After EAB: Can (Should) I Save My Trees

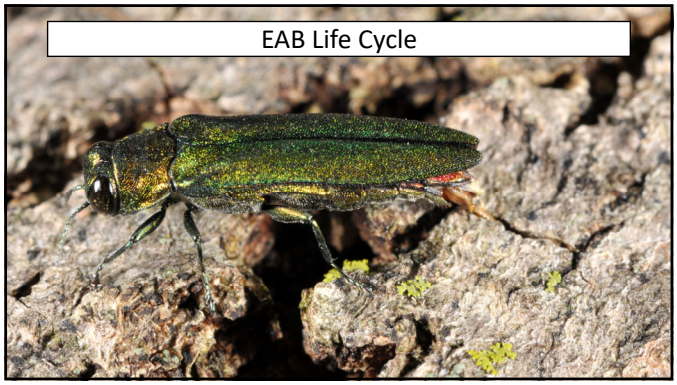
How did it get here?

- EAB is considered native throughout portions of Russia, northern China, Japan, and Korea
- Was never seen in North America prior to 2002
- Believe to have arrived in NA in solid wood packing materials

A bit of context…

- Emerald ash borer (EAB) was first detected in Indiana in 2004 and has since spread across the state
- As a specialist, EAB has virtually extirpated ash from the state
- Is ash tree preservation still relevant?

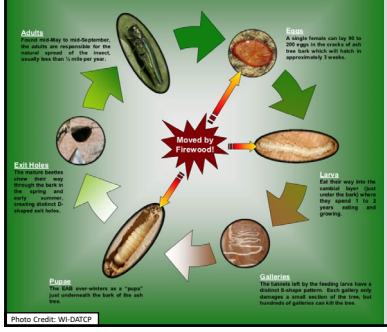
EAB Life Cycle



EAB Life Cycle

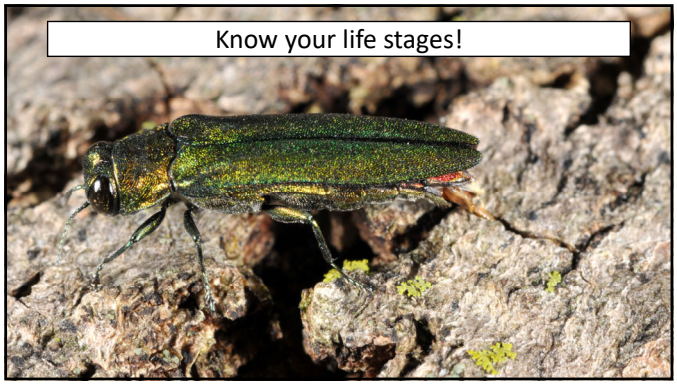
- EAB can survive for either one season in stressed trees, or two seasons in healthy hosts; also dependent on environment
- Adults consume leaves while larvae consume nutrient-carrying tissue
- Natural spread is only ½ mile per year, but assisted by human activity

The EAB Life Cycle



- Larvae develop by chewing galleries through phloem tissue
- Overwinter in shallow galleries; pupate in spring
- Adults emerge from D-shaped holes; can be present May-September, but only two for a few weeks at most

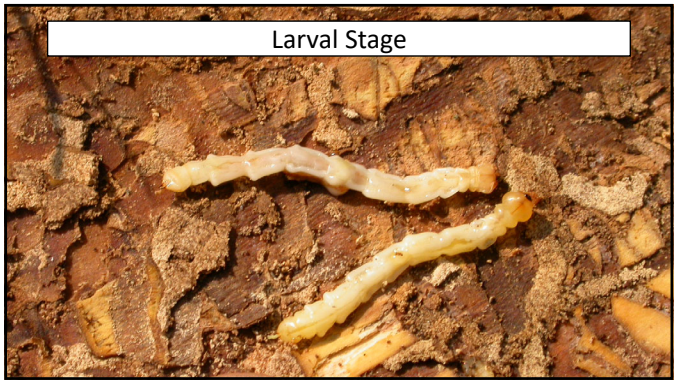
Know your life stages!



