

# WE NEED YOUR HELP!

We are glad to provide these materials for free. In order for us to continue receiving funding for new materials, we need to collect information on how they are used.

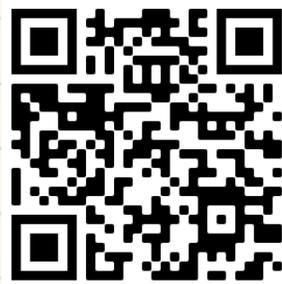
**Thank you for taking the time to answer the following one-minute survey.**



## There are three ways to complete the survey:

**1**

Scan this code with your smartphone camera



**2**

Type the following link into your web browser:  
<https://plantheroes.org/educator-survey>

**3**

Email your answers to:  
[plantheroes@publicgardens.org](mailto:plantheroes@publicgardens.org)



- 1) Job title
- 2) Name of organization you belong to
- 3) What kind of educator are you?
  - Teacher
  - Summer camp counselor
  - Home schooler
  - Public garden educator
  - Informal educator
  - Other (please describe)
- 4) What grade level do you teach?
  - Elementary (K-5)
  - Middle School (6-8)
  - High School (9-12)
  - Other (please describe)
- 5) Specify what subject area you teach:
  - Science
  - Math
  - Language Arts
  - Social Studies
  - Other (please describe)
- 6) How many students do you teach in a school year?



# Field Guide:

## Emerald Ash Borer

*The larvae of this green beetle from Asia burrow under the bark of ash trees, cutting off their water and nutrient supply. It's a notorious hitchhiker in firewood.*



**Plant  
Protection  
Program**

AMERICAN PUBLIC GARDENS ASSOCIATION

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

# EMERALD ASH BORER

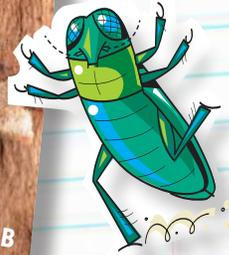
## Identification



↑ Adult emerald ash borer on a tree leaf.



↔ Actual size of an adult emerald ash borer (*Agrilus planipennis*); don't let their small size fool you!



↑ An adult emerald ash borer, usually a little less than 0.5 inches (1 centimeter) in length.



↔ Close-up side view of an adult emerald ash borer.

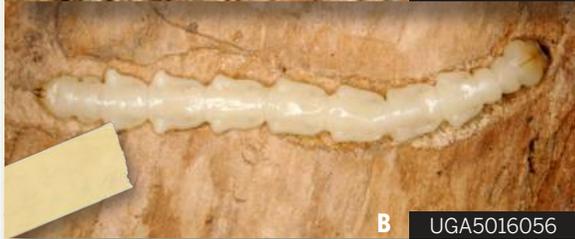
# EMERALD ASH BORER

## Life Cycle

Close-up showing the second, third, and fourth larval (immature, grub-like) stages of the emerald ash borer. >>



A UGA5016055



B UGA5016056

<< Emerald ash borer larvae can grow up to 1.2 inches (3 centimeters) long.



D UGA1460072



E UGA1337003

<< Tiny emerald ash borer eggs, only 0.04 inches (1 millimeter) in length, or about the size of a grain of sand!



C UGA2106098

<< An adult emerald ash borer is usually about 0.5 inches (1 centimeter) in length.



# EMERALD ASH BORER

## Host Trees

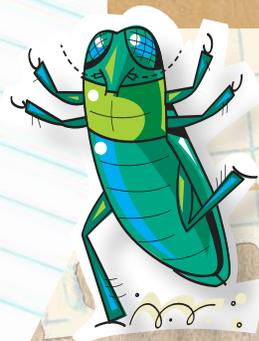
Host trees are trees that the emerald ash borer lives in and feeds on.

Close-up of an ash twig showing the opposite arrangement of leaves, a helpful way to identify an ash! >>



⚡ Ash trees have opposite branching, meaning the branches protruding from tree limbs have a mate protruding from the exact opposite side of the same limb. Only ash, maple, dogwood, and horse chestnut trees have opposite branching.

All ash trees have leaves that are made up of individual "leaflets." This photo shows one leaf with seven leaflets. >>



# EMERALD ASH BORER

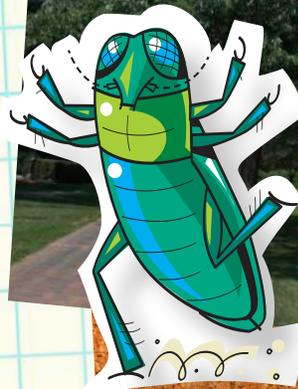
## Host Trees 2



<< Beautiful fall colors of the green ash tree, otherwise known as *Fraxinus pennsylvanica*.

Stately ash trees are commonly used to provide shade. Green, blue, black, pumpkin, and white ash, as well as white fringe tree, are all susceptible to the emerald ash borer.

>>



<< Close-up of bark from a green ash tree. Many ash trees have similar furrows (grooves in the bark) as this green ash.



# EMERALD ASH BORER

## Symptoms



A UGA1439003

<< Close-up of an infested ash tree, showing the leafy shoots that develop near the base of stressed trees.



C 5389744



B UGA1523072

<< D-shaped holes caused by the emerald ash borer when it exits the tree, usually about 0.125 inches (3 millimeters) in diameter.



