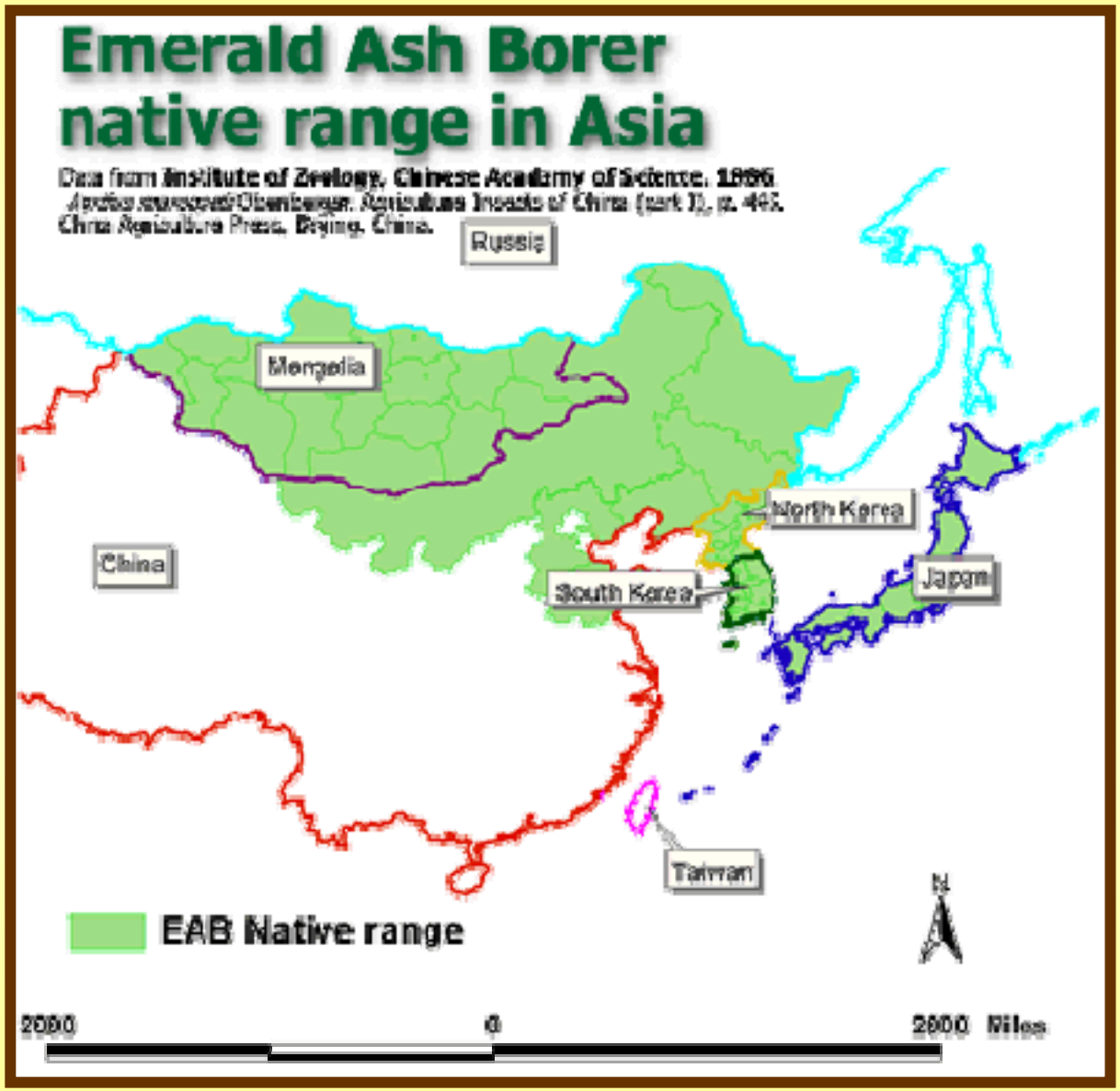
Emerald Ash Borer


Emerald Ash Borer
native range in Asia
Data from Institute of Zoology, Chinese Academy of Science, 1996.
China Agriculture Press, Beijing, China.
Russia
Mongolia
China
North Korea
South Korea
Japan
Taiwan
EAB Native range
N
2000
0
2000 Miles

How Did EAB Travel to North America?

- Arrived in solid wood packing material from Asia 15+ years ago.
- First detected in Detroit/Windsor area in July 2002.

What kind of trees does EAB attack?

In North America, EAB attacks all types of ash trees *Fraxinus* spp.), including:

Green ash

White ash

Black ash

and all other horticultural varieties of ash.

Mountain ash (*Sorbus americana*) is not a true ash tree and is not attacked by EAB.


