

# Knowing Your Insect Control Options for Trees and Shrubs & The Latest on Managing EAB

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# Pollinators

- Bees, wasps, beetles, moths, butterflies
  - Honey bees, bumble bees, solitary bees



# Pollinator Decline

- Pollinators, especially bees have been declining
- Reasons:
  - Habitat loss
  - Diseases: protozoans, viruses, etc.
  - Parasitic mites
  - Interactions with pesticides



# How Neonicotinoids and Bees Became a Crisis for Greenhouse and Nursery Growers: the Last 16 Months

June 20, 2013

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**Buzzkill: Huge bee die-off in Oregon parking lot blamed on insecticide spraying**  
Grist.org, Oregon Public Broadcasting

- 25,000 dead bumble bees in Target parking lot
- Linden trees in full bloom had been sprayed with Safari (dinotefuran)



Slide Credit: Dave Smitley, MSU

# What Does the Label Say?

*This product is highly toxic to honeybees and other bees exposed to direct treatment or residues on crops or weeds in bloom. Do not apply this product to target crops or weeds in bloom.*



# THE NEW EPA BEE ADVISORY BOX

On EPA's new and strengthened pesticide label to protect pollinators

**PROTECTION OF POLLINATORS**

**APPLICATION RESTRICTIONS** and use the product in accordance with the label directions. Do not use the product in a manner inconsistent with the label directions.

Look for the bee icon on the application site for specific restrictions and instructions to protect bees and other insect pollinators.

**This product can kill bees and other insect pollinators.** Bees and other insect pollinators fly high or close to the ground and can be exposed to pesticides.

Bees will die if they come in contact with pesticides. Bees are often present and foraging when plants and trees flower. EPA's new label requires it clear that pesticides cannot be applied until all petals have fallen.

Bees warn users that direct contact and ingestion could harm pollinators. EPA is working with beekeepers, growers, pesticide companies, and others to advance pesticide management practices.

Highlights the importance of avoiding drift. Sometimes, wind can cause pesticides to drift to new areas and can cause bee kills.

The science says that there are many causes for a decline in pollinator health, including pesticide exposure. EPA's new label will help protect pollinators.

Labels start to separate restrictions on the label. These prohibit certain pesticide use when bees are present.

The new bee icon helps signal the pesticide's potential hazard to bees.

Makes clear that pesticide products can kill bees and pollinators.

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Read EPA's new and strengthened label requirements: <http://go.usa.gov/3H44>

# What Can YOU Do?

- Use pesticides only when needed
- Read the pesticide label; follow all directions
- Choose products that are less toxic to bees
- Apply insecticides early in the morning or in the evening
- Minimize drift
- Avoid applying pesticides to flowering plants
- Be aware of your surroundings
  - *“Weeds” can be food source for pollinators!*



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ORIGINAL PAPER

## Pollinator assemblages on dandelions and white clover in urban and suburban lawns

Jonathan L. Larson · Adam J. Keshimer ·  
Daniel A. Potter



- More than 50 species of pollinators found on dandelions and white clover in lawns



**UK**  
UNIVERSITY OF  
**KENTUCKY**  
College of Agriculture,  
Food and Environment

Slide Credit: Dave Smitley, MSU

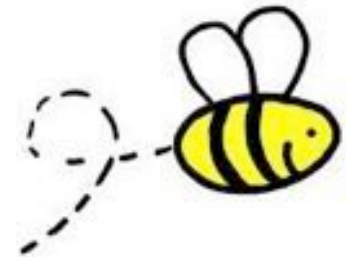


# Assessing Insecticide Hazard to Bumble Bees Foraging on Flowering Weeds in Treated Lawns

Bumble bees colonies caged 24 h after turfgrass with clover was sprayed, and kept their for 2 weeks:

- Clothianidin- foraging bees reduced by 75%; no new queens produced (compared with 35 queens in control plots)
- Chlorantraniliprole - No difference from control treatment
- For lawns mowed before spraying- No effect on the bees

