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://planheroes.org/educator-survey

3) Email your answers to:
   planheroes@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?
Help the Plant Heroes protect our forests by slowing the spread of pests and diseases!

**INSECT**

**EMERALD ASH BORER**

**PLANTHEROES.ORG**

**ADVANCED ACTIVITY BOOK**

**Aponi Star**

BE A PLANT HERO!

Help Aponi slow the spread of the Emerald Ash Borer!
Aponi and her cousins were playing softball during a summertime family reunion picnic at a neighborhood park in Harrisburg, Illinois. While bored to death (nobody was hitting well that day!) she noticed a patch of small dirt mounds in center field. After the game, she went back to inspect more closely, and realized that these were ground nests and eventually saw a small wasp entering the burrow. She took a picture of the bug and looked it up in her *Field Guide to Flying Insects of the Midwest* when she got home and learned that this was the famed species of wasp, *Cerceris fumipennis*, known for hunting emerald ash borer.
The presence of the wasp in the area helped local officials find and remove a stand of infested ash trees (the first found in this part of the state) and prevent the borer from spreading into the nearby Shawnee National Forest!

Aponi shared this finding with her county extension agent, who explained that using the wasp to track the location of emerald ash borer was called "biosurveillance" and put her in touch with her state’s pest survey coordinator.
Complete the emerald ash borer crossword puzzle. Look on the next page for word clues!

FIREWOOD
ENTOMOLOGY
IRIDESCENT

THORAX
BORER
ABDOMEN

PUPA
GALLERIES
XYLEM

GENUS
ASH
LARVAE
ACROSS

2 A tree in the genus Fraxinus with feather-shaped leaves and opposite branching. It is the host for emerald ash borer.

3 The third stage of complete metamorphosis and an intermediate stage between a larval and adult insect. In this stage, the insect is not feeding and is reorganizing its whole body to become an adult.

5 This is used as fuel to start and keep a fire going. Tree killing pests love to use this to hitch rides to new places, so don’t take it with you when you camp!

8 A taxonomic group that contains one or more species.

10 Shimmering with colors, shiny or luminous. ..like emerald ash borer’s coloring!

12 The immature, worm-like stage of some insects that occurs between the "egg" and "pupa" stages. This is the life stage of emerald ash borer responsible for killing ash trees.

DOWN

1 Tunnels that adults or larvae of wood boring insects like emerald ash borer create when burrowing in the tree’s wood.

4 This is the tail end or hind part of the body of an insect that has neither wings nor legs.

6 The woody part of plants; it is specialized tissue that provides support and transports water and minerals from one part of the plant to another.

7 A type of insect that spends part or all of its life tunneling into the wood of trees.

9 The branch of science that studies insects.

11 The middle section of an insect’s body where its wings and legs are attached.

_Cerceris wasps are natural enemies of emerald ash borer and love to build their nests in sandy areas._

_They are much better than humans at finding EAB, so keeping a close eye on what these good guys are bringing back to their nests can help us detect it in new areas._

*Photo: Philip Careless, University of Guelph, Insect Systemics Lab*
Answer Key

G A S H
L O N G
B O N E
E M E N
L E R
O R E
A G N
S I D E
S C E N T
E R
O L Y
A X
L A R V A E
O M O G O
Complete the maze, and then find the words. The words can only be found along your maze path.