EAB has already killed over 20 million ash trees in North America.
New infestations continue to be found.
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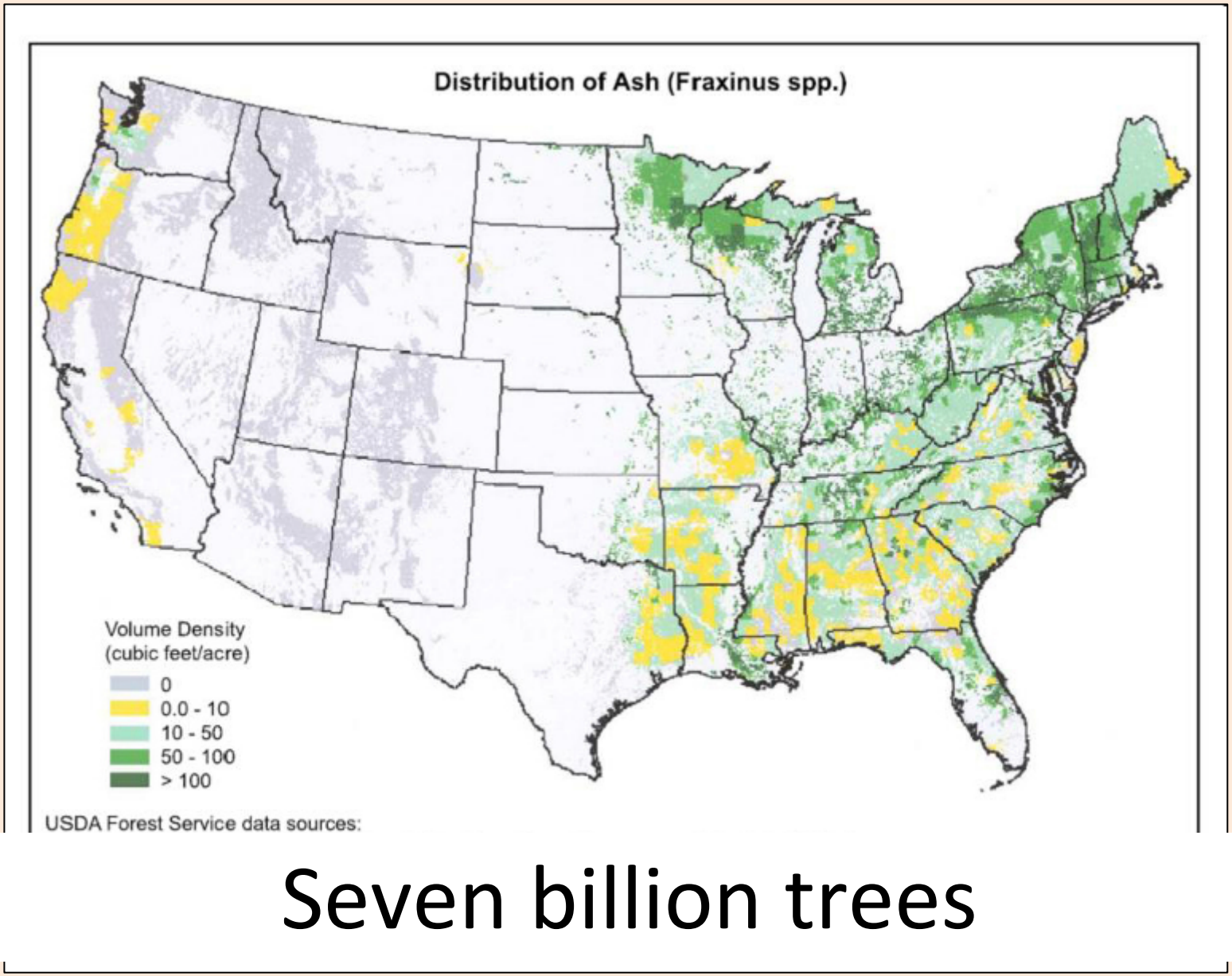
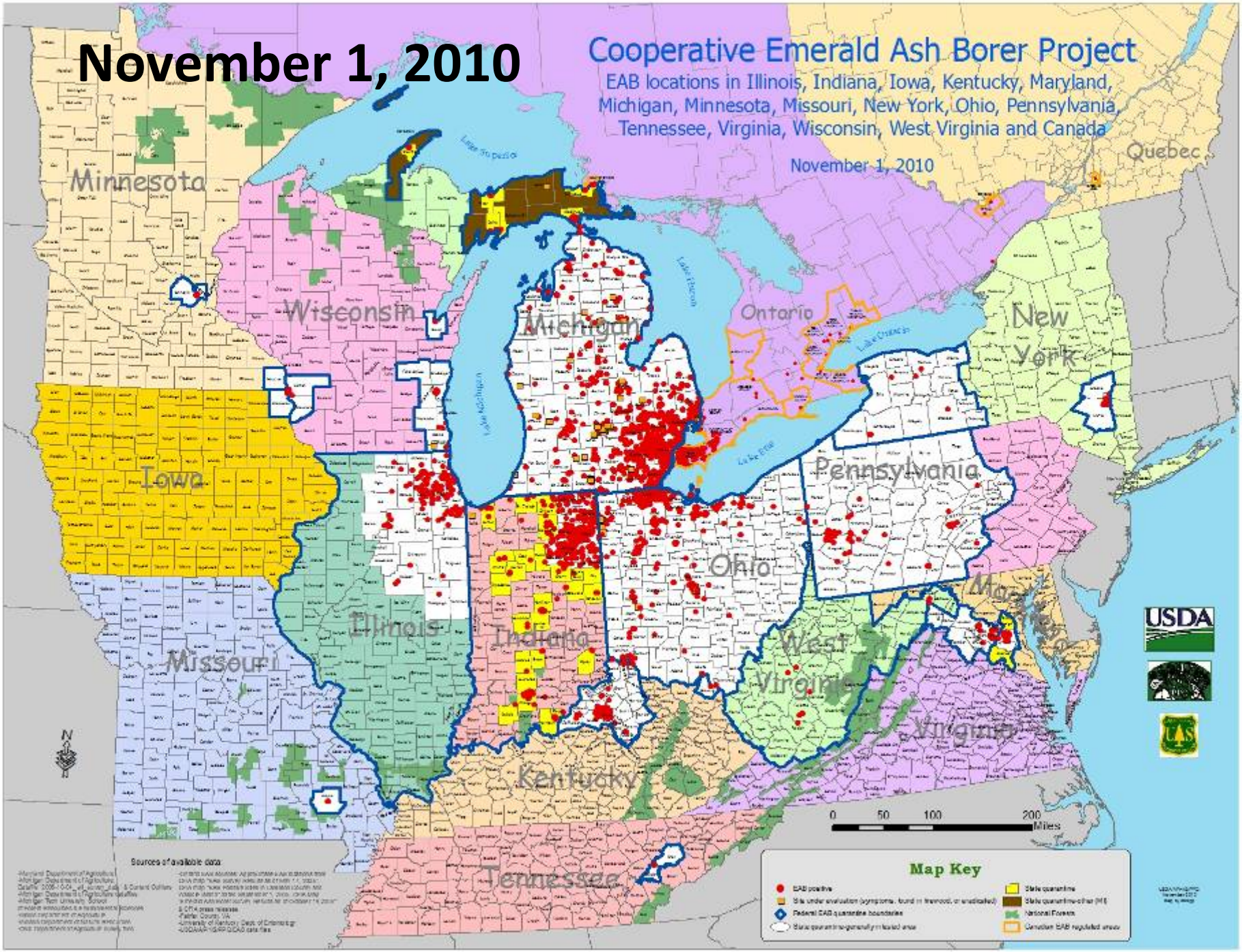
The Ash Resource – What's At Risk