# Sprays versus granular applications



No adverse effects



Gels, Held & Potter 2002

# “Good Guys” in the Landscape

- Predatory insects can be very common in the landscape

## Predators

- Beetles
- True bugs
- Flies
- Lacewings and kin
- Yellowjackets and wasps
- Spiders

## Parasites

- Wasps
- Flies
- Roundworms (nematodes)

## Pathogens

- Bacteria
- Fungi
- Viruses



# Predators: Beetles

Ground beetles



Firefly Larva (w/slug)



Rove beetles



# Predators: *Lady Beetles*



Multicolored  
Asian Lady  
beetle

(*Harmonia  
axyridis*)

(Coleoptera:  
Coccinellidae)



# Predators: True Bugs



Minute Pirate Bug



Damsel Bug

Spined Soldier Bug



Assassin Bug



# Predators: Flies



Hover Fly  
(Diptera: Syrphidae)



Robber Fly



Tachinid Fly

# Predators: Lacewings





# Predators: Wasps



Bald Faced Hornet  
(Hymenoptera: Vespidae)



Yellow Jacket  
(Hymenoptera: Vespidae)



# Parasites

- Usually specialists (only kill one or a few hosts)
- Can be ecto- or endo- parasites (external vs. internal)
- Same size or smaller than prey
- Examples:
  - Wasps
  - Flies



# Parasitic Wasps

- Many species known
- Tend to attack only a single specific host
- Some have been purposely released for biocontrol



# Parasites: Flies



Pyrgotid Fly  
and May/June Beetle



—Madison



Tachinid Flies



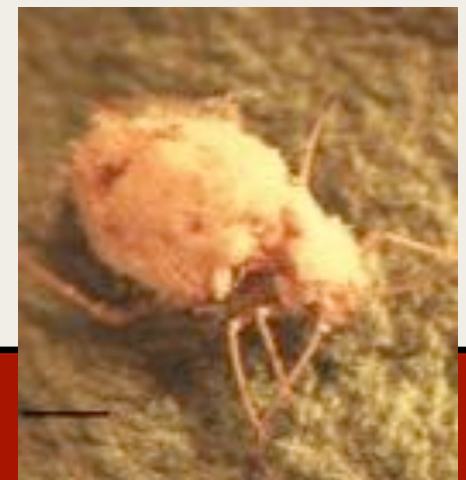
# Nematodes & Pathogens

- Some can be highly specific, others can infect many hosts
- Can be significantly influenced by weather
- Some are commercially available



# Pathogens: Fungi

- Spread through spores
- Most require high humidity
- Some commercially available



# Pathogens: Bacteria

- Some are commercially available
- Milky spore (*Bacillus popilliae*)
- *Bacillus thuringiensis*



Milky Spore  
Infected

Non-Infected



# Pathogens: Viruses

- Are highly specific
- Viruses exist for many insects, including pests such as armyworms, black cutworm, and gypsy moth





# Why Should you Keep an Eye Out for Beneficial Organisms?

- If predators/parasites/pathogens are present in numbers:
  - *Why treat if Mother nature can help correct the problem*
- Eliminating predators can sometimes lead to other problems



# “Bad Bugs” in the Landscape



# “Bad Bugs” in the Landscape

- Several main groups exist:

