Service, has deployed more than 1,750 traps in all 21 NJ counties and have done two years of biosurveillance with a ground wasp, *Cercis plannipenis*, in an effort to survey for EAB populations.

Below are the types of traps we are using to identify EAB populations.





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Jersey Equine



Farmland Preservation / Right to Farm



Jersey Ag Education



Animal Health Diagnostic Lab



NJ Farms and Registration Management System

This is a purple prism sticky trap with a lure. These are checked twice a season for the presence of EAB.



Trap catch with high EAB populations.



Lindgren funnel trap for enhanced EAB capture.

This is a newly designed

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■ **Ash Tree Inventory**

[Ash Tree Inventory Map](#)

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Students at Rutgers University compiled ash tree data from municipal street tree inventories that have been shared with Rutgers Urban Forestry Program over the last 10-15 years. The resulting map shows the number of ash trees in the municipal tree resource for communities where inventory data was available.

Although some of these inventories are very old, this map starts to form the picture of the municipal ash resource, and illustrates that New Jersey does have a significant ash component under municipal control.

Rutgers Urban Forestry Program and NJ State Forestry Services have partnered to conduct a rapid survey of ash trees in several additional NJ municipalities this summer. Our goal is to get an idea of how extensive the municipally owned ash population is throughout NJ, to better understand the impact that Emerald Ash Borer will have on municipalities.

If your municipality has a street tree inventory that was not included on the map, and you would like to share your inventory data to contribute to this project, please contact Dr. Jason Grabosky at the Rutgers Urban Forestry Program grabosky@aesop.rutgers.edu.

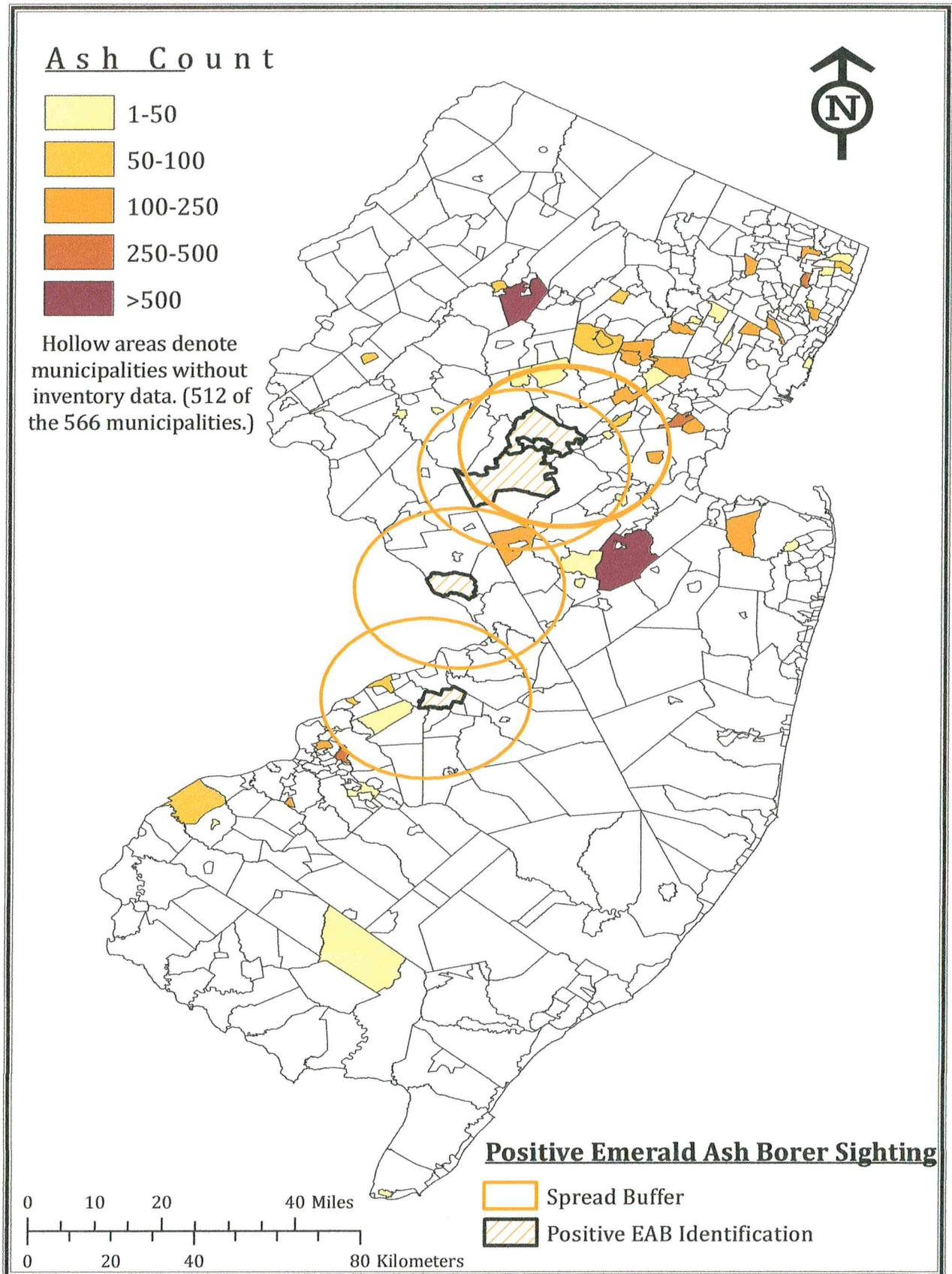


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P.O. Box 330, Trenton, NJ 08625

Emerald Ash Borer in New Jersey



Emerald Ash Borer Management Plan for the Municipality of Your Town, NJ
April 13, 2015

Introduction

The Emerald Ash Borer (EAB) is an exotic, invasive pest from Asia that is killing ash trees in 25 states including New Jersey. Since its discovery in Detroit, Michigan in 2002, the borer has killed hundreds of millions of ash trees.

As of 2015, Your Town inventories show approximately 100 (10%) of the municipalities 1,000 street trees are ash. 25 are in parks, and the others are in wooded areas, wetland and transition areas, and private property. The municipality of Your Town must prepare and manage for the arrival of this pest and its impacts on ash trees in Your Town.

Plan Purpose

By implementing the provisions in this management plan, the municipality will take a proactive approach to mitigate the disruption of its urban forest caused by the anticipated infestation of the EAB. Taking a proactive approach will enable the municipality to address public and private needs in an efficient and effective manner.

The goals of this plan are to:

1. Protect and treat valuable ash trees within the municipality (Protect Forests From Threats: Forest Action Plan National Strategy)
2. Remove hazardous ash tree to protect public safety
3. Replant non-host tree to replace those removed

Administration of Plan

The following elements of the municipality's EAB management plan have been adopted, and are subject to periodic revision as new information about the EAB is available. This plan is also subject to change should state or federal policies dictate. The municipality's Department and Shade Tree Commission (STC) will be responsible for implementing and following up on the provisions of this plan. This EAB Management Plan will supplement the current NJ Community Forestry Management Plan.

Communications

The Mayor, Municipal Manager, Municipal Council, department heads, and the STC will receive periodic updates through standard channels. All media relations will follow standard municipal approval and protocol.

Management Options

Your Town will implement the management option B (See Appendix A), Selective Management. High value, significant, healthy ash trees will be chemically treated to protect them from EAB infestation and legacy tree retention. Ash trees that pose a risk, are in decline, or are planted in inappropriate locations will be prioritized for removal and replacement. The EAB Cost Calculator will be used to estimate the cost of ash tree removal, treatment, and replacement over time to determine budget needs over the next several years. Other SLOW Ash Mortality (SLAM) options will be utilized within the management options as needed (See Appendix B).

Wood Disposal

The Department will not dispose of any wood outside the quarantine area except at approved sites. The entire state of NJ has been placed under EAB quarantine, under US Department of Agriculture Animal and Plant Health Inspection Service (USDA APHIS) and NJ Department of Agriculture regulations. Movement of ash products (including firewood, nursery stock, logs) outside of the state boundaries is restricted, unless a Compliance Agreement from USDA AHPIS is received. However, to minimize the continual spread of EAB to non-infested portions of the state, ash trees that are removed will be kept within municipal limits unless it is chipped or the bark is removed.

Wood Utilization

The Department will make every effort to utilize the ash trees to its greatest value. Ash lumber is a valuable resource and is used for various purposes including flooring, furniture, lumber, and baseball bats. Ash is also commonly used for firewood. The quality of ash wood does not degrade immediately after infestation by EAB, as the insect feeds on the wood tissue just under the bark. However, ash wood will begin to degrade soon after it is killed by EAB, so any wood utilization efforts will be made prior to, or soon after the onset of tree death.

Canopy Replacements

As budget permits, ash trees removed will be replaced with non-host specific species that will enhance the planting sites, are appropriate for the planting sites, and add diversity. Trees will be planted in accordance with the New Jersey Nursery and Landscape Association Planting Specifications and be no smaller than 1.5" – 2.0" caliper. All new plantings will conform to the "10-20-30" tree species diversity rule – no more than 10% any species of tree, 20% of any genera of tree, or 30% of any one family of tree.

Trees on Private Property

Property owners are urged to monitor for EAB on their property. The decision to treat, remove, or retain private property trees rests with the property owner. Residents should consider many variables when evaluating options, including tree size, location, and condition. Residents can contact the STC for more information and assistance.

Your Town will enforce the relevant section of the Ordinance 123.456, Section E, through its Code Compliance program should it receive complaints about hazardous private trees. Private trees that are a threat to private property will be inspected only as complaints are received.