Seven billion trees

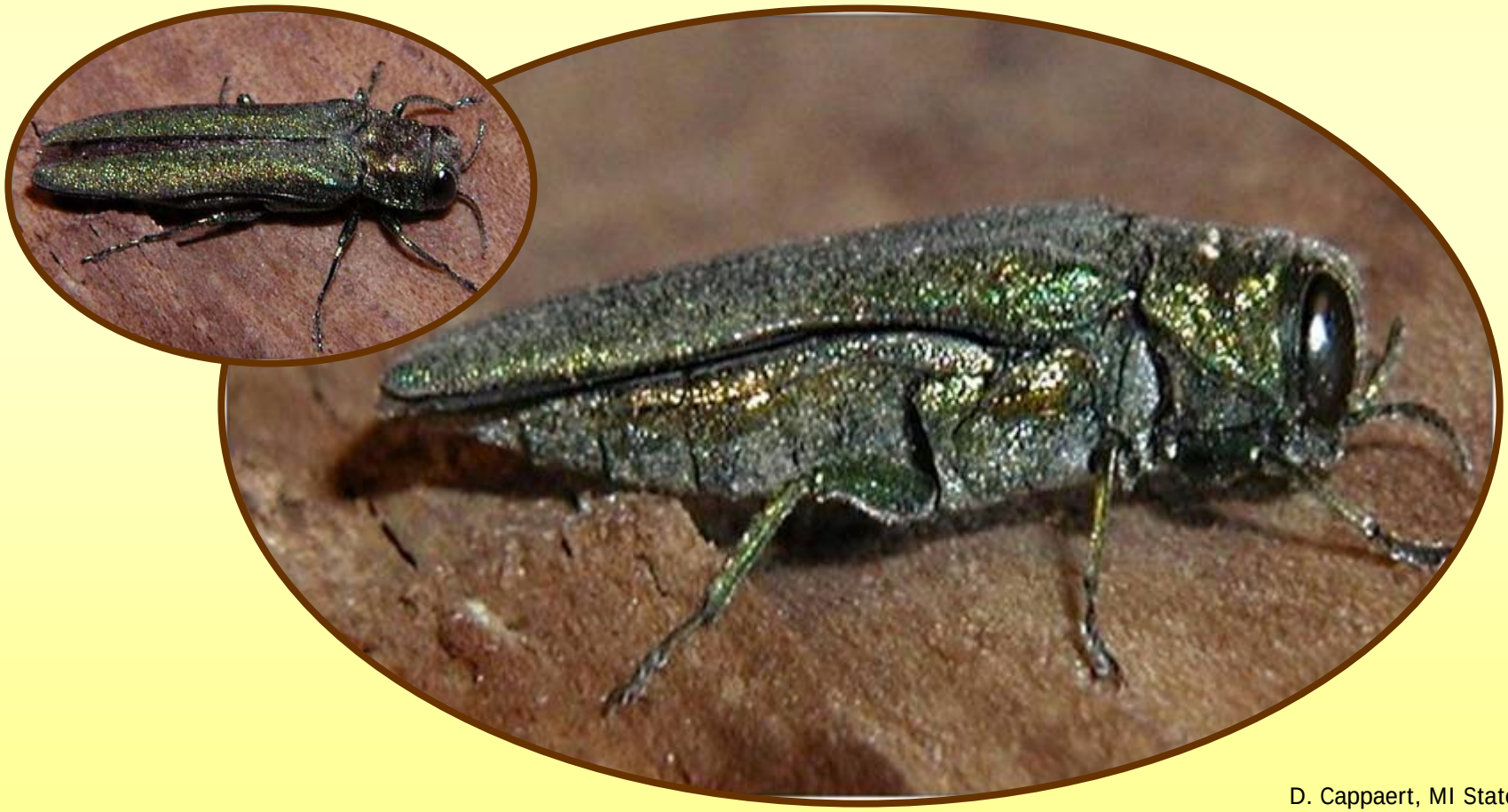

November 1, 2010
Cooperative Emerald Ash Borer Project
EAB locations in Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, Wisconsin, West Virginia and Canada
November 1, 2010
Minnesota
Wisconsin
Michigan
Ontario
Quebec
New York
Iowa
Pennsylvania
Illinois
Indiana
Ohio
Missouri
West Virginia
Virginia
Kentucky
Tennessee
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
USDA
0 50 100 200
Miles
Map Key
EAB positive
State under evaluation (symptoms, found in trap/not, or unidentified)
Federal EAB quarantine boundaries
State quarantine-generally regulated area
State quarantine
State quarantine-other (MI)
National Forests
Canadian EAB regulated areas
Sources of available data

Ash Trees in Indiana

- Ash trees are found on 1.75 million acres in Indiana.
- They make up about 7% of the total number of trees in our *rural* forests.
- There are **47 million ash trees** in our rural forests and **millions more** in our urban areas.
- In urban neighborhoods, ash trees routinely make up from 20–80% of tree composition.