1. Sucking Insects
2. Caterpillars
3. Leaf-Feeding Beetles
4. Borers
5. Other Leaf Feeders
6. White Grubs

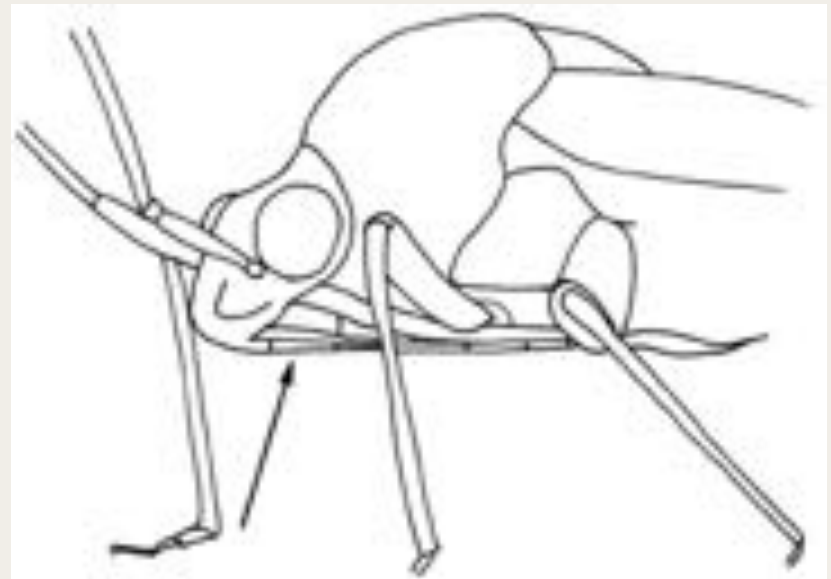
## Resources to ID your “Bad Bugs”

- “Garden Insects” (Cranshaw)
- “Insects that Feed on Trees and Shrubs” (Johnson and Lyon)
- County Extension Office
- Insect Diagnostic Lab



# Sucking Insects

- Aphids, adelgids, plant bugs, tree hoppers, lace bugs, spittle bugs
- Order Hemiptera: tubular mouthparts
- Damage: irregular discoloration, chlorosis, shriveling



# Common Sucking Insects



Four Lined Plant Bugs



Ash Plant Bug



Honeylocust Plant Bug



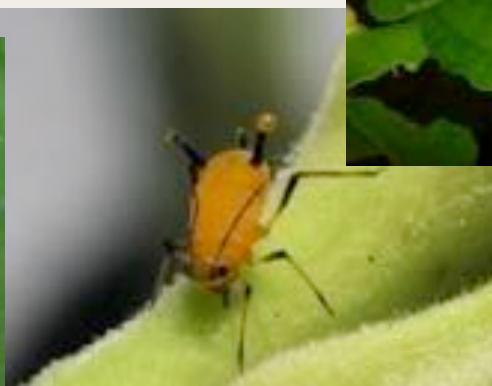
Lace Bugs



# Common Sucking Insects



Aphids



E. Spruce Adelgid



Cooley Spruce Adelgid



Adelgids

# Common Sucking Insects



Leafhopper and Hopperburn



Treehoppers



Spittle Bugs



-Mad

# Common Sucking Insects



Jumping Plant Lice  
(Psyllids)



Chinch Bug





# Sucking Insects: Scale Insects

- Two Types: Armored (i.e., Hard) and Soft Scales
- > 60 species in Midwest
- Damage plant by sucking plant juices
- Relatively immobile, only move as crawlers (young)



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# Caterpillars

- Many species are pests of turfgrass and ornamentals
- Order Lepidoptera (Moths and Butterflies)
- Chewing damage to plants

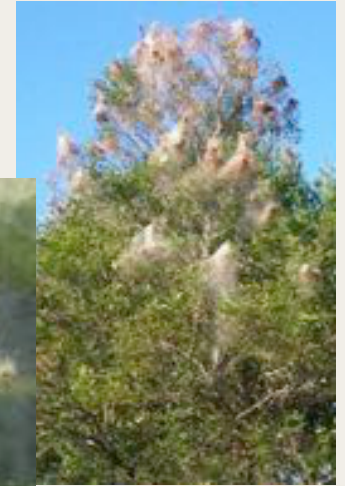


# Common Caterpillar Pests

Eastern Tent Caterpillar



Fall Webworm



Gypsy Moth



Cankerworm



Yellow Necked Caterpillar



# Common Caterpillar Pests



Zimmerman  
Pine Moth



European Pine Shoot Moth



Black Cutworm



Sod  
Webworms



# Leaf-Feeding Beetles

- Order Coleoptera: Beetles
- Adults and larvae can be pests depending on species
- Chewing Damage to Plants
  - Damage sometimes called “skeletonization”