When hiring for insecticide control or tree removal it is encouraged to contact a Certified Tree Expert (CTE) with a Certified Pesticide Applicators License. Your Town also encourages residents to replace trees lost with species appropriate for the site, or to plant new trees in advance of EAB infestation and ash removal.

Outreach

Outreach efforts to increase awareness of EAB in Your Town will be made at various events including Arbor Day, Earth Day, the County Fair, and others as they arise. Events such as an Ash Tree Tagging Event, where ash trees in streets and parks are tagged/flagged, will show which trees will be affected by EAB if not actively managed.

Contacts and Information:

The Department (www.YourTownDepartment.com)
Shade Tree Commission (www.YourTownSTC.com)
New Jersey State Forestry Services (www.forestry.nj.gov)
New Jersey State Forestry Services EAB Webpage (www.emeraldashborer.nj.gov)
EAB Cost Calculator (<http://extension.entm.purdue.edu/treecomputer/index.php>)
National Tree Benefit Calculator (<http://extension.entm.purdue.edu/treecomputer/index.php>)
i-Tree - Tools for Assessing and Managing Community Forests (<http://www.itreetools.org/>)
Emerald Ash Borers (www.emeraldashborer.info)
USDA APHIS (http://www.aphis.usda.gov/planthealth/plant_pest_info/emerald_ash_b/regulatory.shtml)
USDA Forest Service (<http://na.fs.fed.us/fhp/eab/>)
EAB Pesticide Options (http://www.emeraldashborer.info/files/multistate_EAB_Insecticide_Fact_Sheet.pdf)
Slow Ash Mortality (SLAM) (<http://www.slameab.info/>)

Appendix A

Ash Management Options

Option A. No Action

In this option, ash trees will be treated and maintained the same as other species in the community. No survey will be conducted to detect and monitor the spread of EAB, and no control actions will be undertaken even when EAB becomes established in the community. No tree replacement plan for affected areas is in place. It may cost nothing up front. However, the community is still responsible for the removal of hazard trees along roadways and woodland trails. Significant changes in neighborhoods and local landscapes can also be expected. The result will be that most ash trees will be killed by the end of the infestation.

Option B. Selective Management

In this option, high-value ash trees in selected areas (streets and parks) within the community will be managed actively, whereas those in other areas (e.g. woodlots) will be left alone. Ash trees will be monitored for their health and levels of EAB infestation. Chemical control and tree removal will be applied wherever appropriate in a cost-effective manner. Tree replacement (1:1 or 2:1) will be prioritized towards community needs. As a result, most ash trees in the natural areas will be killed by the end of the infestation, whereas a great portion of high-value ash trees are protected for future generations to enjoy. In addition, dead or dying ash trees in streets and parks will be replaced with non-host species to prevent major canopy gaps in neighborhoods.

Option C. Preemptive Management

In this option, ash trees on streets and in the parks will be removed preemptively and replaced with non-host species. No EAB survey activity will be conducted. As a result, treatment areas will contain no ash trees, with no concerns over EAB in the future either. The initial cost of this option could be very high because of expenses associated with tree removal and replacement. Streets and parks also need to deal with major canopy gaps temporarily at the beginning before replacement trees become well established. However, no annual cost will be incurred after the completion of the project.

Option D. Aggressive Management

In this option, all ash trees in the community will be managed actively with all available management tools. EAB survey activities will be carried out on both roadways, parks and in yards. Information from the surveys will be used to determine proper management actions across the Municipality. Chemical control will be actively pursued to protect the maximum portion of ash trees and their canopy. Only dead or dying ash trees will be replaced with non-host species. As a result, most high value ash trees will be saved from EAB damage, whereas a small portion will be replaced with non-host species. Community suffers the least socially and environmentally from the infestation, with less risk of losing urban canopy cover. However, annual cost to the community is the highest among all options.

Appendix B

The goal of SLAM (Slow Ash Mortality) is to slow the spread and reduce the population of EAB so as to delay the onset of mass ash mortality. Here are some methods that can be used to achieve the goals under SLAM*.

Trap Tree

Select ash trees are girdled (a ring of bark is removed, restricting the movement of water and nutrients up and down the tree) in the spring (April/May) prior to EAB emergence. This tree is then cut down in the winter or early spring prior to EAB emergence. A girdled ash tree will attract more EAB than a non-girdled tree because the EAB are attracted to the chemicals emitted from the stressed ash tree. After cutting down the tree, either peel the bark or buck (cut) into 3-4' sections (or smaller). Peeling or bucking the tree will increase EAB mortality by exposing the larvae and promote drying out the wood. **Girdled trap trees must be removed the following winter/early spring, otherwise they will serve as breeding grounds if left standing after EAB emergence.** This method can be applied to a single tree or a cluster of trees.

Lethal Trap Tree

Similar to the Trap Tree method, except the selected ash tree is chemically treated 3-4 weeks prior to girdling. The girdled ash tree will attract the EAB and the chemical will kill any adult or larvae that feed on the tree. The lethal trap tree does not need to be cut down because it will not harbor live EAB. This can be applied in areas where tree removal is difficult or not an option. This method can also be used without girdling the tree.

Phloem Reduction

Tree phloem is the thin layer of living tissue found just under the bark of a tree. The amount of phloem in a tree is directly related to the tree's size; larger trees have larger amounts of phloem than smaller trees. The EAB larvae feed on the phloem, and the more food (phloem), the more EAB. If chemical treatments are not an option, and tree removal is the main method used for EAB management, then the removal of larger diameter trees should be prioritized in order to reduce the most phloem at a time. Also, the Trap Tree method can be used on these larger trees prior to tree removal to attract more EAB before the tree is cut down.

Delayed Tree Removal

In order to spread the cost of tree removal over time, a portion of ash trees can be chemically treated with the intent of removal at a later time. Treatment will protect this portion of ash trees from EAB attack and allow the municipality to delay the need to remove these otherwise infested or hazardous trees. For example, if 100 ash trees are slated for removal, instead of scheduling the removal of all 100 trees at one time, remove 50 in year one and treat the other 50 and plan for removal the following 1-2 years.

Diameter Consideration Tree Removal

When deciding which ash trees should be removed, consider the diameter and value of the ash tree. For instance, ash trees that are <10" in diameter could be slated for removal, regardless of health and location, and then replaced with a non-host tree. However ash trees that are >10" in diameter should be looked at more closely and protected via chemical treatments if they are in healthy condition and planted in a good location. The purpose of this is that a large ash tree (>10") will provide greater ecological value that may take many years for a newly planted tree to provide. So preserving this ecological value in larger ash trees may be more economical in the long run (via shade, energy costs, carbon sequestration, watershed protection, etc).

** Ash tree removal alone does not support SLAM, but rather may increase the spread of EAB, as EAB will fly far distances until they find a suitable host. Integrating multiple SLAM methods concurrently is the best option to slowing the spread of EAB.*

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Emerald Ash Borer



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[Reporting EAB in NJ](#)

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Emerald Ash Borer was discovered in New Jersey in May 2014 in Somerset County. Infestations throughout the U.S. and Canada have killed tens of millions of ash trees since 2002.

Report signs of the beetle to the Department of Agriculture at 609-406-6939.

[NJ Emerald Ash Borer Contacts](#)

[Expected Spread of New Jersey EAB in 2015](#)

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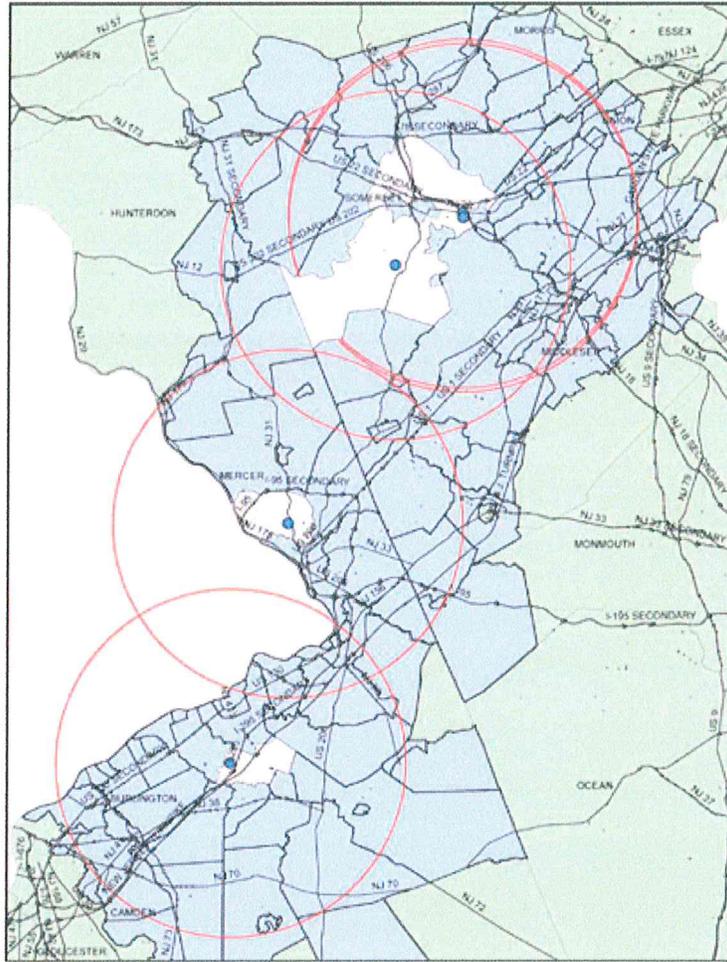
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Emerald Ash Borer

Emerald ash borer (EAB) is a non-native insect pest that infests and kills all species of ash trees. With 24.7 million ash trees, approximately 9 percent of New Jersey forests are susceptible to emerald ash borer attacks. Although rarely the most abundant tree in a forest stand, ash is still found in 24 percent of all forest land. The greatest numbers of ash trees can be found in the northern part of the state. Ash is also commonly planted along streets, as landscape trees in yards, and in parks throughout the state.

