An Introduction to the Emerald Ash Borer

Photograph by Steven Valley
Emerald ash borer (EAB) is a green-colored beetle......

...that develops in ash trees (**Fraxinus** species)....
...and is Native to Asia

Native range of Emerald Ash Borer in Asia.

EAB Native Range
Presence of emerald ash borer has also been reported in adjacent Mongolia and Russia.
Emerald ash borer was accidentally introduced into and has since spread through North America.
Emerald ash borer is devastating to all species of ash that are native to North America.
Why is EAB so destructive to ash trees in North America?

NA ash species lack ability to resist EAB
Chestnut blight – Devastated American chestnut in early 1900s, caused by a fungus

Dutch elm disease – Devastated American elm in mid century. Caused by a fungus, vectored by a bark beetle
EAB Invasion Wave and Protection Needs

* Assumes doubling of affected ash and EAB yearly during growth
These trees can’t be saved. They are already dead.
Colorado EAB Tree #1

Located near the intersection of 30th and Valmont, Boulder
2014 distribution of EAB in North America
The encircled area includes sites where EAB has been detected within Boulder as of today. However, it is presumed that the insect has likely spread throughout the entire city, but at undetected levels.
Unlike states to the east, Colorado is highly compartmentalized due to its geography.

The current infestation is an infestation of the South Platte River drainage, not the State of Colorado.
Emerald Ash Borer has become established within in the South Platte River Drainage of Colorado – not the entire state of Colorado!
Within the next five years, emerald ash borer will move out of Boulder into the surrounding counties.
Over time the South Platte River Drainage will be colonized by emerald ash borer
Unlike states to the east, Colorado is highly compartmentalized due to its geography.

The current infestation is an infestation of the South Platte River drainage, not the State of Colorado.
Most of Colorado is no more – nor less – at risk of infestation by Emerald Ash Borer (EAB) will be a problem due to Boulder infestation. No change in Risk.
How far away is emerald ash borer from your community?
How far away is emerald ash borer from your community?

One truckload
Where are we now with the EAB in Boulder?

* Assumes doubling of affected ash and EAB yearly during growth
Main Points About Emerald Ash Borer in Colorado

• Known infestation presently confined to areas within Boulder City limits
  – In time will spread throughout South Platte drainage
  – Other areas of the state are at no greater risk than before detection

• Treatments are available that will protect individual trees
  – Each treatment option involves decisions balancing costs, environmental hazards, effectiveness and ease of application
Using signs and symptoms to detect EAB infestations
Detecting Emerald Ash Borer
The presence of the insect is a positive detection
Local Flatheaded borers of similar appearance to the EAB

*Cypriacus intricata*  
*Buprestis confluenta*

*Agrilus cyanescens*  
*Agrilus lacustris*
Emerald ash borer larvae create meandering tunnels in the cambium that produce girdling wounds.

Note: Initial attacks are concentrated in the crown of the tree.
EAB adults chew through the bark, producing D-shaped exit holes
Many other wood boring insects can be found in ash trees
Lilac/ash borer
Flatheaded appletree borer

A generalist flatheaded borer/metallic wood borer that is associated with many hardwood that are in decline
Ash bark beetles

An important contributor to limb dieback in Colorado ash
Symptom that will develop as EAB injuries accumulate – Progressive dieback of the crown
Regional ash trees have many issues with dieback that are not related to emerald ash borer!
Possible EAB Symptom - Epicormic branching
Control Options for Management of Emerald Ash Borer
Target Life Stages for EAB Treatments

- Adults as they feed on foliage
- Young larvae that tunnel in the phloem and cambium
Trunk and foliar cover sprays targeting adults and newly hatched larvae. 

*Not the optimal treatment available for this insect.*
Emerald Ash Borer Control Options

• Soil applications with systemic insecticides
  – imidacloprid, dinotefuran

• Non-invasive trunk sprays of systemic insecticides
  – dinotefuran

• Trunk injections of systemic insecticides
  – Emamectin benzoate (Tree-Age), azadirachtin (Treeazin), imidacloprid
When are emerald ash borer adults first active?