# Common Leaf-Feeding Beetles

Japanese Beetle



Imported Willow Leaf Beetle



May/June Beetle



Elm Leaf Beetle



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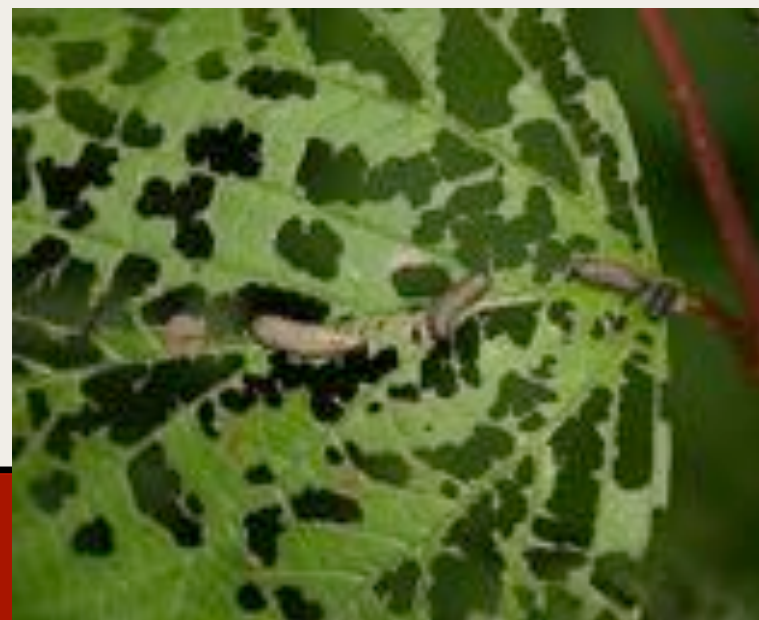
# Leaf Beetles



Lily Leaf Beetle



Viburnum Leaf Beetle



# Borers

- Two Main Types of Borers:
  - Coleoptera (beetles)
  - Lepidoptera (caterpillars)
- Use chewing mouthparts to tunnel into stems/trunks
- Can be difficult to identify and manage
- Typically associated with stressed/dead/dying trees





# Common Borers (Lepidoptera)



Banded Ash  
Clearwing Borer



Viburnum Borer

Peachtree Borer (♂ / ♀)