Emerald Ash Borer

Agrilus planipennis Fairmaire (Coleoptera: Buprestidae)



D. Cappaert, MI State U.

Adult characteristics

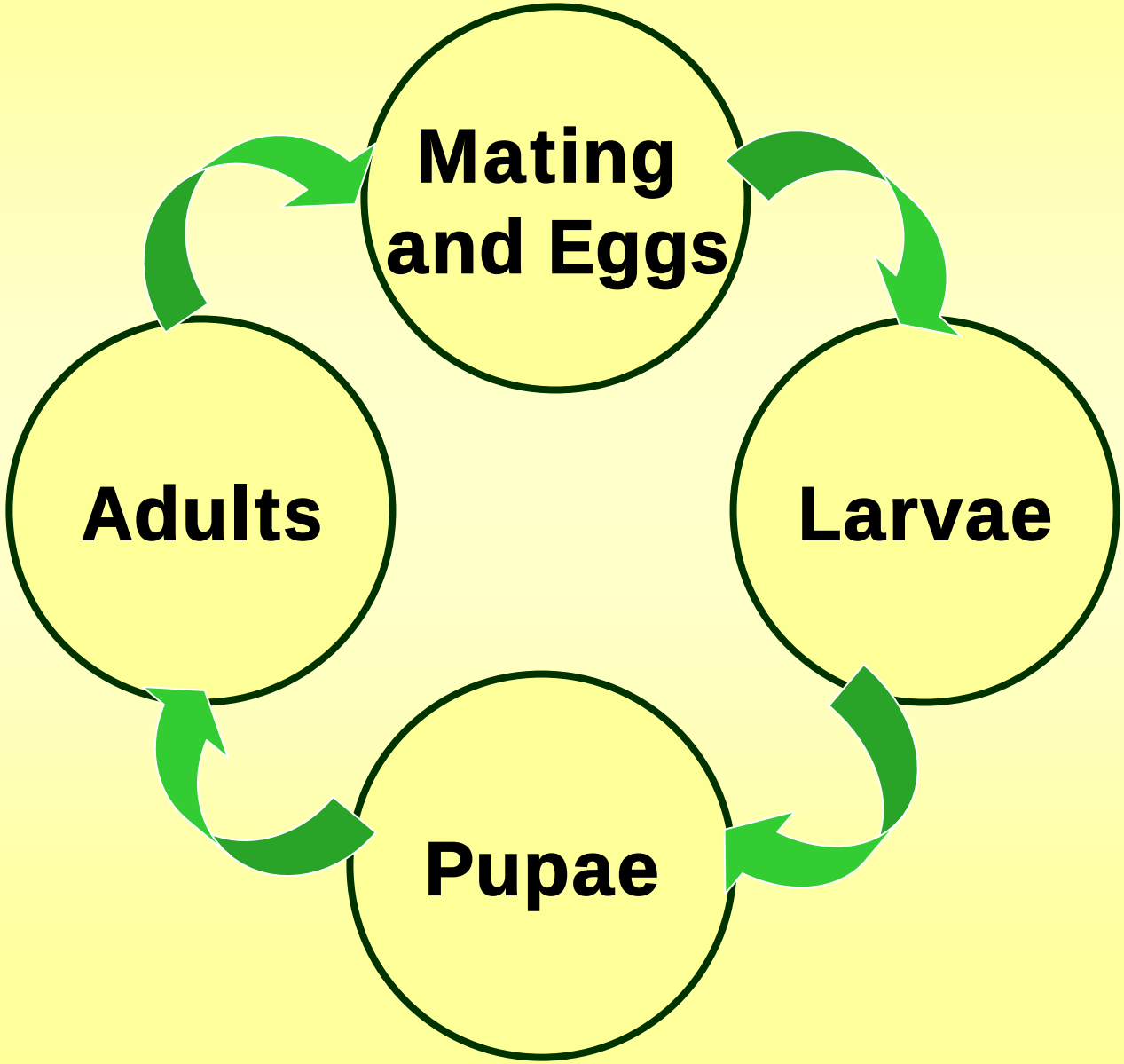
- Bright metallic green.
- Rounded bellies and flat backs.
- 1/3 to 1/2 inches long and 1/16th inch wide.

D. Cappaert, MSU

Their peculiar shape accounts for the distinctive ‘D’-shaped exit holes from which they emerge from trees.