EAB in New Jersey

EAB was found in four New Jersey townships in 2014 in Somerset, Mercer, and Burlington Counties. EAB has also been identified in Bucks County, PA and Orange County, NY. While all ash trees in NJ should be monitored for EAB, ash within 15 miles of known sightings should be most carefully and frequently monitored.

Background of EAB in the United States

EAB was first discovered in southeastern Michigan in 2002 and has since been found in 23 additional states and 2 Canadian providences. The EAB has killed tens of millions of ash trees in Michigan alone, as well as tens of millions of additional trees in the other infested states and providences.

The Insect

The adult EAB is approximately 1/2" long and 1/8" wide, metallic-green in color, with a metallic-copper red abdomen. The larvae are white or cream colored, measure approximately 1 - 1 1/4" long and have 10 abdominal segments that are bell shaped. EAB adults emerge in May or early June creating D-shaped exit holes, 3-4 mm in size on the branches and trunks of infested trees and stay active through August. The EAB feed on the margins of the ash leaf and have a 1 year lifecycle. After feeding, the female EAB deposits eggs in bark crevices or under bark flaps on the trunk or bark. After the egg matures, larvae burrow under the bark and feed on the cambium - the water and nutrient transporting layer of the tree. The larvae become adult beetles in April or May.

Signs and Symptoms

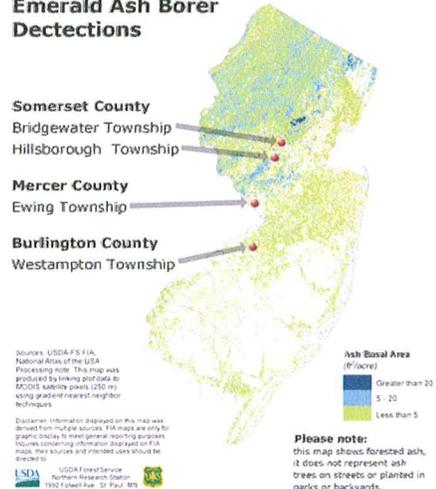
EAB first infest the top of the tree's crown, which makes spotting adult beetles or exit holes nearly impossible from the ground. Woodpecker activity and damage on live trees is often an initial sign of an EAB infestation. As EAB populations increase, crown dieback, epicormic branching, bark splits, and exit holes lower on the bole become more prevalent. Trees will only live an average of 3-4 years after infestation.

Quarantine

Movement of firewood and ash are under federal and state quarantine. Contact USDA's Animal and Plant Health Inspection Service at firewood@aphis.usda.gov for appropriate permits before moving wood or ash trees outside of NJ.



Ash Trees in New Jersey and Emerald Ash Borer Detections



Methods of Detection





Cerceris Wasp

The Cerceris wasp is a ground nesting wasp that preys on Buprestid beetles, the same family as EAB. During the summer months when Cerceris wasp are most active, a "wasp watcher" waits for a cerceris wasp and collects any prey the wasp is carries. Any insect that appears to be an EAB is collected.

Aerial Surveys

During outbreak conditions, rapid assessment can be made from aerial surveys and by ground checking previously identified hazard stands.

Tips from Public

Anyone who thinks they may have emerald ash borer can report it to the forest health specialist at (609) 984-3861

Prism Traps

Hung May through August, the trap uses Manuka oil and z-3 hexanal as an attractant to lure the beetles to it. The surface of the trap is coated with a sticky material which causes the EAB to adhere to it. The traps will not bring EAB into an area that is not already infested.

Visual Inspections

After receiving a tip or noting a potential outbreak during an aerial survey, foresters perform visual inspections on suspect trees. They look for adult beetles, D-shaped holes, larval galleries under the bark, crown dieback, and woodpecker activity.

Trap Trees

Trap trees entail girdling a 4-8" dbh ash tree in the spring, and fell in the fall/winter. The tree is inspected for EAB larvae and galleries. A purple panel trap may also be hung in the girdled tree.

Homeowners

You might have an ash in your yard as it is a popular landscape tree species. If you have ash and live within 10 miles of a known infestation, you can treat your tree to protect it from infestation. If you tree is unhealthy, it should be removed. Contact a [certified tree expert](#) for more information.

Landowners

Even though emerald ash borer is in our state now, it still could be many years before it shows up in your woodlot or community. Plan for emerald ash borer now if you have ash. Know what's at risk: how much ash you have, its size and quality, and where it's located. Consider the ecological, aesthetic, and economic value of your ash, your tolerance of risk, and your objectives for ownership.

Forest Management Plan

If your land is enrolled in Farmland Assessment or the Forest Stewardship Programs, you must follow your approved forest management plan or an approved amendment. Contact your consulting forester if you wish to change your planned activities, treatment schedule, or management objectives. Remember that the state forester needs to approve any changes before the management activity begins. With an approved forest management plan that addresses emerald ash borer, you can salvage and restore ash in riparian areas when they follow the prescribed Best Management Practices. Reassess your plan if emerald ash borer is detected in or near your county. The threat of imminent tree mortality increases when emerald ash borer is within 10 miles of your property. Woodland owners not enrolled in these programs should contact their [regional forestry office](#) for more information.

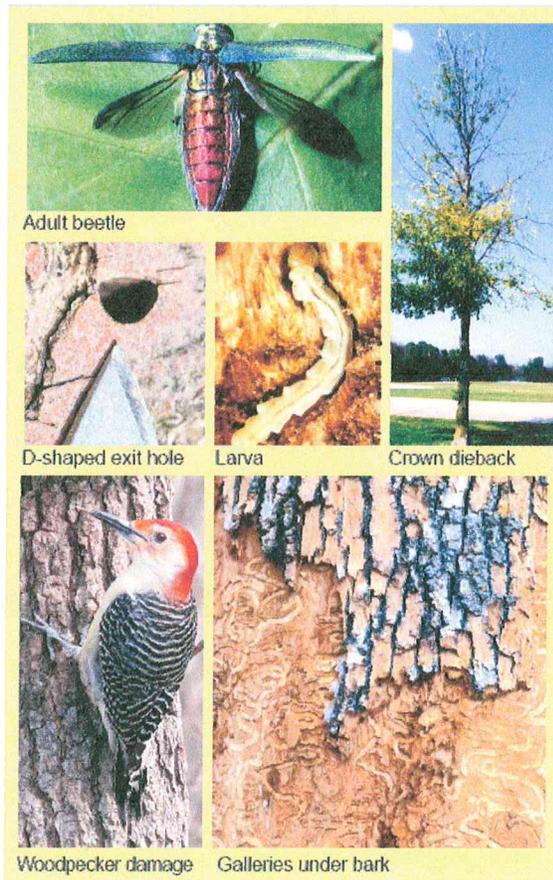
Selling Ash Logs

Work with a consulting forester to get the most from your forest. Studies have shown that owners who use professional forestry services before they cut make more money and are more satisfied with the results than owners who sell timber on their own. Growing ash sawlogs is a riskier longterm investment than it used to be. To limit loss, reduce the percentage of ash if it exceeds 20%. Review your diameter target (how big to grow trees before cutting them) with your forester, discussing site quality, tree condition, and available markets. To keep from degrading your woodlot, retain good quality trees of a variety of species. If you're growing trees for timber income, don't cut ash that is too immature or the trees could be too small to yield high value sawlogs. If you allow them to grow, they increase in volume, and may improve in grade, which leads to a better return. Ask your forester about balancing this with potential emerald ash borer.

Municipalities

If your municipality or county currently participates in the NJ Community Forestry Program and has an approved Community Forest Management Plan and ash is a major component of your community's forests along streets or in parks, consider including a section that addresses your community's response if emerald ash borer is found in your neighborhood. [Contact a Certified Tree Expert](#) for assistance. To enroll in any community forestry program, contact the community forestry

Emerald Ash Borer Signs



photos: bugwood.org

coordinator at (609) 292-2532.