Adult Beetles

- Adults are small, iridescent green beetles with hardened forewings; approximately the size of a cooked grain of rice
- Unlike aphids, spotted lanternfly, or cicadas, equipped with chewing mouthparts
- No difference between males an females beyond reproductive organs

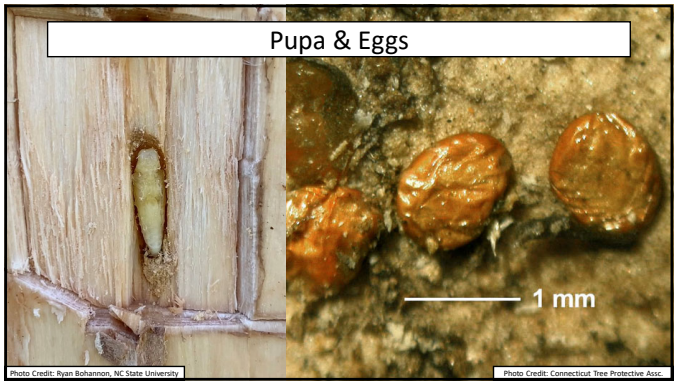
Larval Stage



Larval Stage

- Larvae are pale or beige in color and can reach 1 inch to 1 ¼ inches when fully grown
- Larvae live entirely within cambrium tissue of the ash tree, creating S-shaped galleries throughout the wood
- Eventually will dig out pupation chambers

Pupa & Eggs



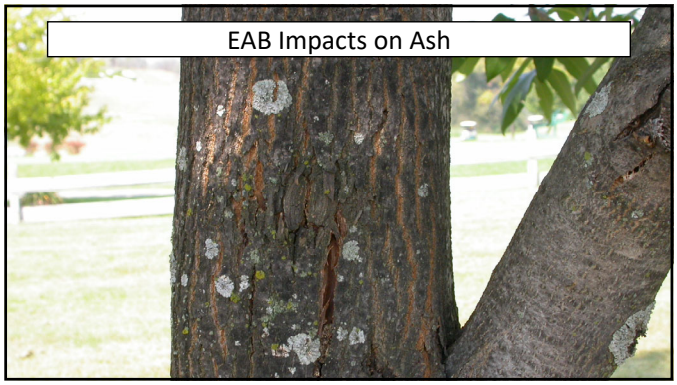
Eggs

- Eggs are laid into bark crevices to give larvae easy access to food substrate
- Eggs will hatch within 7 to 10 days, based on temperature and other environmental conditions
- Very small, ~1mm in diameter

Pupa

- Larvae dig out pupal chambers to metamorphose
- Pupa is unmoving and non-feeding, exarate (exposed) and can visibly showing changes as develop into adult progresses
- Pupation takes approximately 1 to 2 weeks (spring), based on temperature

EAB Impacts on Ash



EAB Impacts on Ash

- Larval feeding results in tunneling through tissue that carries nutrients and water throughout the plant
- Tree's vascular systems is severely impacted, resulting in canopy loss
- Eventually, tree becomes brittle and incapable of sustaining life

Making Treatment Decisions

Important Questions

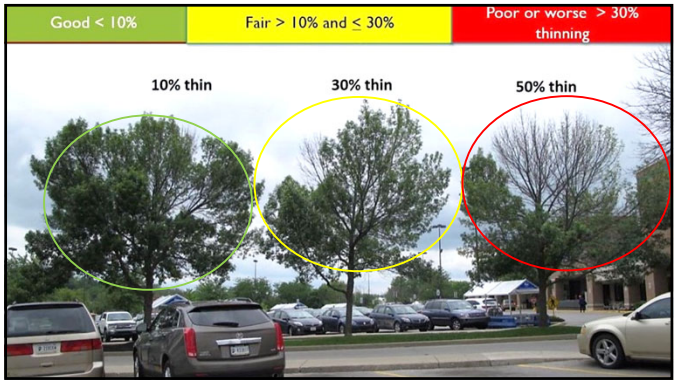
- Do you want to save your trees in the first place?
- Are they worth saving?
- What size are the trees?
- What is the condition of the canopy?

