Insect Management: Alternatives to Neonicotinoid use in Landscapes and Garden Centers

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Pests of Concern in Garden Centers

- Sucking insects such as aphids, whiteflies, mealybugs, scale insects, thrips etc. are the most likely pests



- Mites such as spider mites, broad mites and cyclamen mites are also potential pests

Broad mite

Twospotted spider mites and damage


Greenhouse vs Retail Center Pest Control

- Most pest control takes place in the greenhouse prior to shipping



Greenhouse vs Retail Center Pest Control

- Neonicotinoid use in greenhouses provides long lasting control that benefits retail centers and their customers
- Greenhouse plants not treated with a neonicotinoid may require more frequent pest scouting


Greenhouse vs Retail Center Pest Control

- Retail Center pest control is more difficult due to the presence of customers during the day and possibly early evening

Greenhouse vs Retail Center Pest Control

- Reentry intervals (REI) after an insecticide application need to be strictly followed



Snail damage

- Most insecticides have a REI of 12 hours while that of many others is 4 hours and a few are either 24 hours or 48 hours

An Ornamental Plant Pest Management Guide and Pesticide Rotation Planning Aid

- Control options for nursery, greenhouse, interiorscape, and commercial landscape use sites
- An online publication from UT Extension, UT AgResearch and Clemson University
- https://extension.tennessee.edu/publications/Documents/W329.pdf

Using the Guide

- The "x" in the pest column means that the insecticide is labeled for that pest
- Neonicotinoid insecticides are listed at the top of the second page of the chart (IRAC [mode of action] code 4A)
- There are many chemical alternatives for neonicotinoids

Using the Guide

- For example, non-neonicotinoid insecticides for aphids in the landscape are plentiful
- Some select listed aphid insecticides are: XXpire (IRAC Code 4C + 5) - can only use existing stocks
- Orthene T&O, Lepitect, Inject-A-Cide B, Malathion 5E, Malathion 8F, Harpoon (1B)
- Onyx, Onyx Pro, Menace GC, Decathlon, Tempo Ultra WP, Tempo SC Ultra, Scimitar CS, Scimitar GC, Demon WP, Mavrik Aquaflow, Astro, Permethrin Pro, Perm-Up 3.2 EC

XXpire


Canna leafroller

- Active ingredients are sulfoxaflor + spinetoram (IRAC 4C + 5)
- Since the **EPA cancellation order** on Nov. 12, 2015 for sulfoxaflor containing products, **growers can only use their existing stocks** of these products
- For use in landscape, nursery and greenhouse

Using the Guide

- More non-neonicotinoid insecticides labeled for aphids in the landscape
- Avid, Lucid, Aracinate TM, Arbormectin (6)
- Sirocco (6 + unknown mode of action)
- Prev-AM Ultra (8D)
- Endeavor (9B)
- Aria (9C)

Sirocco

- Active ingredients are abamectin + bifenazate
- For use on landscape, nursery, greenhouse and interiorscape
- Listed pests include: aphids, whiteflies, thrips, leafminer (fly), broad mite, eriophyid mites, spider mites

Image courtesy of A. Windham, UT

Endeavor

- Active ingredient is pymetrozine
- For use in landscape, nursery, greenhouse and interiorscape
- Listed pests include: aphids and whiteflies

Aria

- Active ingredient is flonicamid
- For use in landscape, nursery and greenhouse
- Listed pests include: aphids, armored scales, soft scales, mealybugs, whiteflies, thrips, leafhoppers, and plant bugs

Using the Guide

- More non-neonicotinoid insecticides labeled for aphids in the landscape
- Distance IGR and Fulcrum (7C)
- Acelepryn (28)
- Azatin O and others (Unknown mode of action)
- BotaniGard ES, BotaniGard 22 WP, Naturalis-L, Grandevo PTO, NoFly, Preferal, Ultra-Pure Oil, M-Pede, Trilogy, Triact 70 (not classified mode of action)