IN GOD WE TRUST
LIBERT
2002
D

Life Cycle and Biology of EAB

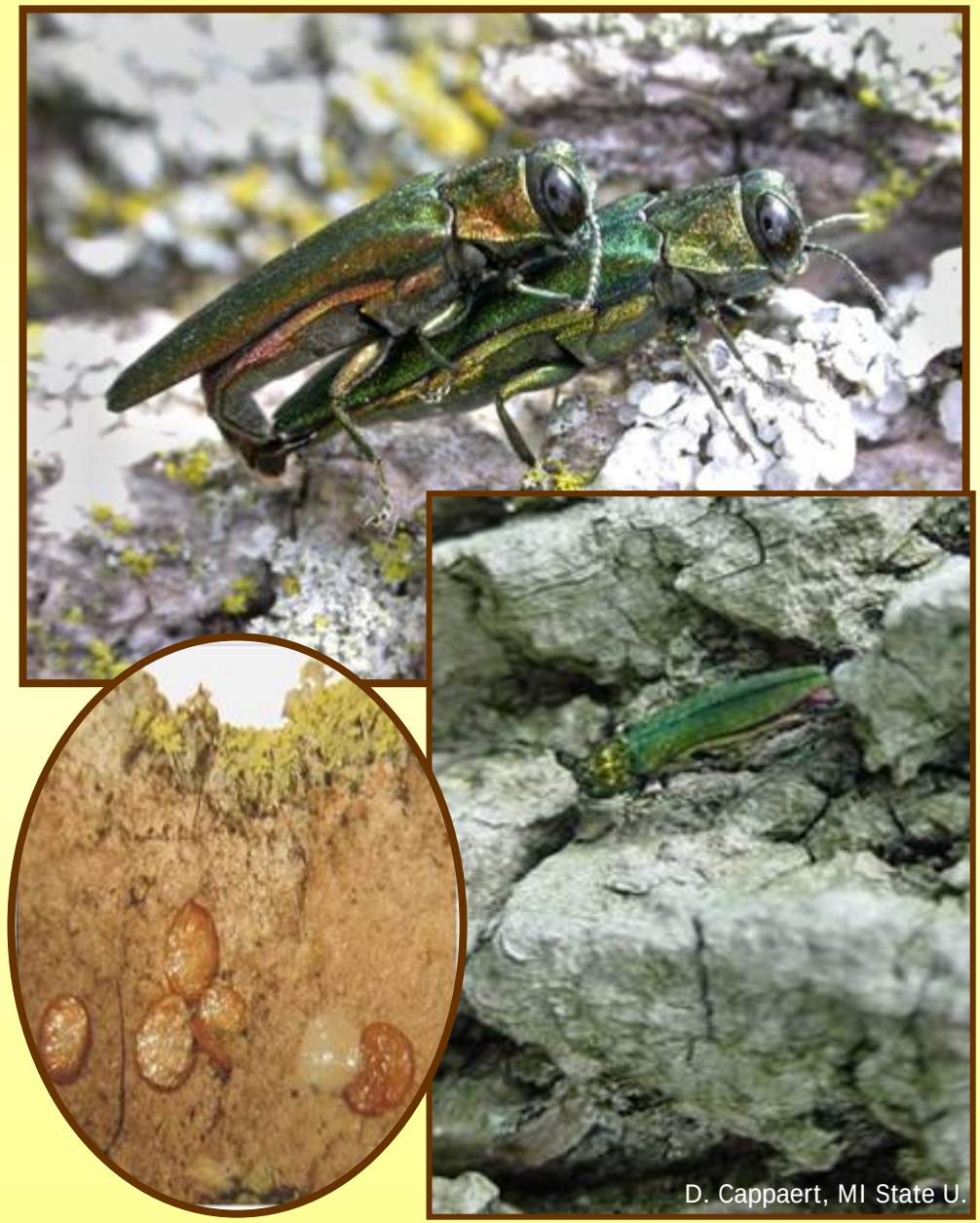


Mating and Eggs (May-July)

•Adults emerge from late May throughout summer.

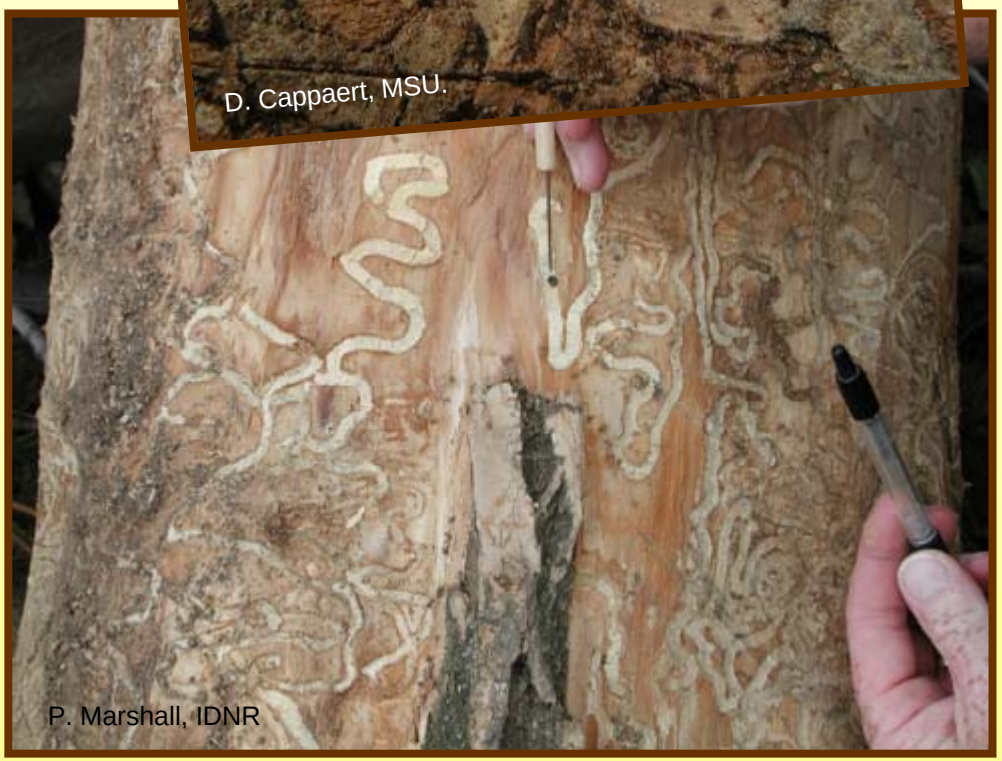
•Females deposit 75 eggs one-at-a-time through July.

•Eggs are light yellow, oval, and about 1/25th of an inch long.



Eggs hatch in 7 to 10 days into worm-like larvae.

Larvae (June through May)