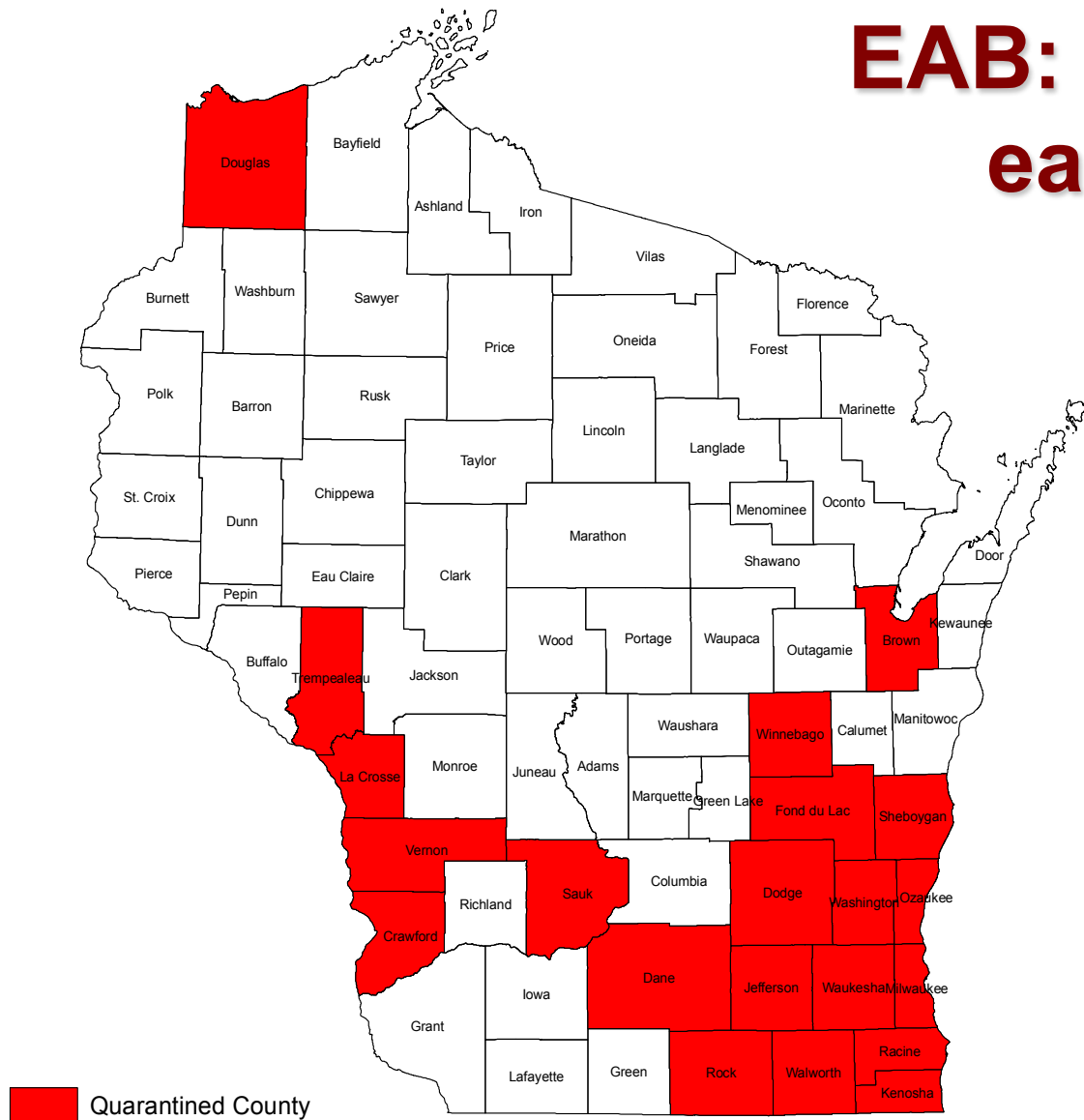
# Common Borers (Coleoptera)



Emerald Ash Borer



# EAB: Quarantine early 2014



Map Credit:  
WI-DATCP



University of Wisconsin–Madison  
Insect Diagnostic Lab

# EAB: Quarantine December, 2014



Map Credit:  
WI-DATCP



University of Wisconsin–Madison  
Insect Diagnostic Lab

# Common Borers (Coleoptera)



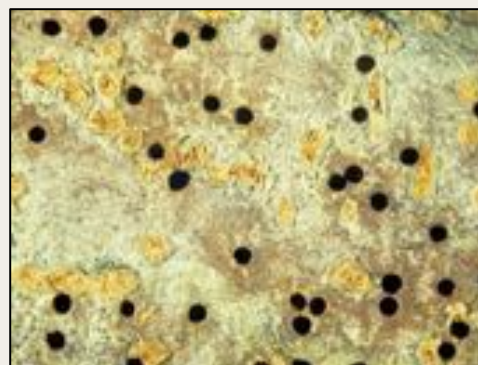
Bronze Birch Borer



Two Lined Chestnut Borer



Bark Beetles



# Other Leaf Feeders

- Sawflies (Order Hymenoptera)
  - Caterpillar-like
  - Use chewing mouthparts to feed on leaf material
- Leafminers (from a variety of groups)
  - Tunnel between upper and lower leaf surfaces