Distance IGR and Fulcrum

- Active ingredient is pyriproxifen
- For use in landscape, nursery, greenhouse, and interiorscape
- Listed pests include: aphids, armored scales, soft scales, mealybugs, whiteflies, thrips, leafminers (moth), fungus gnats, and shore flies

Various armored scale

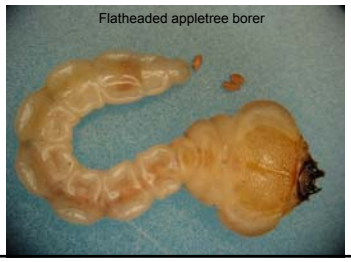
Alternatives to Neonicotinoids for Insect Control in the Landscape

Wood-boring Insects are Important Pests

- Especially of stressed trees and shrubs which they often attack
- Wood borers have the potential to cause severe damage or even death of plants
- Damage is often cumulative as the plant can become infested year after year

Wood-boring Insect Control Using Neonicotinoids

- Soil or media applied systemic neonicotinoids applied preventatively have enabled landscape professionals and growers of container grown plants to better control flatheaded borers and roundheaded borers



Alternative Borer Control Using Bark Sprays

- Bark applied contact insecticides should be applied just prior to egg laying (flatheaded borers, roundheaded borers, clearwing borers, carpenterworms, American plum borer, root collar borer, bark beetles, ambrosia beetles, various weevils & others)
- Note that more than one application is needed for many of the wood-boring pests

Peachtree Borer (A Clearwing Borer)

- Lesser Peachtree Borer Moth

Peachtree Borer

- Attacks fruit bearing or ornamental cherry, plum, peach and other *Prunus* spp.trees and shrubs, including cherrylaurel

- Spray any exposed roots, the trunk and lower limb scaffold of ornamental *Prunus* spp. in late May and in mid-July

Rhododendron Borer

- Attacks rhododendron and occasionally mountain-laurel and deciduous azalea

- Apply protective sprays in mid-May and late June

Oak Clearwing Moth Borer

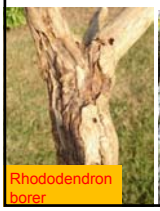
Image of empty pupal case courtesy of Brett A. Hubbard, Woodland Tree Services, LLC

Clearwing Borer Bark Spray Timing for Tennessee

- An oak borer (early June & July 1)
- Ash borer (lilac, fringetree, mountain-ash, privet in mid-April & mid-June)
- Ash borer and banded ash clearwing (ash trees in mid-April and mid-July) - Note that banded ash clearwing may require a third spray in early September during cool summers
- Dogwood borer (late April, mid-July and early September)
- Rhododendron borer (mid-May and late June)
- Peachtree borer (late May and mid-July)

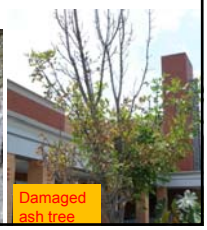
Clearwing borer bark sprays in the landscape

- Protective sprays of bifenthrin (Onyx, Onyx Pro), permethrin (Astro, Perm-Up), or chlorantraniliprole (Acelepryn) can be applied to the bark
- Application timing is important and a repeat application may be needed if the egg laying period is extended



Rhododendron borer

Banded ash clearwing image courtesy of A. Windham



Damaged ash tree

Flatheaded Borers

Flatheaded Appletree Borer

- Attacks some 30 species of woody plants, but maple, hickory, linden, oak, sycamore, tuliptree, dogwood, and apple are most commonly infested

- Apply protective pyrethroid sprays in mid-May and late June (TN timing)

Emerald Ash Borer

- First found in southeastern Michigan and Windsor, Ontario, Canada in 2002, but thought to have been established there for 6-10 years prior to that date
- Now found throughout Michigan, across much of Ohio, and in parts of Indiana, Illinois, Maryland, **Missouri**, Minnesota, New York, **Kentucky**, Pennsylvania, Virginia, West Virginia, Wisconsin, Iowa, and East Tennessee (2010). Also, infestations found in more areas of Ontario and in Quebec.