DYGLQQI LAWMI PNSHPWKFHHI BTJDP CDPDI YUNQP DERKLOJ XMNDENP VMEGF KAPP
I B O O C
B Q W H E
P T B V G
XI NBW CLHTCFYYN B R Y AGQUW Y R DRGWH Q P
A O X K L C E X L F U
F Q R H T I I P C D M
I L S L A A H P I T B
R MNFAA J BUFDKDEU I B B BMIII ATI EM PBOXE K
E G T H P H I E
W C V F H T O T
O N U Q S O O W
O U U WXS UWCJ VI N O T GNMMDENTOMOLOGYF P O T O K N V T W
D T G T P G L F E A
G R H X K N E G G D
F E P V E P E K G U
M ELCMRAEHHEADF C Padyx FSFAV INSECTHML P S L
R N B D G G P T
I L A W M T X T B
J E R C O B X H G
TFBTL A X KABDOMENHJPBPUPAW TRKQRSVFL O Y O T
A V S I S H R L R
X E P T L R E E A
D S R N J I R M X
H QXEAE O E YAVQMP LARVAEMASR W B Y S K TMoha
L U P B C
B T M H Y
M S A S L
WGALLERIESBICVLRHEYCHSVHAY1MCWP MCOATBI YMEOTGEUGEXXMQASHHWSLTN

Find and circle these words:

- SPROUTS
- EGG
- ABDOMEN
- XYLEM
- FIREWOOD
- TREE
- GALLERIES
- LARVAE
- ENTOMOLOGY
- BARK
- ASH
- LEAVES
- PUPA
- BORER
- INSECT
- HEAD
- THORAX
- ADULT

PLANT HEROES
planheroes.org

GAMES!
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<table>
<thead>
<tr>
<th>THORAX</th>
<th>ADULT</th>
<th>LARVAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGG</td>
<td>FRASS</td>
<td>PUPA</td>
</tr>
<tr>
<td>INSECT</td>
<td>GENUS</td>
<td>SPREAD</td>
</tr>
</tbody>
</table>

- **EGG**: G S O G G
- **PA**: M O A P U P A J V
- **AD**: A S P R E A D N W
- **SN**: G N G E N U S O S S
- **FR**: N F R A S S Y R S
- **IN**: G X S I N S E C T
- **RA**: D L A R V A A A E
- **UR**: A D U L T D T A G
- **TH**: U R T H O R A X H

**PLANT HEROES**

Learn more and test your knowledge with interactive games on planheroes.org

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Oh, no! The letters from sixteen words have been curved and hidden in the puzzle. A curved word may start anywhere in the puzzle. It can then move in any direction. Once a word has used a square in the puzzle, that word may not re-use the same square. But another word is allowed to re-use squares from other words. One word (egg) has already been found for you! How many words can you find in 30 minutes? If you don’t find all of nine words in 30 minutes, then stop.

Start Time: _______________  End Time: _______________  Total Time: _______________ minutes

FIREWOOD  INSECT  HEAD  ADULT
ENTOMOLOGY  TREE  LARVAE  THORAX
BARK  EGG  BORER  ASH
ABDOMEN  PUPA  SPROUTS  XYLEM

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Complete the Plant Heroes word search!
To make it fun, “insect” is spelled backwards!

E E E D B B S R A G L A R V E
U E L O S P D G A R R P U F R
E H P T F R A S S T U R E E B
V A N A S I E B O R E R S A A
R A V A N L A H P U P A A R A
R B D R U E A V R A L P X A E
A E O D T C E S N I E A A D S
I N A R A S U A A E R R E C P
E T P R O N P R O O F O U T F
N S T P E O S R H O E T E G L
N A L G G F G T E O P A N C A
E C U D G N A D H A T R E G V
G R D F O C I T F R D R S A S
A R A S L G S P R E A E N G U
V E R A L A E A T T R D I S I

Thorax
Egg
Borer
Genus
Spread
Larvae
Adult
Frass
Pupa
Insect

Games!
Learn more and test your knowledge with interactive games on planheroes.org

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Plant Heroes Pledge

This Certifies That

_______

is an Official Member of the Plant Heroes Team and pledges to:

- Learn about the pests and diseases that affect the plants in my region
- Be on the lookout for symptoms of pests and diseases on trees in my neighborhood
- Report any suspicious findings to an adult who can notify the local extension agent
- Refrain from moving firewood

Awarded by the American Public Gardens Association
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 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.