



ARREST THAT PEST!

LESSON TWO:

Criminal History of the Emerald Ash Border: *Meet the “Green Menace”*

Goal:

Youth will integrate information from video clips and a Purdue press release to develop and demonstrate an understanding of the characteristics and life cycle of the Emerald Ash Borer.

Purpose of Lesson:

Youth will be introduced to the Emerald Ash Borer (EAB) infestation problem and will work together cooperatively to identify three important ideas from their assigned reading section main idea of the section assigned and restate the three most important details.

Learning Objectives:

Youth will be able to:

- Explain the characteristics and life cycle of the Emerald Ash Borer
- Identify where it came from and how it has continued to spread in the United States and Canada
- Define why it is a problem

Teacher Preparation:

- Familiarize yourself with the [Frequently Asked Questions](#) section, the press release, EAB Information Sections One, Two, and Three, and website videos.
- Make necessary copies of EAB information sections and concept map.
- As you work with students, check for their understanding of vocabulary words and any other new words that come up during discussions.

Materials and Resources:

- Purdue University Press Release
- EAB Information Sections 1-3
- Computers with internet access
- Websites and Videos:
 - www.eabindiana.info
 - *EAB Laying Eggs*
 - <http://www.dontmovefirewood.org/>

- *Life Cycle of the Emerald Ash Borer*
- *Behind the Bug: EAB*
- *The Interview*
- *The Smith Family Goes Camping*
- Graphic Organizer
- PowerPoint slides

Vocabulary:

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|--------------------|-------------------------------|
| • Abdomen | • Larva(e) |
| • Bore | • Nutrients |
| • Cambium | • Pallet |
| • Chambers | • Parasite |
| • Crevices | • Predator |
| • Co-evolution | • Primary Pest |
| • Dunnage | • Pupation |
| • Emergence | • Secondary pest |
| • Exotic species | • Segments |
| • Infested | • Solid wood packing material |
| • Iridescent | • Vascular |
| • Invasive species | |

Introduction:

Begin the lesson by engaging youth in a brief discussion about invasive species and the reasons why they can be harmful to an ecosystem (if needed, please see Lesson One for background material on invasive species). Explain that in this lesson they will be discussing a particular invasive insect called the Emerald Ash Borer (EAB). Construct a conversation with students to gauge what they already know about EAB: Have they heard of it? Do they know what it looks like? Where it came from? How it reproduces? Have them share and discuss for a few minutes.

Development:

After the close of your initial discussions, view the short, on-line videos as a hook to engage youth and then read the News Release aloud to the class as a kick-off activity. Instruct them to think about the following questions as you read and ask them to take notes and record additional questions and observations from the videos and press release.

- What is the problem described in the Press Release?
- What is being affected?
- How does the Press Release say that we can slow the spread of this pest?
- What are the signs and symptoms of infestation?
- What can we do to help?

PURDUE UNIVERSITY PRESS RELEASE:
Green menace on the loose: Emerald Ash Borer flies again in Midwest

WEST LAFAYETTE, IN. - Millions of ash trees are dead, and the green menace is back on the loose, said an expert from Purdue University.

Each May, the adult Emerald Ash Borer (EAB), a shiny, green beetle originating from Asia, begins flying again. On its own, EAB will spread only a half mile annually. However, many infestations come as a direct result of ash firewood, log, and nursery stock movement. "EAB is an exotic and invasive species that has largely been spread through the movement of firewood," said Jodie Ellis, Purdue Extension EAB specialist. "In order to protect the environment and our natural resources, people must realize that the time to move firewood freely over long distances is over."

The state of Indiana is under a federal quarantine, which means that none of the following may leave the state: ash nursery stock, ash logs or untreated ash lumber with the bark attached, any type of firewood except pine, and any composted or un-composted wood or bark chips that are 1 inch or larger. "The quarantines are in place to keep EAB from being moved to new areas. If we don't keep the insect under control, all of our ash resources will be lost," said Ellis.

Aside from following all quarantine regulations, and refraining from firewood movement, the general public can help slow the spread of EAB by monitoring area ash trees for EAB activity. "Emerald Ash Borer has many times been detected by citizens who knew what to look for," Ellis said. "It is a difficult insect to detect, even with our scouts and our trap tree programs. We need numerous eyes looking for the signs of this pest, so citizens have the opportunity to make a real difference."