Municipalities with ash trees should develop an EAB response plan which should include:

- Conduct a tree inventory: know the size, health status, and where ash trees are located
- Begin to remove ash trees that are in less than healthy status and replace with non-ash species
- Identify high value ash trees that you would like to treat to protect them from EAB
- How will infested ash tree removals be handled?
- Who will take the lead on EAB management issues
- Plan for restoration efforts with non-ash species
- Budget (use the [Purdue University EAB Cost Calculator](#))

Do your part to combat the effects of EAB on NJ trees:

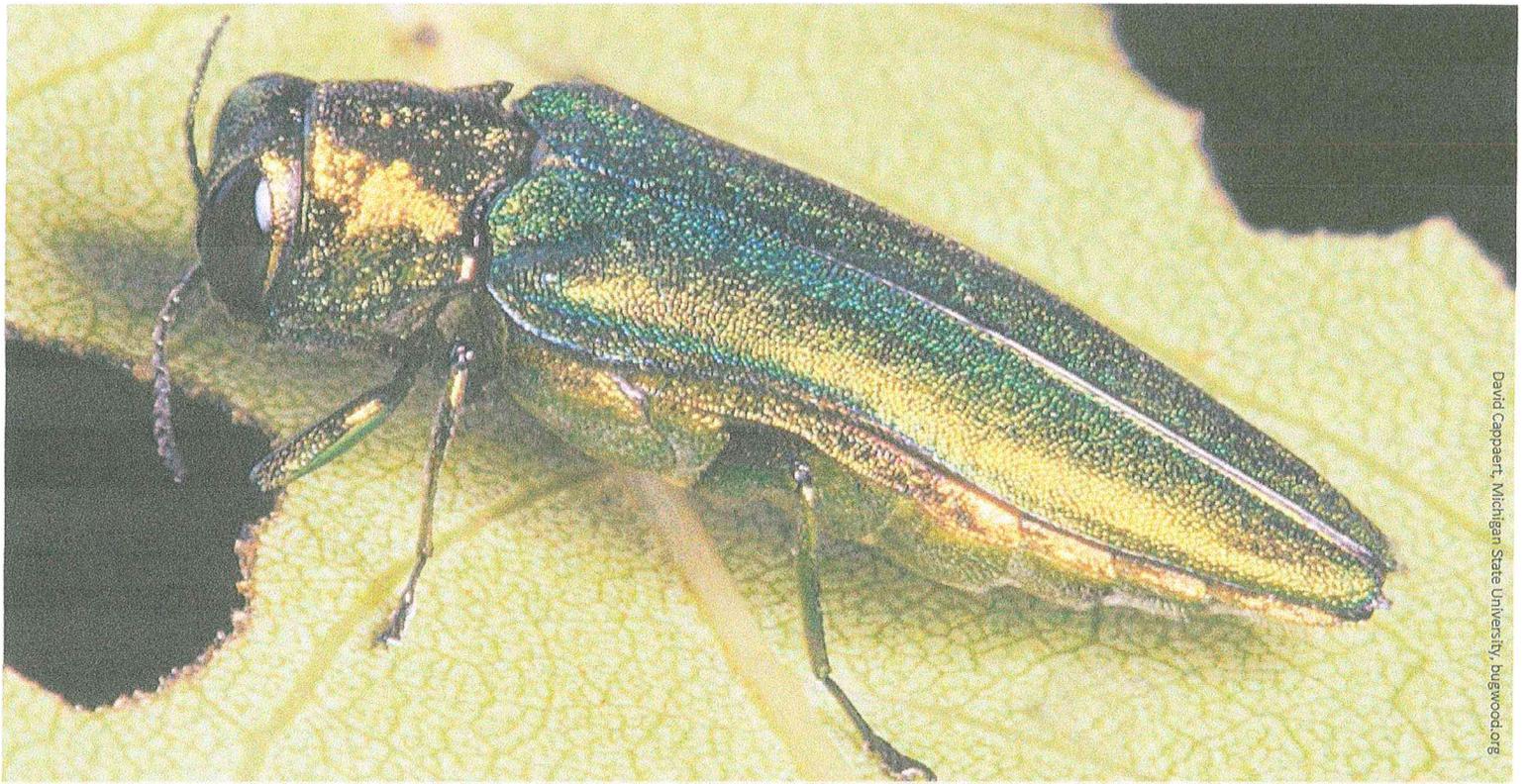
- **Identify** ash trees. Ash species have opposite branches and leaves and a compound leaf with 5-11 leaflets. The bark has a unique diamond-shaped ridge bark on older trees, but younger trees may have smoother bark.
- **Monitor** your ash trees for emerald ash borer, you will know when the risk of mortality becomes urgent. Look for the dying branches at the top of the tree, woodpecker damage, galleries under the bark, d-shaped holes, bark splits, sprouting at tree base and along trunk, and green adult beetles.
- **Use traps** to detect emerald ash borer in your community or woodlot. If the emerald ash borer is in the area, it will be attracted to these purple prism traps.
- **Spread the message**, "Don't Move Firewood." Visitors who bring infested firewood to second homes or campgrounds near you put your trees at risk. Use only locally sourced or certified firewood. More info on [don't move firewood](#). Talk with neighbors and campground owners in your community.
- **Report sightings** to your [regional forestry office](#). Collect and/or photograph any suspect insects and larvae. Note that several insects look similar to the [emerald ash borer](#).

[More information from USDA](#)

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Emerald Ash Borer: Ash Tree Identification



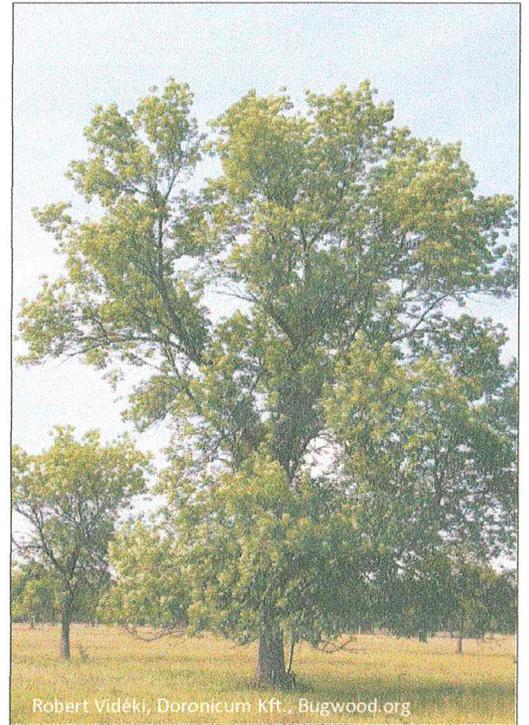
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Preparing for the Emerald Ash Borer
<http://nyis.info>

Ash Trees are easy to Identify

All three Ash, white, green and black, have:

- Opposite Branching
- Pinnately Compound Leaves (5-11 leaflets)
- Large, Stout, Terminal Buds
- Noticeable Bud Scars
- Oar Shaped, Dry Fruit (samaras)
- Diamond Pattern in the Bark (white and green ash)



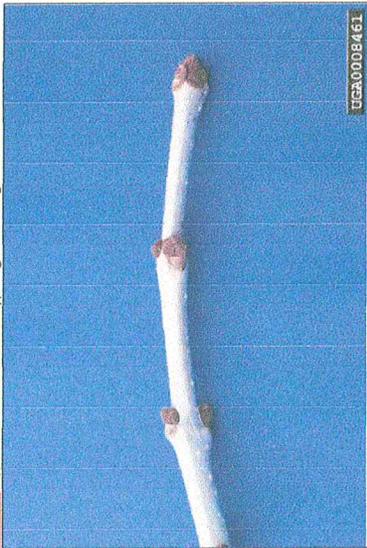
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Opposite Branching

Buds (therefore leaves and branches) grow directly across from each other. Only a few trees in NY have opposite branching: Ash, Maple, and Horsechestnut/Buckeye.



Opposite,
Ash



Alternate,
Beech



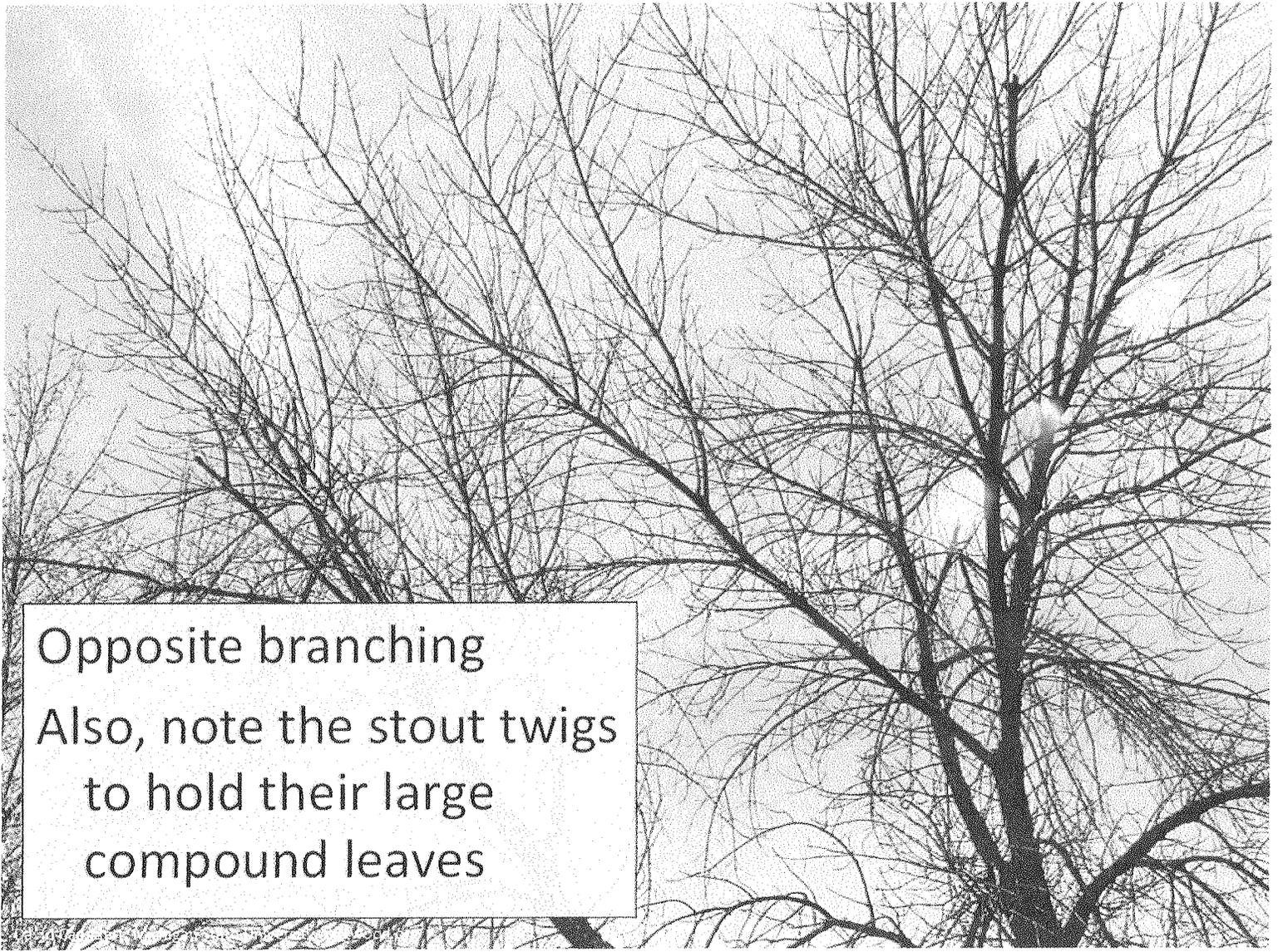
Paul Wray, Iowa State University, Bugwood.org