Typically late May. Flight appears to coincide with peak bloom of black locust.
Emerald Ash Borer

Insecticides

- **Imidacloprid** (Merit, Xytect, Criterion, etc.)
  - Soil drench, possible trunk injection

- **Dinotefuran** (Safari, Zylam)
  - Basal trunk spray, possible soil drench

- **Emamectin benzoate** (Tree-Age)
  - Trunk injection only

- **Azadirachtin** (Treeazin)
  - Trunk injection only
Soil application option – imidacloprid applied as drench or injection
Primary method of imidacloprid application – soil applications for root uptake
## Use of High or Low Rates of Imidacloprid?

<table>
<thead>
<tr>
<th>Low Rates (1X, 1/2X)</th>
<th>High Rates (2X)</th>
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<tbody>
<tr>
<td>Smaller trees</td>
<td>Large trees</td>
</tr>
<tr>
<td>EAB populations low, moderate</td>
<td>High EAB populations present (peak outbreak phase)</td>
</tr>
<tr>
<td>Spring applications</td>
<td>Fall applications</td>
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</table>
Basal trunk spray with dinotefuran (Safari, Xylam)
Trunk injection with azadiractin (TreeAzin)

Some efficacy and tree wounding issues are unresolved at present.
Trunk injection with emamectin benzoate (TREE-age)
Note on a Definition

Triage - (in medical use) the assignment of degrees of urgency to wounds or illnesses to decide the order of treatment of a large number of patients or casualties

**TREE-age** – an emamectin benzoate insecticide formulation widely used as a trunk injection to control emerald ash borer and other insects
Highest Risk in 2015

Decreasing risk

Decreasing risk
EAB Risk Zone Maps

• Located at the eabcolorado.com site maintained by the Colorado Department of Agriculture
• Provides regionally adapted guidelines for EAB recommended practices in upcoming year based on present known distribution
Ash Tree Management Zones

This map is one information tool to aid management decisions for your ash trees. To use the map, enter your address into the box to the right and hit enter. This will place a marker on your location and let you know into which zone you fall. If you click on the map at your location it will take you to the Ash Management Zones document, or click on the link below.

Zone Management Classifications

- Zone 1 - Infested
- Zone 2 - Quarantine
- Zone 3 - Planning
- Zone 4 - Alert

Reset view
- Zone 4 - Alert (Colorado)
- Zone 3 (South Platte Area)
- Zone 2 (EAB Quarantine Area)
- Zone 1 (5-mile)
Risk Zone 1 – Presumed to be infested at this time

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Decreasing risk

Decreasing risk
EAB Risk Zones

• **Zone 1** – Area within 5 miles of all presently known locations of EAB in Colorado

• **Zone 2** – Area that is presently under quarantine due to EAB detections (i.e., Boulder County)

• **Zone 3** – Area that will eventually be affected by presently known infestation (South Platte drainage)

• **Zone 4** – Area outside South Platte Drainage and unlikely to be infested through natural spread
EAB Risk Zone 2 – The Quarantine Zone that encompasses the entire county* within which EAB has been detected

* Plus some areas of Jefferson, Weld and Larimer Counties that include landfills used by Boulder County
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Considerations for Management in EAB At Risk Areas (South Platte Drainage)

• Make decisions on what actions you will take to mitigate effects of emerald ash borer
  – Make decisions on your long term plans for ash on your property
    • Will choose to protect
    • Will choose *not to* protect and plan for removal
  – Consider planting replacement trees to ease effects if tree is lost
Additional Considerations for Management in Highest Risk Areas

• Determine what actions you will take to control emerald ash borer in 2015
  – Wish to maintain tree - *Begin insecticide treatments now, or very soon*
  – Decide to not protect tree and make plans for future removal
    • If desired take actions to plant replacement tree(s)
What to Do in 2015?