# Common Sawflies



European Pine Sawfly

Elm Sawfly



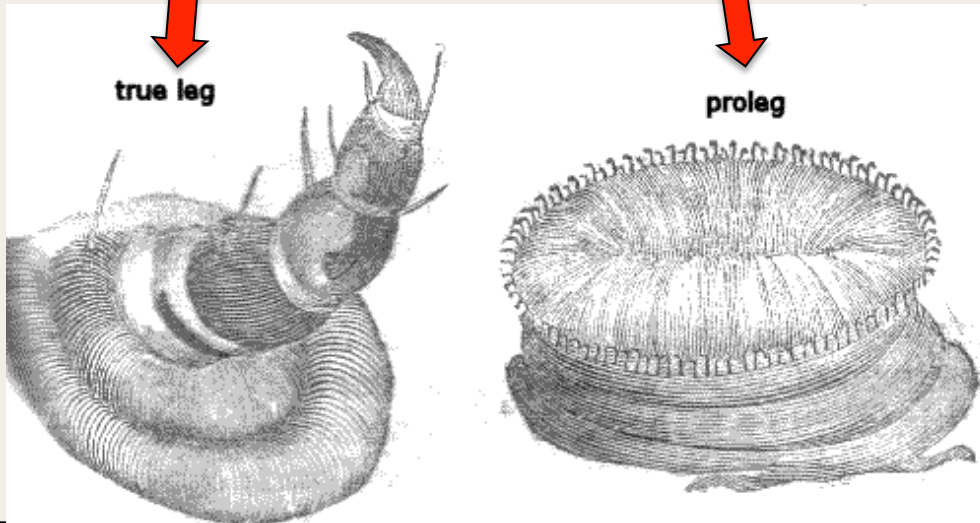
Redheaded Pine Sawfly



Dusky Birch Sawfly



# Caterpillars vs. Sawflies



## Caterpillars

- 3 pairs of true legs
- 4-5 pairs of prolegs often present, have hooks called crochets

## Sawflies:

- Not a caterpillar!
- 7 pairs of prolegs
- No crochets





# Leafminers



Birch Leafminer



Elm Leafminer



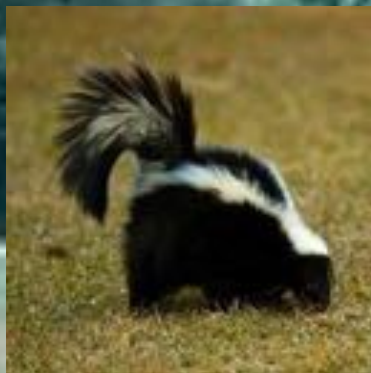
Arborvitae Leafminer



# White Grubs

- Larvae of Scarab beetles
  - May/June Beetles
  - Japanese beetles
- Can be very destructive to turfgrass





# Managing Landscape Insects

- Know which pest you're dealing with!
- Are there cultural/mechanical practices that are effective?
  - *Ex. remove E. tent caterpillar tents by hand*
- Know when to target your pest
- Choose an appropriate insecticide
  - Apply it properly!



# Insecticides

Chemical Class	Example	Insects Groups Controlled
<b>Carbamates</b>	Carbaryl	Contact Spray
<b>Organophosphates (OP's)</b>	Acephate, Trichlorfon	Contact Spray; systemic activity (acephate)
<b>Pyrethroids</b>	Bifenthrin, Deltamethrin, etc.	Contact Spray
<b>Neonicotinoids</b>	Imidacloprid, Thiamethoxam, Dinotefuran	Systemic activity; contact spray*



# Insecticides

Chemical Class	Example	Insects Groups Controlled
<b>Insect Growth Regulators</b>	Azadirachtin	Contact spray; systemic activity (some products)
<b>Indoxacarb</b>	Indoxacarb	Contact Spray
<b>Anthranilic Diamides</b>	Chlorantraniliprole	Contact spray; some systemic activity
<b>Avermectins</b>	Emamectin benzoate	Systemic activity
<b>Biological</b>	Bt & Spinosad	Contact sprays
<b>Others</b>	Oils, soaps	Contact Sprays





# The Latest on Managing EAB

# Host Plant Resistance

- Manchurian ash not fully resistant
- Survival of blue ash trees noted by McCullough in Michigan
  - Only significant resistance in any native ash species