Cooperative Extension

Bill Cook, Michigan State University, Bugwood.org

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The Emerald Ash Borer
<http://nyis.info>

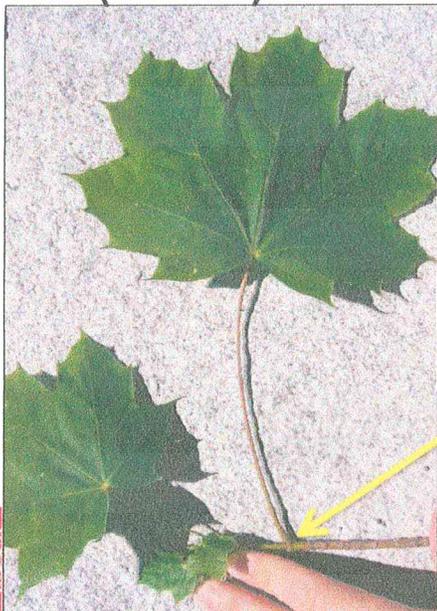


Opposite branching
Also, note the stout twigs
to hold their large
compound leaves

Pinnately Compound Leaves

Compound leaves: leaves made up of multiple leaflets.

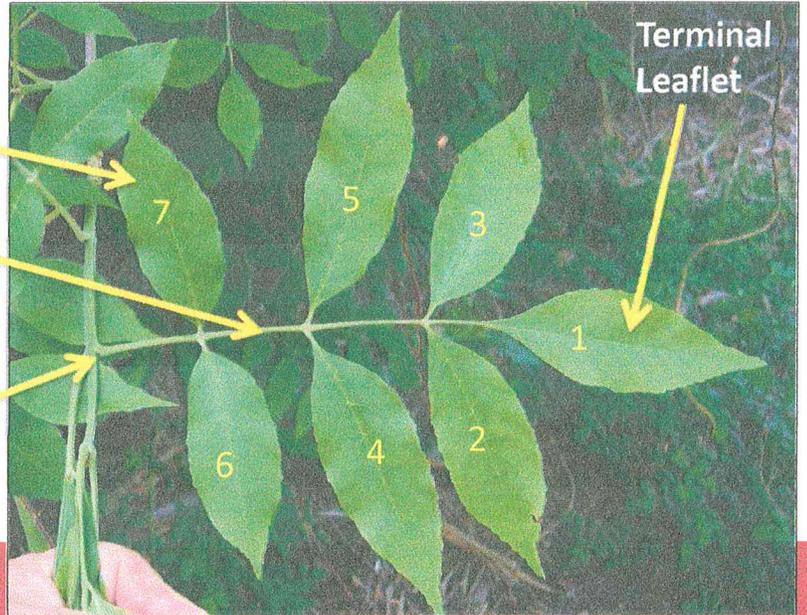
Pinnate: Leaflets arranged linearly along a rachis (stem)



Leaflet

Rachis

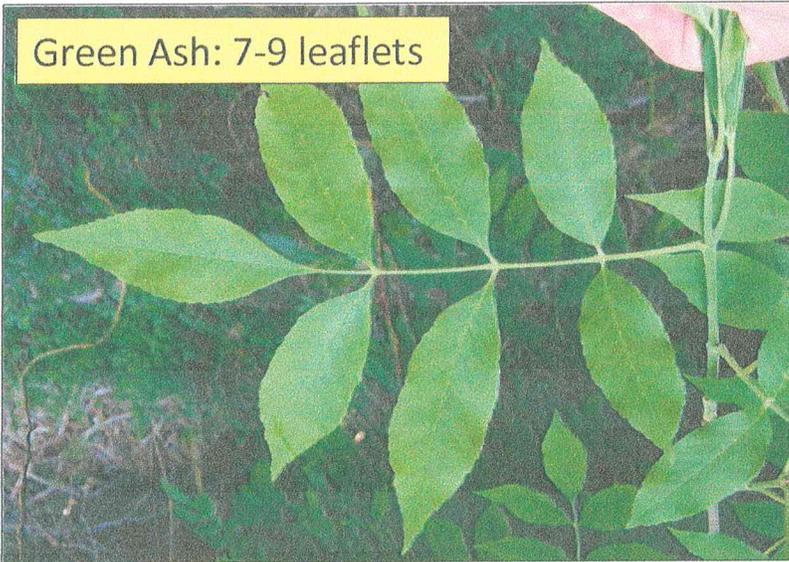
Bud



Terminal Leaflet

Keith Kanoti, Maine Forest Service, Bugwood.org

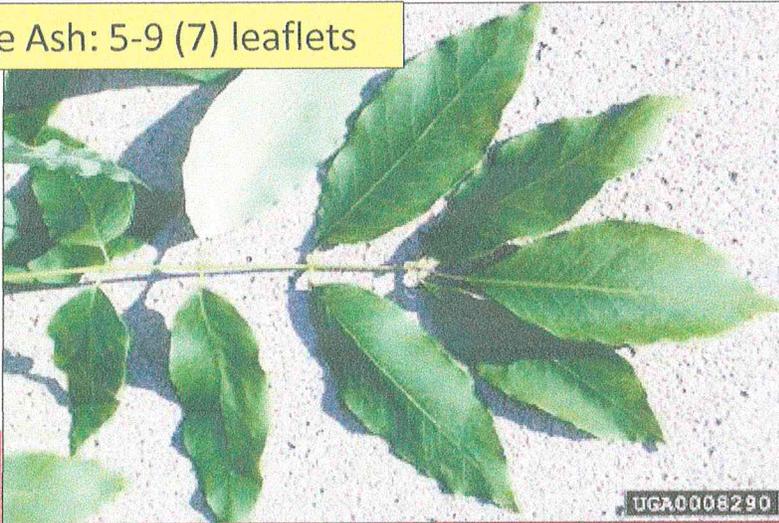
Green Ash: 7-9 leaflets



Black Ash: 7-11 leaflets



White Ash: 5-9 (7) leaflets



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Large, Stout Buds & Prominent Leaf Scars

Green Ash



Paul Wray, Iowa State University, Bugwood.org

Black Ash



Bill Cook, Michigan State University,
Bugwood.org

White Ash



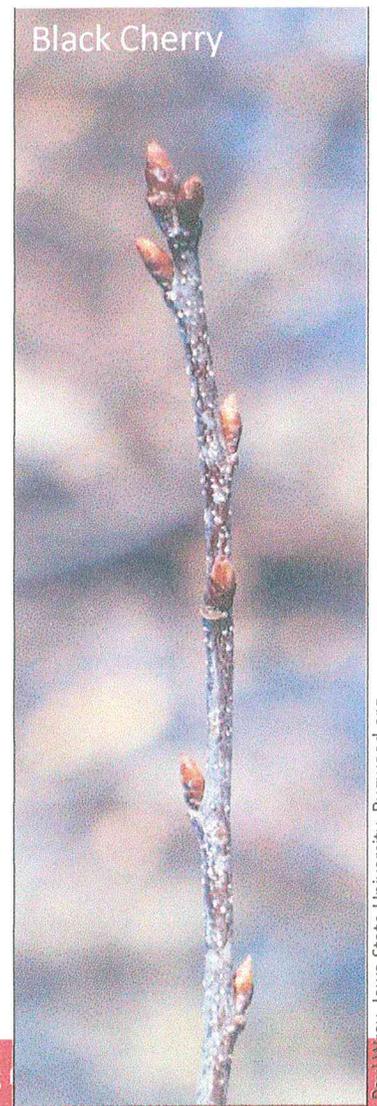
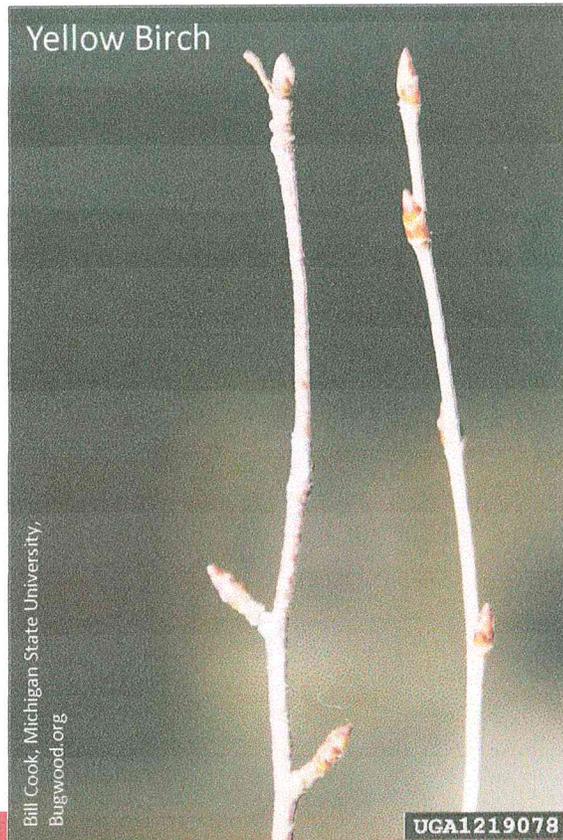
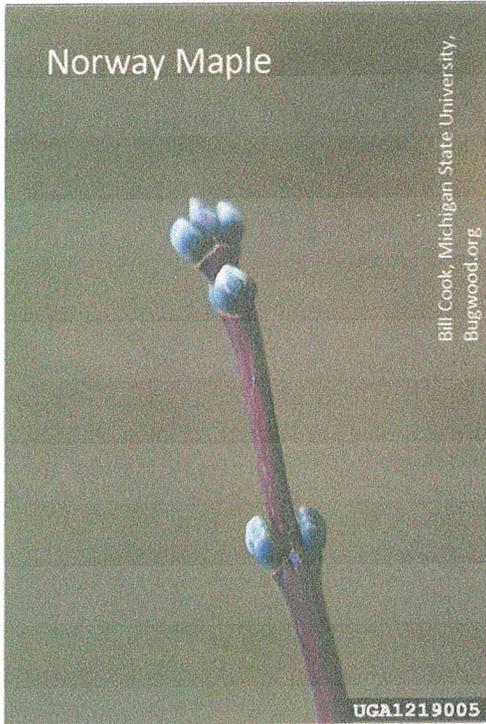
Paul Wray, Iowa State University, Bugwood.org