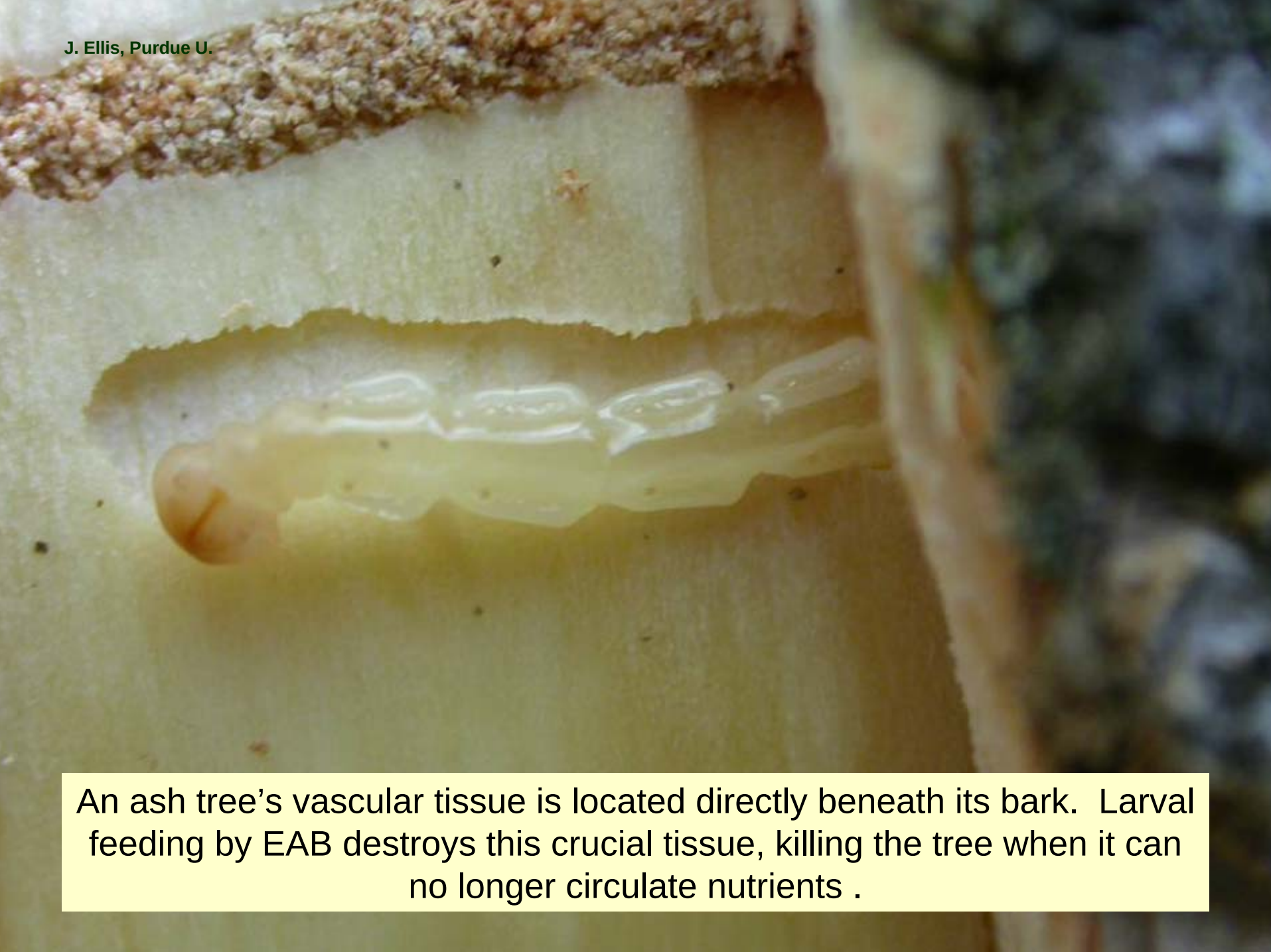


- After hatching, hungry EAB larvae bore through bark to feed on ash trees' vascular tissue.
- Feeding larvae zigzag through tree tissue, forming S-shaped tunnels that are flat and wide.

•Larvae are creamy white with flat, broad-shaped bodies. Note the bell-shaped body segments.

•Mature larvae are about 1 inch long.

EAB larvae feed just beneath the tree's bark but do not move into the heartwood.



An ash tree’s vascular tissue is located directly beneath its bark. Larval feeding by EAB destroys this crucial tissue, killing the tree when it can no longer circulate nutrients .

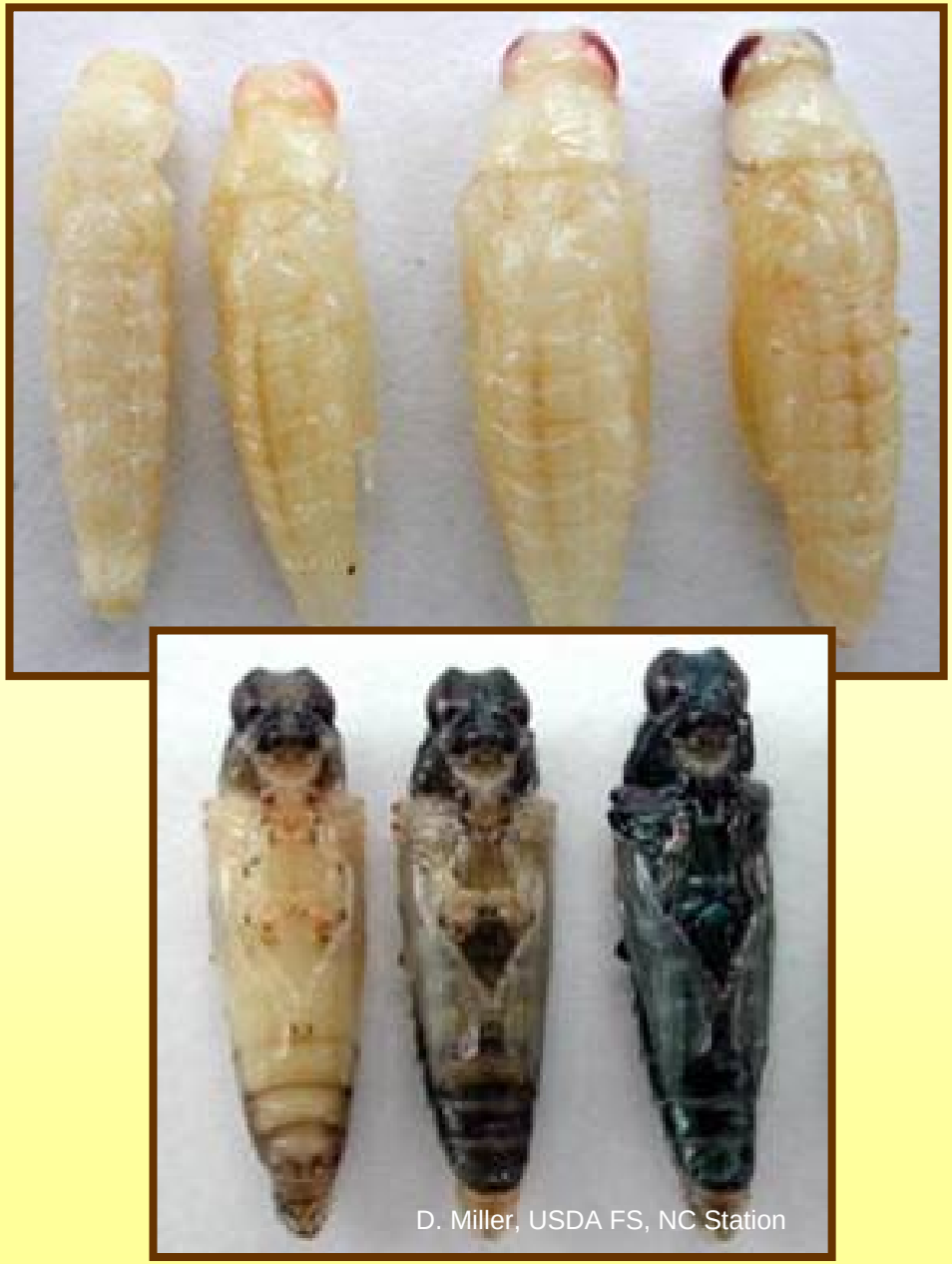
The bark on this ash tree has been removed to reveal multiple larval feeding tunnels.