D UGA1372002

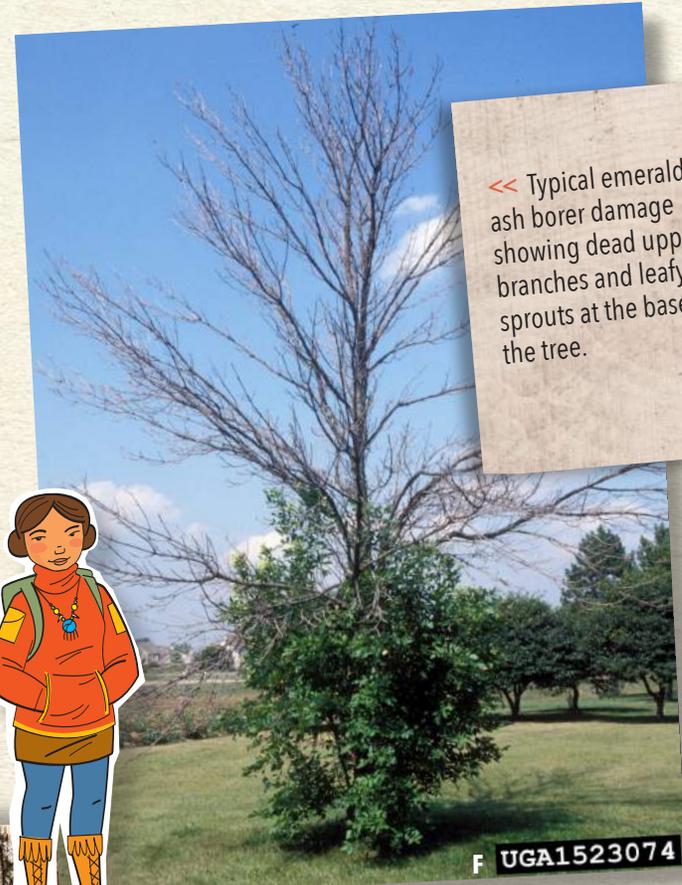
<< The downy woodpecker is a natural predator of emerald ash borer. It can be a sign that the emerald ash borer might be nearby!

<< Woodpeckers peck at the bark on ash trees to find emerald ash borers to eat, and leave behind light regions of flaking bark.



E UGA5382317

<< Tree trunk with many emerald ash borer tunnels (called "galleries") under the bark.



<< Typical emerald ash borer damage showing dead upper branches and leafy sprouts at the base of the tree.

F UGA1523074

# EMERALD ASH BORER

## Biosurveillance

This wasp (*Cerceris fumipennis*) is a predator of the emerald ash borer, so if you spot wasps nearby, there's a chance you might see emerald ash borers too!

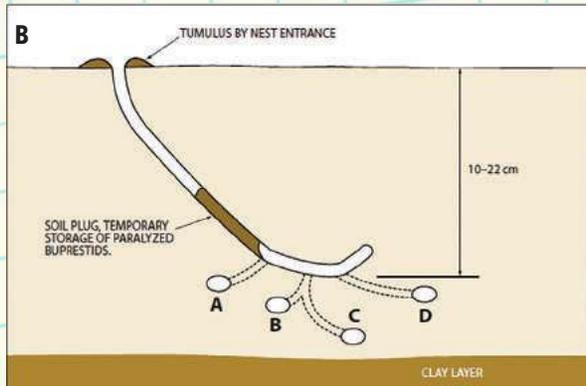


<< Note the single, broad, creamy-yellow abdominal band.

∨ Typical wasp nest entrance.



∧ Wasp with emerald ash borer prey.



<< Diagram of a wasp nest. A, B, C, and D indicate the location of completed cells; dotted lines indicate the sections of the main burrow that were backfilled upon completion.



∧ Wasp colony at a park in Ontario, 2006.



Join our team of Plant Heroes and learn about trees, forests, and the natural world around you!

**PLANTHEROES.ORG**

**You can be a Plant Hero!**

Are you curious about plants and animals? Do you like asking questions about nature? Do you enjoy being outdoors and having fun, climbing trees, balancing on logs, or finding a new butterfly or beetle? If so, you are already on your way to becoming a Plant Hero! We invite you to join forces with Nate, Laura, Aponi, and Frankie to protect the plants and ecosystems we all love.

**How can you become a Plant Hero?**

Join our team and go on a journey with Nate, Aponi, Laura, and Frankie. As a Plant Hero, you will learn to notice when plants are in trouble. You will also find out ways you can act quickly to help find solutions in your own neighborhood. Follow their adventures and learn how they help plants and ecosystems stay healthy.

**On the Plant Heroes website, you will find** materials to help you learn about plants, forest health, and ecosystem balance. The more you know, the more you can help protect plants and ecosystems in your own yard, neighborhood, and community!

**Plant Heroes strives to spark curiosity about nature and science in all children.**

Our program provides hands-on, nature-based learning materials for educators to engage children in topics of plant health, ecosystem balance, and forest health. We also spotlight the amazing work our public gardens do in protecting the plants and ecosystems we all depend on through our website and printed materials. Visit [plantheroes.org](http://plantheroes.org) today to learn more!

**Plant Heroes is brought to you by the American Public Gardens Association, founded in 1940.**

Over the last eight decades, the Association has supported the work of public gardens in North America and beyond. Our mission is to champion and advance public gardens as leaders, advocates, and innovators in the conservation and appreciation of plants. Our vision is "A world where public gardens are indispensable" as they provide botanic, conservation, community, education, and economic resources to their community.

The Association is committed to increasing the knowledge of public garden professionals throughout North America through information sharing, professional development, networking, public awareness, and research, so that they have the tools to effectively serve visitors and members.



**American  
Public Gardens  
Association**

[PublicGardens.org](http://PublicGardens.org)

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