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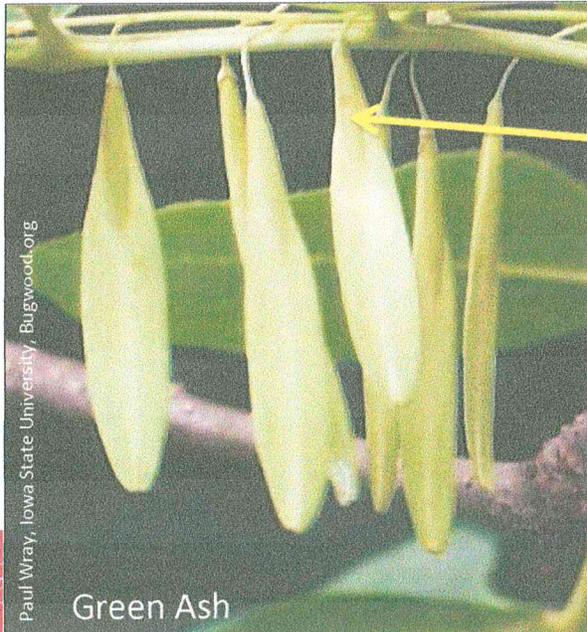
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<http://n>

Other Twigs and Buds



Fruit

Ash fruit a single samara: seed surrounded by dry, oar shaped wings that help with dispersal.



Paul Wray, Iowa State University, Bugwood.org

Green Ash

Seed



White Ash

Franklin Bonner, USFS (ret.), Bugwood.org

Pre





Keith Kanoti, Maine Forest Service, Bugwood.org

Bark

As white and green ash trees age their bark develops distinct diamond patterns. Young ash trees have smooth bark.

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Black Ash Bark

Black ash trees have flakey bark as they age. But, a diamond pattern may still be seen.



Kerth Kanoff, Maine Forest Service, BugWood.org



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Look Alike Trees

Although ash are quite unique looking, there are a few trees that could be mistaken for ash.

- Norway Maple
- Box Elder
- Elderberry
- Mountain-ash (not a true ash)
- Hickory and Walnut



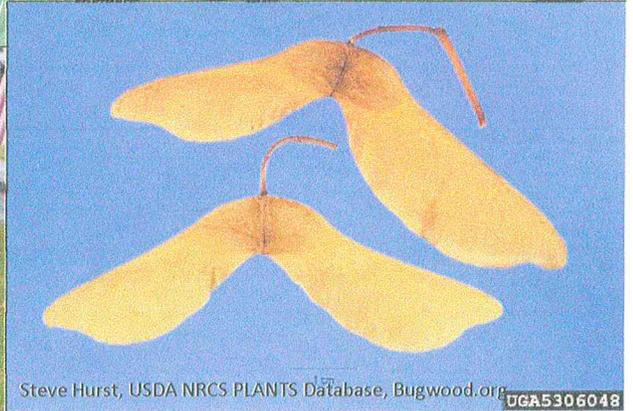
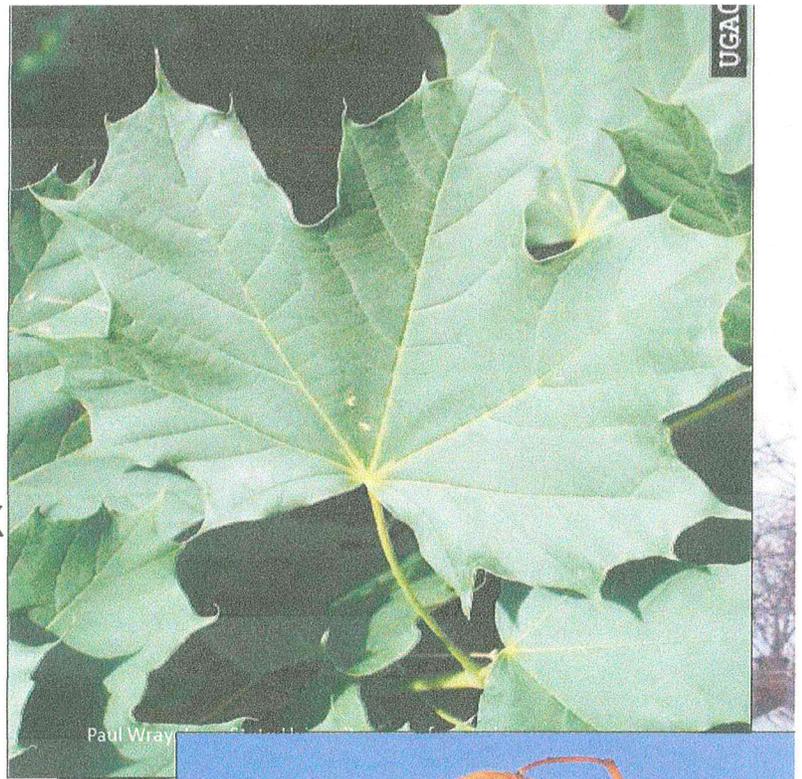
Norway Maple

Similarities

- Opposite Branches
- Diamond Patten Bark

Differences

- Large, simple Leaves
- Paired samaras



Steve Hurst, USDA NRCS PLANTS Database, Bugwood.org



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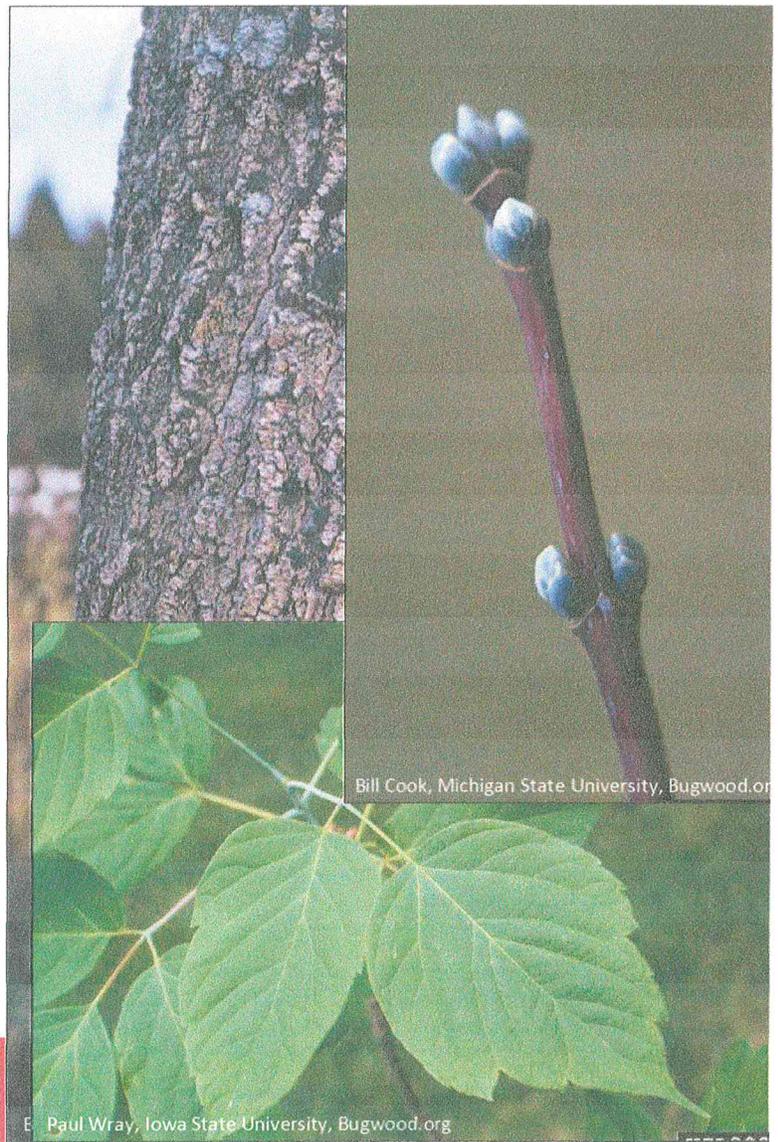
Box Elder aka- Ash-leaf Maple