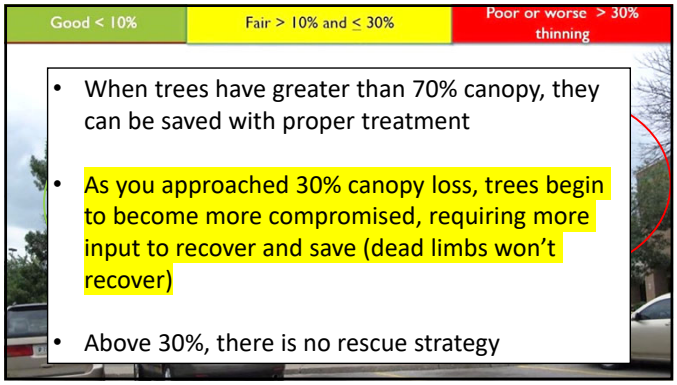
First Steps

- Determine tree size by measuring diameter at breast height (DBH)
- Estimate percentage remaining of canopy
- Evaluate condition of limbs (dead, alive, etc.)

What's next?

- If you aren't sure about any parts of this, or DBH is greater than 20 in, get professional help
- If you are confident, there are some products homeowners can use to protect their trees
- There is no way to manage EAB without use of insecticides





- When trees have greater than 70% canopy, they can be saved with proper treatment
- As you approached 30% canopy loss, trees begin to become more compromised, requiring more input to recover and save (dead limbs won't recover)
- Above 30%, there is no rescue strategy

Making Treatment Decisions

Insecticide	Egg	Larvae				Toxicity of Poisoned Leaves to adults
		L1	L2	L3	L4	
Imidacloprid	No	Yes	Yes	No	No	Sustained feeding
Dinotefuran	No	Yes	Yes	No	No	A few bites
Emamectin Benzoate	No	Yes	Yes	Yes	Yes	One or two bites
Azadirachtin	No	Yes	Yes	Yes	Yes	Not toxic, but reduces fecundity of adults

Making Treatment Decisions

- Not all applications are made in the same way:
  - Imidacloprid: Soil Drench, Granular
  - Dinotefuran: Soil Drench, Bark Spray
  - Emamectin Benzoate: Injection
  - Azadirachtin: Injection
- Professional help is required for most of these pesticides; do not attempt on your own!

Non-target Lethality

- Ash are wind-pollinated, so risk to pollinating insects is very low
- Avoid planting pollinator-friendly plants near treated ash
- To avoid ground-water contamination, limit drench area to root system

Common Questions

Why do we keep getting infestations?

Why do we keep getting infestations?

- EAB doesn't really infest ash tree saplings, allowing younger trees to continue to develop
- Ash populations continue to resupply, getting large enough before infestation to happen
- Even after infestation, trees take between 6 to 10 years before enough damage occurs to kill the tree

Is it worth it to continue treating my trees?

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- Consider costs of removal vs. treatment:
  - Potential removal costs: $1800-$3600 depending on circumstances
  - Treatment costs: $300/3 years if costs equal to $10/diameter inch
- Associated risks of brittle trees

Is it worth it to continue treating my trees?

- Results of 10 year study in Indianapolis
  - Trees treated with emamectin benzoate
  - Applied in 2013 and 2016
  - Protection stable until 2019, when increased damage became visible
  - In 2022, trees were damaged enough to become a safety hazard

Good Practices for Prevention

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- After 20 years of infestation, EAB is a part of Indiana's ecosystem permanently, but we still need to prevent it's movement
- DO NOT MOVE FIREWOOOD
- Quarantine was lifted in 2016, but burn were you find it; this counts for several invasives

Good Practices for Prevention

- Consider treatment scheduling for trees that can be saved
- While infestation is often inevitable, treatment can reduce live population on insects
- Some pesticides, such as azadirachtin, will reduce fecundity

Good Practices for Prevention

- YES, keep treating your trees
- Benefits are long-term, but need to be maintained
- EAB is here to stay

Special thanks to:

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Other Resources:
- reportINvasive on twitter, facebook, and Instagram
- Purdue Landscape Report
- Emerald Ash Borer University
- PennState Extension