Larvae spend winter under ash tree bark.

Pupae (April to early May)

•When warmer weather arrives (around April), larvae enter the pupal stage.

•Newly formed adults emerge from the tree as soon as their development is complete.



Adults

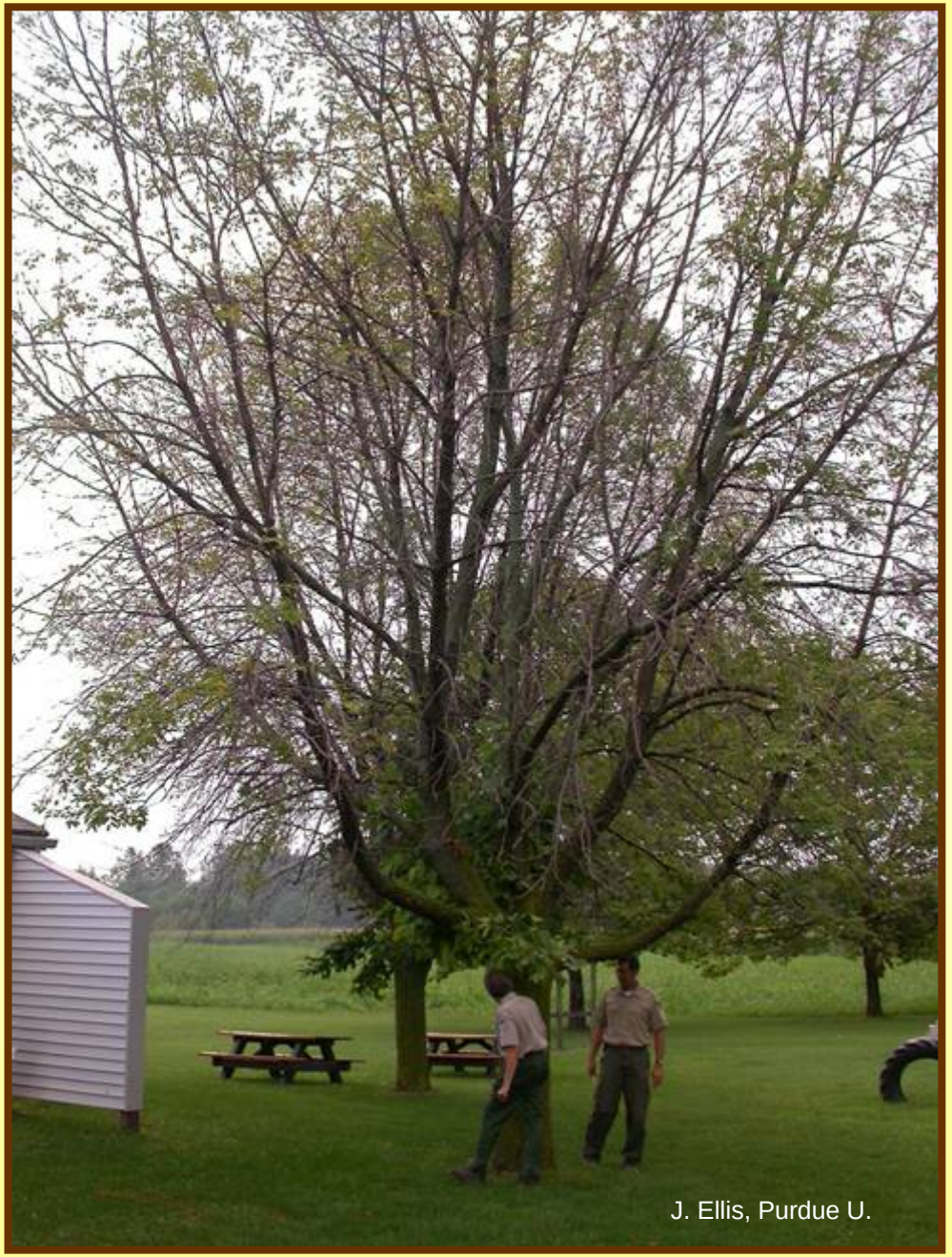
•Adult borers emerge from the tree through ‘D’-shaped exit holes in May and during the summer.