Similarities

- Opposite Branching
- Compound, Pinnate Leaves
- Diamond Pattern Bark

Differences

- Lobed terminal leaflet
- 3-5 leaflets
- Reddish stems/young bark



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Elderberry

Similarities

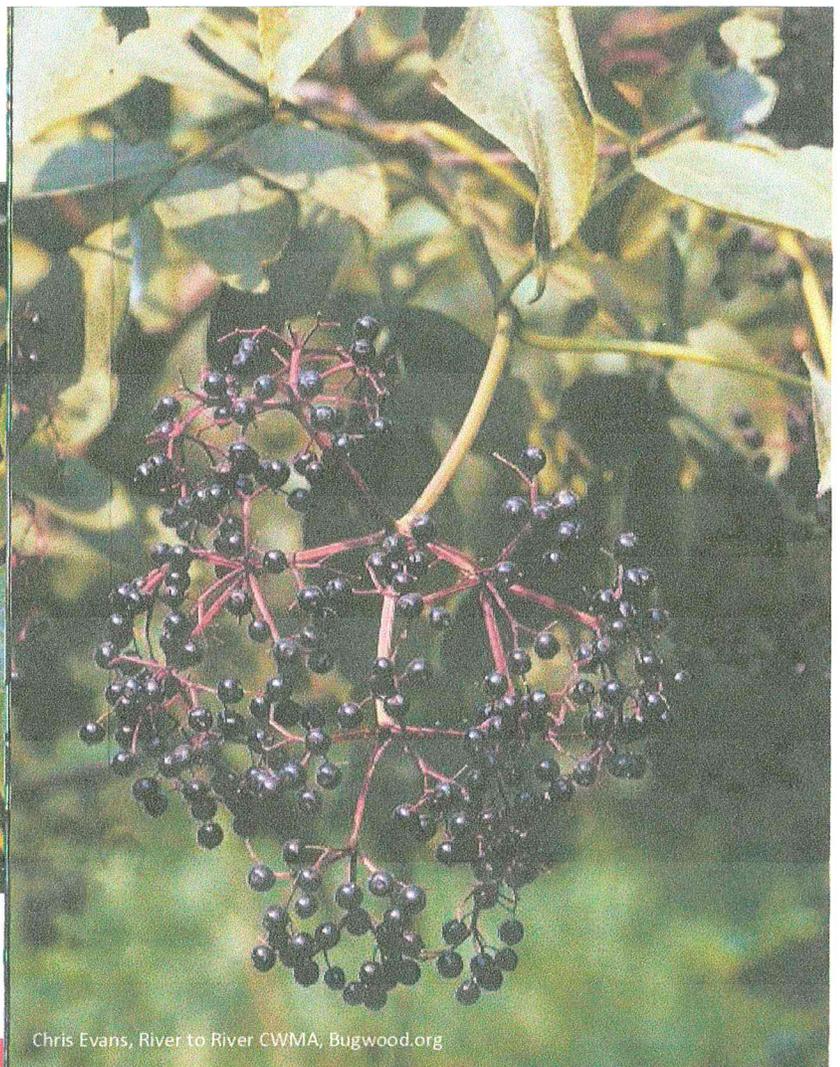
- Opposite branching
- Pinnately compound leaf

Differences

- Shrub
- Soft/pithy twigs
- Berries



John Cardina,



Chris Evans, River to River CWMA, Bugwood.org



Cornell University
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John Cardina, The Ohio State University, Bugwood.org

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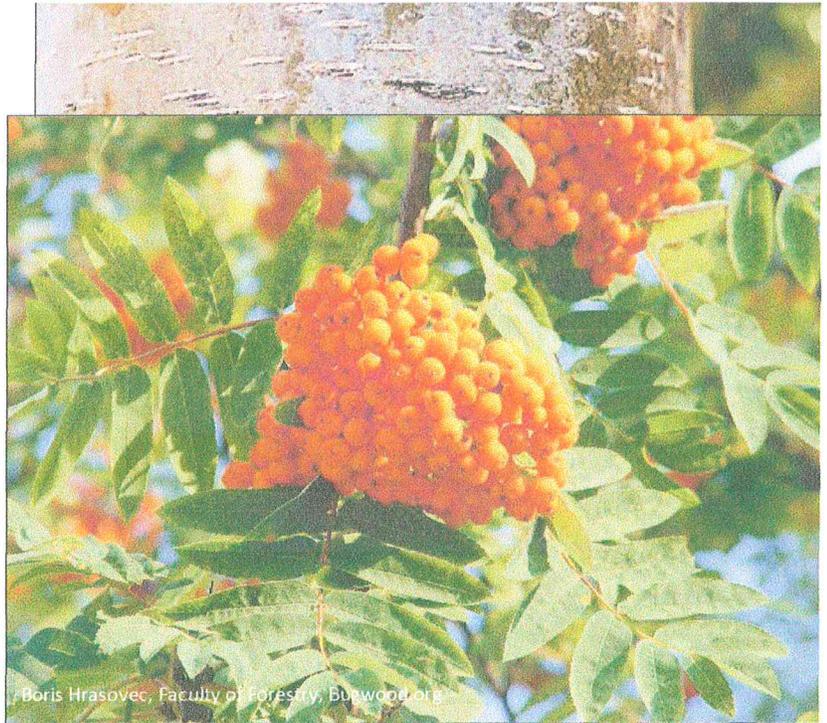
Mountain-Ash

Similarities

- Pinnately compound leaf

Differences

- Leaflet number and serrations
- Smooth bark
- Alternate branches
- Berries



Boris Hrasovec, Faculty of Forestry, Bugwood.org



Tom DeGomez, University of Arizona, Bugwood.org



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Hickory and Walnut

This group of trees primarily has pinnately compound leaves, but **alternate** branching, **nuts** and varying bark types (some of which can look diamond like).

Shagbark Hickory

Bitternut Hickory

Black Walnut

Paul Wray, Iowa State University, Bugwood.org

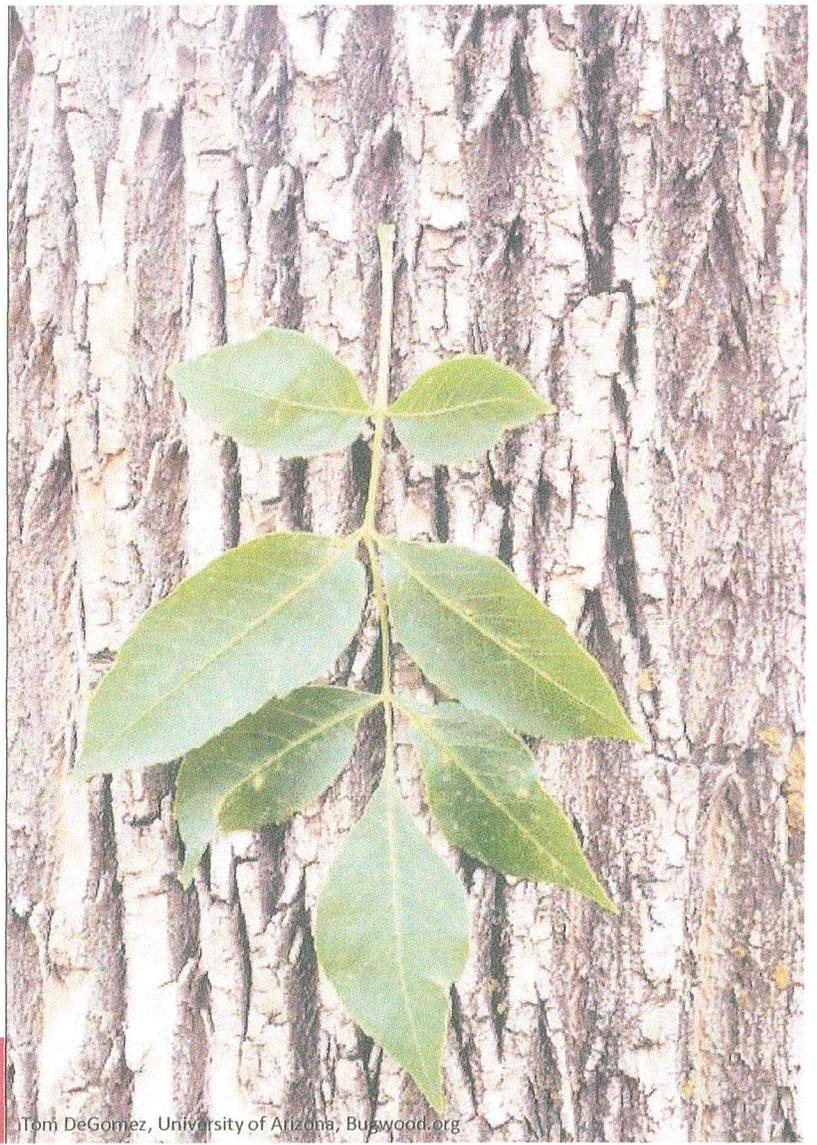
Paul Wray, Iowa State University, Bugwood.org

UGA0008448

Steps in Identifying Ash Trees

Does the tree have:

1. Opposite Branching
(with stout twigs)
2. Pinnate Compound
Leaves
3. 5-11 (7) Leaflets
4. Single Samara
5. Pronounced
Diamond Pattern
Bark



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Toni DeGomez, University of Arizona, Bugwood.org

On-Line Identification Resources

- Know Your Trees:
<http://ecommons.cornell.edu/bitstream/1813/86/2/art.pdf>
- CU Woody Plant Database:
<http://woodyplants.mannlib.cornell.edu/>
- Virginia Tech Dendrology:
<http://cnre.vt.edu/dendro/dendrology/main.htm>



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Preparing for the Emerald Ash Borer
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Credits

- Presentation prepared by
 - Rebecca Hargrave, Horticulture and Natural Resources Extension Educator, Cornell Cooperative Extension of Chenango County, jrh45@cornell.edu, and
 - Mark Whitmore, Forest Entomologist with Cornell University Department of Natural Resources mcw42@cornell.edu
- Funded by USDA/APHIS and Cornell University



March 11, 2011



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- What is EAB?
- Management & Control
- Quarantine and Firewood
- Collecting Ash Seeds
- Facts & History

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- Home & Woodlot Owners
- Communities & Governments
- Local Task Forces
- Tree Care Professionals
- Materials for Educators

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MAPS

GET HELP

REPORT

Or call 1 (866) 640-0652



Home > Insects > Emerald Ash Borer > Home & Woodlot Owners > Ash Tree Identification

Home and Woodlot Owners

ASH TREE IDENTIFICATION

Ash trees are generally easy to identify. All three varieties of ash trees - white, green, and black - possess distinct characteristics.