D-Shaped Exit Holes

Emerald Ash Borer Larvae

Blonding by Woodpeckers

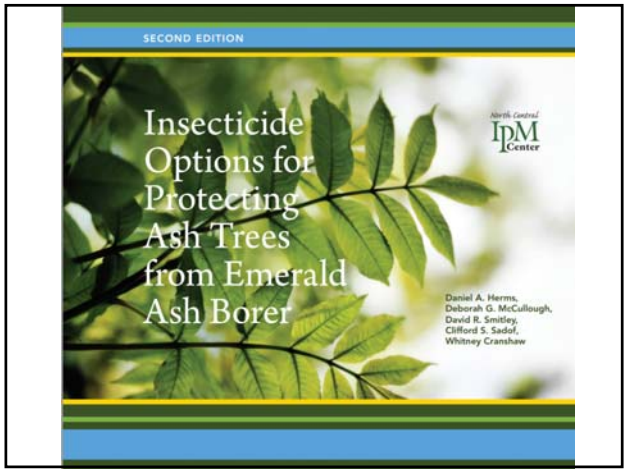


Table 1. Insecticide options for professionals and homeowners for controlling EAB that have been tested in multiple university trials. Some products may not be labeled for use in all states. Inclusion of a product in this table does not imply that it is endorsed by the authors or has been consistently effective for EAB control. Additional imidacloprid products may be available in your area. See text for details regarding effectiveness.

Insecticide Formulation	Active Ingredient	Application Method	Recommended Timing
Products Intended for Sale to Professional Applicators			
Merit® (75WP, 75WSP, 2F)	Imidacloprid	Soil injection or drench	Early to mid-spring or mid-fall
Safari™ (20 SG)	Dinotefuran	Soil injection or drench	Mid- to late spring
Transect™ (70WSP)	Dinotefuran	Soil injection or drench	Mid- to late spring
Xytect™ (2F, 75WSP)	Imidacloprid	Soil injection or drench	Early to mid-spring or mid-fall
Zylam® Liquid Systemic Insecticide	Dinotefuran	Soil injection or drench	Mid- to late spring
Azasol™	Azadirachtin	Trunk injection	Mid- to late spring after trees have leafed out
Imicide®	Imidacloprid	Trunk injection	Mid- to late spring after trees have leafed out
TREE-äge™	Emamectin benzoate	Trunk injection	Mid- to late spring after trees have leafed out
Astro®	Permethrin	Preventive trunk, branch, and foliage cover sprays	Two applications at 4-week intervals; first spray should occur at 450-550 degree days (50°F, Jan.1); coincides with black locust blooming
Onyx™	Bifenthrin		
Tempo®	Cyfluthrin		
Sevin® SL	Carbaryl		
Products Intended for Sale to Homeowners			
Bayer Advanced™ Tree & Shrub Insect Control	Imidacloprid	Soil drench	Early to mid-spring
Optrol™	Imidacloprid	Soil drench	Early to mid-spring
Ortho Tree and Shrub Insect Control Ready to Use Granules®	Dinotefuran	Granules	Mid- to late spring

Partial list of available insecticide options

- http://www.emeraldashborer.info/files/multistate_EAB_Insecticide_Fact_Sheet.pdf

Partial list of available insecticide options

http://www.emeraldashborer.info/files/multistate_EAB_Insecticide_Fact_Sheet.pdf

Granulate Ambrosia Beetle (GAB)

Attacks trees in late winter to early spring

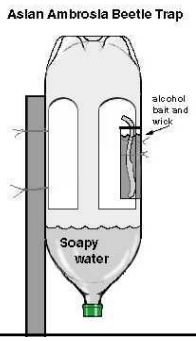
Image by M. Windham

Decision Guide for Applying Spray Treatments Against Ambrosia Beetles

- Ethyl alcohol baited traps are used to detect the late winter or early spring flight
- The need to use an insecticide spray is greater if the beetles have been caught in the traps and the trees have not broken dormancy