- Boulder residents in High Risk areas need to make EAB treatment decisions now.
- Everyone in Colorado should renew vigilance in detection of EAB infestations.
- Communities within the South Platte drainage need to make long-term plans for EAB management now.
- Revisit the Colorado situation this time next year (and every year).
Entertaining visitors from the East this year? – Tell them you will provide all the firewood they need.
Sources of Information for Emerald Ash Borer in CO

• Colorado Department of Agriculture
  –http://www.eabcolorado.com
• Colorado State Forest Service and CSU Extension Offices
• Insect Information Web Site
Emerald Ash Borer

Upcoming Workshops for Tree Care Professionals

Where has EAB been found? 8/14/2014

Sign Up for the EAB Newsletter!

Managing Emerald Ash Borer: Decision Guide

Ash Management Zones (How close are you to EAB?)

Emerald Ash Borer (EAB) was found in Boulder, CO, in September 2013. As a non-native insect, EAB lacks predators to keep it in check. EAB only attacks ash trees, and is responsible for the death of millions of ash trees in the midwest. Help protect Colorado’s ash trees! Treatment is recommended for property owners within 5 miles of areas known to be infested.

Effective 11/12/2013, an emergency quarantine was issued to protect Colorado ash trees. See links below regarding the quarantine.

- Emerald Ash Borer Quarantine Rule
- Range Monitoring & Detection Map

Assessing your ash tree for Emerald Ash Borer -- New Video!!

Check out the lifecycle of EAB -- Great Video!!
Insect Information

All materials needed in another accessible format can be made available upon request.

Colorado Bug Mugs

The [Colorado Bug Mugs](#) project is an innovative approach to helping country Extension offices in Colorado identify the arthropods most likely to be brought by clients for diagnosis. This project is ongoing, and additional species may be added if requested and needed by Extension personnel.

Arthropods of Colorado

Information on many [Arthropods of Interest in Colorado](#) have been developed by the Colorado State Extension Entomology program. Many of these are treated in Extension Fact Sheets that can be accessed at [Extension Insect Publications](#).

Extension Related Insect Information

[Extension Insect Fact Sheets](#)

[Resources for Handling Public Inquiries on Biting and Stinging Insects](#)

[Mystery Bites and Itches – Arthropod and Non-Arthropod Causes in Colorado](#)

[Life in a Colorado Water Garden (bulletin)](#)

Quick Links

- [Colorado State Beekeepers Association](#)
- [Western Colorado Entomology](#)
**Emerald Ash Borer**

- Insecticide Options for Protecting Ash Trees from Emerald Ash Borer, 2nd Edition (North Central IPM Center)
- National Emerald Ash Borer Information
- Colorado Department of Agriculture EAB
- Control Options for Emerald Ash Borer in Colorado
- Frequently Asked Questions Regarding Potential Side Effects of Systemic Insecticides Used to Control Emerald Ash Borer
- Emerald Ash Borer in Colorado – Identification of Insects and Damage of Similar Appearance
- Emerald Ash Borer: A Guide to Identification and Comparison to Similar Species
- Emerald Ash Borer Questions and Answers
- Statement On Recommended Areas For EAB Treatment In 2014
- Spread Sheet Of Systemic Insecticides Used To Control Emerald Ash Borer
- A Comparison Of Lilac/Ash Borer And Emerald Ash Borer
- Colorado Department of Agriculture Emerald Ash Borer Web Site
- Managing Emerald Ash Borer in Colorado
- Wood Boring Insects of Ash Trees
- Map of EAB Risk Zones in Colorado for 2014

**Bed Bugs**

- Bat Bugs, Bed Bugs, and Relatives (Extension Fact Sheet)
- Bed Bug Identification Poster
EAB Information Sites Can Provide:

• Present known distribution of emerald ash borer in Colorado
• Links to resources for identification of EAB and other ash insects
• *Common Questions and Answers about Emerald Ash Borer* (new fact sheet)
• *Control Options for Emerald Ash Borer in Colorado* (new bulletin)
This presentation will be saved on the CSU Insect Information Web Site.

Search “BSPM CSU”*

Click on “Extension and Outreach”

Click on “Insect Information”

* Department of Bioagricultural Sciences and Pest Management