Green Ash
Photo credit: David Cappaert, Michigan State University, Bugwood.org

Steps in Identifying Ash Trees:

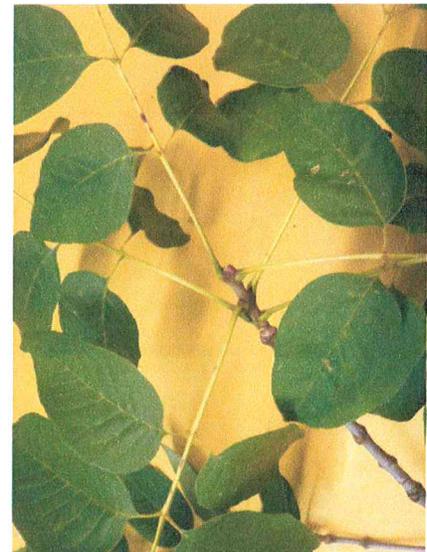
Consider these quick points when identifying ash trees:

- Opposite Branching (with stout twigs)
- Pinnate Compound Leaves
- 5-11 Leaflets
- Single Samara
- Pronounced Diamond Pattern Bark



Opposite Branching:

Buds, and therefore leaves and branches, grow directly across from each other. Only a few trees in New York State have opposite branching, including Ash, Maple, and Horsechestnut/Buckeye.



Ash branches are characterized by oppositely arranged buds and leaves on the twigs. Twigs tend to be stout, able to hold large compound leaves.

Image Credit: Rebecca Hargrave, Cornell Cooperative Extension



*White Ash leaf, note small leaflets (9 total, 4 paired and one terminal) and the brown bud at leaf base.
Photo credit: Rebecca Hargrave, Cornell Cooperative Extension*

Pinnate Compound Leaves:

Compound leaves are leaves made up of multiple leaflets. Pinnate leaflets are arranged linearly along a rachis, or stem. White ash generally has 5-9 leaflets. Green ash has 7-9 leaflets. Black ash has 7-11 leaflets. You will find a bud at the base of each leaf where it meets the stem.

Samara:

Ash fruit is a single samara, or seed surrounded by dry, oar-shaped wings that help with dispersal. The wing on the green ash fruit, seen here, extends down almost to the base of the seed, whereas the wing on white ash fruit only extends to the top half of the seed. Both are about the same size, 1 -2 inches in length.



*Ash branches are characterized by oppositely arranged buds and leaves on the twigs. Twigs tend to be stout, able to hold large compound leaves.
Image Credit: Rebecca Hargrave, Cornell Cooperative Extension*



*The diamond pattern bark is distinctive in green and white ash trees.
Photo credit: Keith Kanoti, Maine Forest Service, Bugwood.org*



*Black ash trees have flakey bark as they age. But, a diamond pattern may still be seen.
Photo credit: Keith Kanoti, Maine Forest Service, Bugwood.org*

Diamond Pattern Bark:

As white and green ash trees age their bark develops distinct diamond patterns. Young green and white ash trees have smooth bark. Black ash trees start with warty or smooth bark and grow to have flakey bark as they age, but, a diamond pattern may still be seen. An easy differentiation between green and white ash; the upper branches of white ash tend to be smooth to the top, even in older trees, whereas the upper branches of green ash tend to be rough all the way up.

Look Alike Trees:

Although ash trees are quite unique looking, there are a few trees that could be mistaken for ash.

- **Norway Maple:** These trees also have opposite branches and diamond-pattern bark, but they have large, simple leaves and paired samaras (fruit).
- **Box Elder:** Sometimes known as the Ash-leaf Maple, this tree also has opposite branching, compound and pinnate leaves, and diamond-pattern bark. However, the box elder has three-five lobed terminal leaflets, and reddish stems and young bark.

- **Elderberry:** Elderberry has opposite branching and pinnate, compound leaves. Important differences from the ash tree is that elderberry is a shrub, with soft, pithy twigs, and berries.
- **Mountain-ash:** This tree is not a true ash. Like the ash, it has pinnate, compound leaves. Unlike the ash, the mountain-ash has smooth bark, alternate branches, and berries.
- **Hickory and Walnut:** This group of trees, including Shagbark Hickory, Bitternut Hickory and Black Walnut, primarily has pinnately compound leaves, but alternate branching, nuts, and varying bark types (some of which can look diamond like).

Additional Resources

- **Ash Tree Identification Fact Sheet:** Hit sheet for Ash Tree Identification, Cornell University.
- **Emerald Ash Borer:** Ash Tree Identification This presentation developed by Cornell University contains information and photographs to identify ash trees and common look-alike trees.
- **Know Your Trees** , Cornell University education bulletin, 2001.
- **Cornell Woody Plants Database**, Cornell University tree identification searchable online tool.
- **Dendrology at Virginia Tech**, Virginia Tech tree identification searchable online tool

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Ash Tree Identification

Ash species attacked by emerald ash borer include green (*Fraxinus pennsylvanica*), white (*F. americana*), black (*F. nigra*), and blue (*F. quadrangulata*), as well as horticultural cultivars of these species. Green and white ash are the most commonly found ash species in the Midwest with blue ash being rare.

While other woody plants, such as mountainash and pricklyash, have "ash" in their name, they are not true ash, or *Fraxinus* species. Only true ash are susceptible to attack by emerald ash borer.

To properly identify ash trees, use the following criteria:



Branch and Bud Arrangement

Branches and buds are directly across from each other and not staggered. When looking for opposite branching in trees, please consider that buds or limbs may die; hence not every single branch will have an opposite mate.



Diane Brown-Rytlewski

Leaves

Leaves are compound and composed of 5-11 leaflets. Leaflet margins may be smooth or toothed. The only other oppositely branched tree with compound leaves is boxelder (*Acer negundo*), which almost always has three to five leaflets. White ash (on left) and green ash (on right)



Black Ash

White Ash

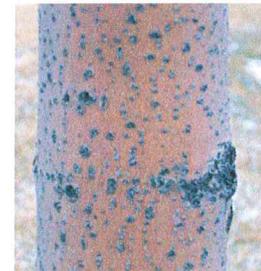


forester401

*Paul Wray, Iowa State University

Bark

On mature trees (left), the bark is tight with a distinct pattern of diamond-shaped ridges. On young trees (right), bark is relatively smooth.



Identifying ash trees by their bark is difficult. Use this in combination with other indicators.



*Paul Wray, Iowa State University

Seeds

When present on trees, seeds are dry, oar-shaped samaras. They usually occur in clusters and typically hang on the tree until late fall, early winter.

MICHIGAN STATE UNIVERSITY EXTENSION



Emerald Ash Borer

Tree Species Resembling Ash

Boxelder (*Acer negundo*)

Exhibits opposite branching and compound leaves. However, has 3 to 5 leaflets (instead of 5 to 11) and the samaras are always in pairs instead of single like the ash.



*Paul Wray, Iowa State University



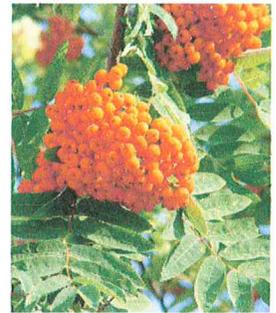
*Bill Cook, Michigan State University

European Mountainash (*Sorbus aucuparia*)

Leaves are compound with alternate (staggered) branching. Tree bears clusters of creamy white flowers in May. Fruits are fleshy, red-orange berries.



Diane Brown-Rytlewski



*Boris Hrasovec, University of Zagreb

Shagbark Hickory (*Carya ovata*)

Leaves are compound with 5 to 7 leaflets, but the plant has an alternate branching habit. Fruit are hard-shelled nuts in a green husk.



*Paul Wray, Iowa State University



*Paul Wray, Iowa State University

Elm (*Ulmus species*)

Branching is alternate and the leaves are simple with an unequal leaf base.



*Paul Wray, Iowa State University



*Paul Wray, Iowa State University



*Paul Wray, Iowa State University

Black Walnut (*Juglans nigra*)

Leaves are compound with 9 to 15 leaflets, but the plant has an alternate branching habit. Fruit is a large dark brown nut inside a green husk.



*Paul Wray, Iowa State University

Authors: Kimberly Rebek and Mary Wilson

*www.forestryimages.org