Infested trees show signs of dying leaves beginning on the upper one-third of the tree canopy and progressing downward, vertical splits in the bark, D-shaped exit holes measuring approximately one-eighth of an inch wide, S-shaped feeding galleries in the vascular tissue directly under the bark, heavy woodpecker activity on the tree's trunk and branches, "epicormic shoots" or water sprouts growing from the tree trunk, and the presence of worm-like larvae up to 1 inch long under the bark of the tree.

Exploration:

After your introduction of the press release and videos on the suggested websites, divide the group into three cooperative learning teams. Give each group one of the three Background Information sections and a copy of the graphic organizer. Together, the team will read their assigned section and using the information they learn, fill in one section of the graphic organizer.

EAB INFORMATION SECTIONS

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SECTION ONE: WHAT IS THE EMERALD ASH BORER?

The [iridescent](#) adult beetle is dark green in color, 1/2" long and 1/8" wide. When adults flare their wings, you can see their purple [abdomen](#). The [larvae](#) are cream-colored grubs with flat bodies, bell-shaped [segments](#), and wide heads.

Recent research has shown that in heavily [infested](#) trees or in trees that are stressed, most EAB have a one year life cycle. In healthy trees that have only a few larvae, most EAB require two years to complete their development.

Adult beetles begin emerging in middle to late May, with peak [emergence](#) occurring during the month of June. The adult insects are most numerous in late June and early to middle July. Adults feed on the ash tree leaves, and then females begin laying eggs approximately two weeks after they emerge.

The eggs, laid in bark [crevices](#), hatch in one to two weeks and the tiny larvae [bore](#) through the bark. The larvae remain here for several months, usually from late July through October, feeding on the [cambium](#) or [vascular](#) tissue that carries water and [nutrients](#) and water to the tree.

Most EAB remain in small [chambers](#) underneath the outer bark over the winter. [Pupation](#) occurs in the spring, and new generations of adults emerge in May to begin the cycle all over again. (For more information, please visit www.eabindiana.info)

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SECTION TWO: WHERE DID EAB COME FROM, AND WHY IS IT A PROBLEM?

Scientists can't say for sure, but they believe that EAB probably "hitchhiked" to this country in [solid wood packing material](#) (SWPM) in the early 1990s. Solid wood packing material includes wooden crates, [pallets](#), and [dunnage](#) used to stabilize cargo on ships that contain goods imported from Asian countries.

This scenario is possible because the EAB larvae and pupae live inside the wood of ash trees. Some of the larvae and pupae can survive the process of chopping down a tree, cutting it into lumber, and building a crate. They can be shipped, along with the cargo contained in the crate, to other countries.

The beetles emerge from the crate and into trees close by. EAB adults do not fly very fast or very far, usually moving no further than a 1/2 mile from where they emerge. The primary movement of the borer is through infested ash wood products such as firewood or ash debris that is transported by people. (For more information, visit www.eabindiana.info)

Closure:

Once teams have completed the reading and filled out their portion of the concept map, come together and complete a concept map that incorporates the main ideas from all three Background Information Sections.

Assesment:

Online quizzes coming soon!

Concept Extension Ideas:

- Write an informational flyer using the format of a movie review and include a clever title: *Aliens vs. Predators* or *Attack of the Aliens*
- *Diary of a Hitchhiker*: Create a fictional account of an invasive insect pest's journey. Be sure to include specific geographical information about the trip and explain how humans have accelerated the spread of invasive species.
- Name two invasive species that are causing problems in your area and prepare a bulletin to explain how groups or individual are working to halt or slow the spread.
- Start a letter writing campaign to defeat the invaders by educating people about how to reduce the number of new invaders, decrease their impact and restore natural resources.
- Research one of the following and write an expose or news article that includes the following information:
 - Species profile
 - Signs and symptoms, clues for detection
 - Native origins and world wide spread – include a distribution map
 - Environmental and economic damage it has caused and current efforts to control or eradicate it from areas where it is not a native
 - History of the problem
 - Types of Destruction
 - Solutions