# Common Misconceptions Regarding the Management of EAB

- ALL ash trees are doomed
- Ash Trees can NOT be saved or protected
- Insecticide Treatments are NOT Effective
- Insecticide Treatments are cost prohibitive
- Only ONE insecticide product is effective

# Chemical Treatment Availability

- Professional Use Products (arborists)
  - Several chemicals available
  - Several application methods available
  - Require specialized training and equipment
- Homeowner products
  - Imidacloprid and Acephate available
  - Soil drenches and trunk implants available
  - Can be purchased at local gardening centers

# Professional EAB Insecticide Treatment Options

- Imidacloprid
  - Merit (Soil drench or injection)
  - Xytect (Soil drench or injection), 2X label rate!
  - Pointer (Trunk Injection, Wedgle)
  - IMA-Jet (Trunk Injection, ArborJet)
  - Imicide (Trunk Injection, Mauget)
- Dinoterfuan
  - Transtect (Basal Bark Spray or Soil Drench)
  - Safari (Basal Bark Spray or Soil Drench)
- Emamectin Benzoate
  - Treeäge (Trunk Injection, ArborJet), RUP\*
- Azadirachtin
  - Treeazin (Trunk Injection), Only organic option available
- Others
  - Acepahte (Ace-Jet, ACECAP), contact (trunk & canopy) sprays

See UW-Extension Factsheet:

XHT1185 “Professional Guide  
to Emerald Ash Borer  
Insecticide Treatments”

# Insecticide Application Techniques



Soil Drench Method



Basal Bark Spray

# Professional Tree Injections



Arborsystems  
Wedgle



Mauget

Arborjet Tree IV



# Soil Application vs. Trunk Injection:

## Soil Application

**Pros:** Noninvasive, can be easy to apply

**Cons:** Slower uptake (3-6 weeks)

## Trunk injection

**Pros:** Rapid uptake (under good conditions);  
apply where soil treatments not possible

**Cons:** Specialized equipment, trunk wounding

# Homeowner EAB Insecticide Treatment Options

- Acecap Systemic Tree Implants
- AmdroTree and Shrub Care Concentrate
- Bayer Advanced Tree and Shrub Products (several)
- Compare N Save Systemic Tree and Shrub Insect Drench
- Ferti-loam Systemic Tree and Shrub Drench
- Monterey Once A Year Insect Control
- Ortho Bug B Gone Year Long Tree and Shrub Insect Control
- Optrol (same 2X rate as Xytect)

Other products may exist, market changes regularly!

See UW-Extension Factsheet XHT1181:

“Homeowner Guide to Emerald Ash Borer Insecticide Treatments”



Soil Drench Method

For a video demonstration of how to apply a soil drench insecticide, visit the UW-Madison Emerald Ash Borer website:

[labs.russell.wisc.edu/eab/](http://labs.russell.wisc.edu/eab/)

## Homeowner Insecticide Options



Acecap Systemic Tree Implants



# Optimal Timing of EAB Treatments

- EAB Adults emerge around 450-500 GDD
  - Around the time that black locust is in bloom
  - Systemic products need to be applied before this to allow for uptake
- Soil Treatments
  - In Spring allowing time for uptake before adults begin to feeding and eggs begin to hatch
  - Typically early May for small trees, April for larger trees
- Trunk Injections
  - In Spring just after the canopy has fully developed

# What's on the Radar?

- boreGone! (Phyllom Bioproducts)
- Arbormectin (Rainbow Treecare. . .Rotam Agrichemical)
  - Similar to Treeage, but non-RUP
  - “Caution” instead of “Warning” signal word

# Should you treat your tree for EAB?

- Several factors to consider before to treating you ash trees:
  - Tree health
  - Tree location
  - Tree value
  - Costs to treat
  - Costs to remove

See UW-Extension Factsheet XHT1215:

“Is My Ash Tree Worth Treating  
for Emerald Ash Borer”



# Questions?

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