D-shaped exit holes

Adult feeding

Adults live about 20 days, feeding lightly on the edges of ash leaves.

EAB aggressively attacks even healthy trees, killing them quickly, in just 1 to 3 years .



Diagnostic symptoms of emerald ash borer infestation

Look for combinations of the following:

1. **Canopy thinning in upper third of tree.**
2. **Epicormic shoots.**
3. **D-shaped exit holes.**
4. **S-shaped larval feeding tunnels under bark.**
5. **Vertical splits in bark.**
6. **Activity by woodpeckers.**

1. Canopy thinning in the upper third of the tree

The upper third of a tree dies back first, followed by the rest the next year.

The canopy continues to decline until the tree eventually dies.

Another example of dieback in EAB-infested ash trees.

2. Epicormic shoots (“water sprouts”) emerge below infested portions of the trunk.

3. Presence of D-shaped exit holes

4. Presence of curvy larval feeding tunnels under bark

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5. Vertical splitting in bark

6. Woodpecker activity

Woodpecker activity is an ‘early warning sign’ of the presence of emerald ash borer.

What Can We Do About EAB?

Identify and Inventory Ash Trees

Photo: Paul Wray, Iowa State University,
www.forestryimages.org

Photo: Paul Wray, Iowa State University,
www.forestryimages.org

Actions for Homeowners

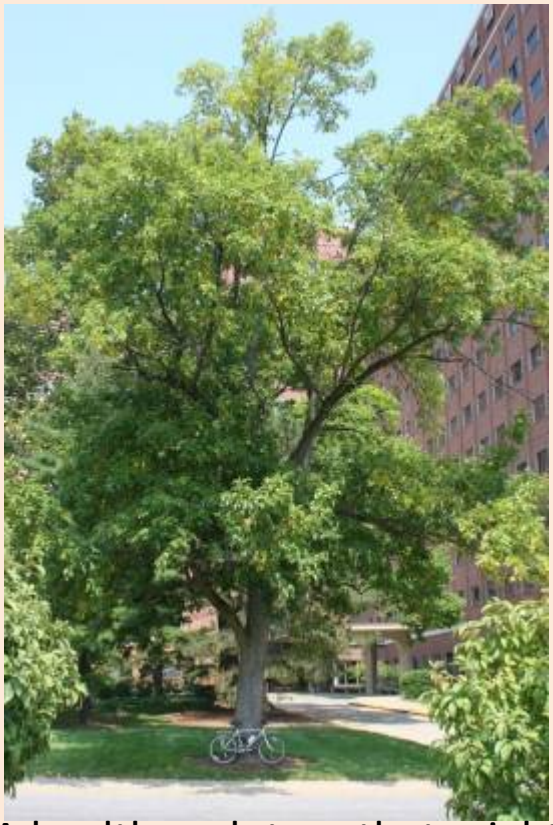
- Landscaping/Sanitation
  - Tree inventory including decisions about treatability
  - Intersperse new plantings with ash trees
  - Remove dying and dead trees before they become hazardous to people and property.

Actions for Homeowners

- Pesticides
  - Applied by homeowners when trees are **<45" in circumference**
    - Soil drenches (imidacloprid formulations)
    - Bark sprays (dinotefuran)
  - Applied by professionals when trees are **>45" in circumference**
    - Soil and cambium injections (imidacloprid, emamectin benzoate)
    - Bark sprays (dinotefuran)

To Treat or Not To Treat

Not every ash tree *can* or *should* be protected from EAB with pesticides.



A healthy ash tree that might be worth protecting.

Trees with 25-50% dieback cannot be saved.

Ash tree with problems other than EAB are not a good choice for treatment.

- Begin to treat trees when EAB is reported within 5 miles
- Pesticides must be taken up by the tree’s roots or delivered by injection to its vascular tissue.
- This method kills feeding larvae, the most destructive stage of the insect.
- The cost of chemically protecting an ash tree might exceed the cost of removing and replacing it.
- Every tree must be considered on an individual basis.

Cost of Treating EAB

- Homeowner Applied < 45” circumference
  Soil Drench or Bark Spray: $20-40/year/tree

- Professional Applied > 45” circumference
  Pressure treatment $100-200+/tree/year

Soil Drenches for Homeowners

Products

Products sold as soil drenches for use by homeowners contain **1.47% imidacloprid**:

- Bayer Advanced™ Garden Tree and Shrub Insect Control
- Fertilome® Tree and Shrub Drench
- Other products are also available.

REMINDER: Always check the label to make sure a product is appropriate for your intended use and follow all directions.

Soil Injections (Professionals only)

- *Professional pesticide applicators* may apply **imidacloprid** (several varieties) either as a **high pressure soil injection** or as a **direct injection** into the tree's trunk.
- *Soil injections* require specialized equipment that places the insecticide under mulch or turf and directly into the root zone.
- *Soil injections* help prevent runoff on sloped surfaces.

Trunk Injections (Professionals only)

- Certain systemic insecticide products can be injected directly into the trunk of the tree including formulations of **imidacloprid** or a newer product, **emamectin benzoate (Tree-age)**.

- Emamectin benzoate only needs to be injected **every other year** instead of yearly as in the case of imidacloprid. Correspondingly, its cost is usually higher than imidacloprid.

Systemic basal trunk sprays

- Dinotefuran (Safari or Green Light) is an effective pesticide applied as a bark spray.

- Dinotefuran is sprayed on the lower 5 to 6 feet of the trunk. The insecticide then penetrates the bark and is taken up and spread through the rest of the tree.

What is NABB?

Neighbors Against Bad Bugs (NABB) is a program where **Purdue Master Gardeners** work with **Neighborhood Volunteers** to get the message out about EAB.

NABB helps neighbors learn:

1. Where their ash trees are.
2. How to lessen the impact of the insect by acting before it arrives.
3. Where to go for good information and advice.

For more detailed information on EAB, including the NABB program, visit:

www.eabindiana.info