Ambrosia Beetle "Baker" Trap

- http://www.ces.ncsu.edu/depts/ent/notes/O&T/trees/note122/note122.html



Granulate Ambrosia Beetle Control

- Best to treat with bifenthrin or permethrin preventatively
- Or treat at first sign of attack (mid-March to May)

Scale Control Without Neonicotinoids

- The key to scale control is to apply an insecticide with thorough coverage when the crawlers have emerged from the eggs
- Thus, monitoring for crawlers is essential to determine the proper timing of the insecticide sprays

Scale Monitoring

- Sticky traps can be made to catch the emerging scale crawlers
- Use double sided Scotch tape, black electrical tape, or even white tape coated with a thin layer of petroleum jelly (Tape color depends on crawler color)
- Flag the branch and check at least once per week starting 10-14 days before expected emergence

Euonymus Scale Settled Crawlers

Scale Insecticides

- A dormant application of horticultural oil
- Target crawlers with horticultural oil, malathion, Sevin, Carbaryl, Orthene, Insecticidal soap, Distance, Fulcrum, and Talus 70 DF

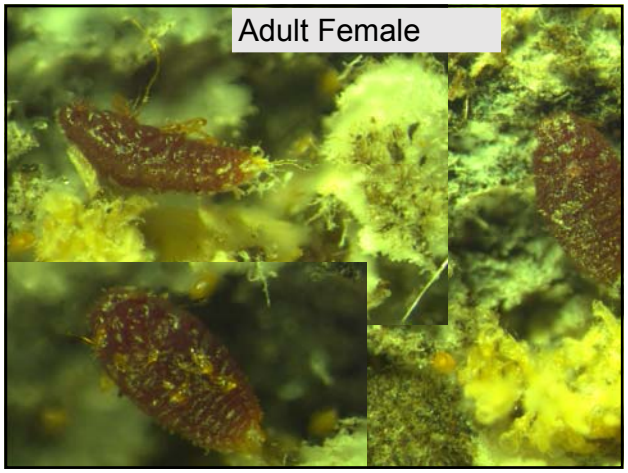
Insect Growth Regulator Insecticides

- Insect growth regulators (IGRs) such as pyriproxyfen (Distance, Fulcrum) and buprofezin (Talus 70 DF) target crawlers
- IGRs have been very effective on many species of immature scale

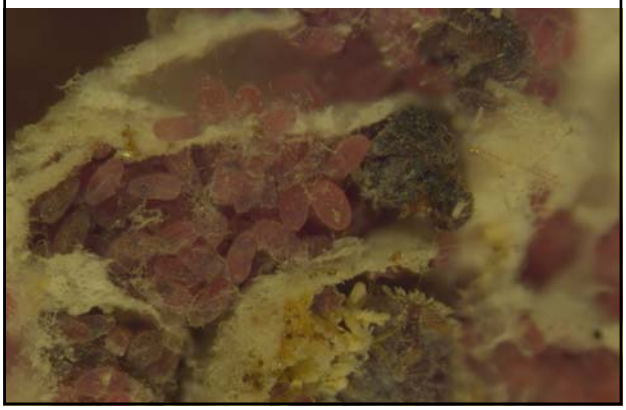
Crape Myrtle Bark Scale
Eriococcus lagerostroemia

Crape Myrtle Bark Scale

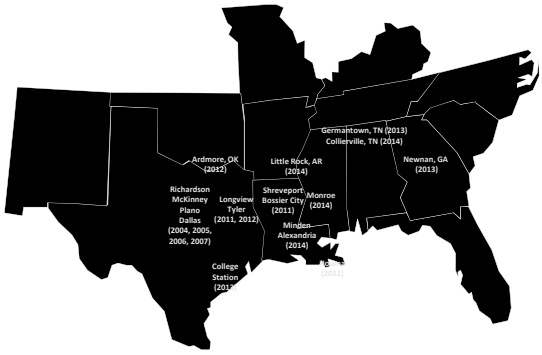
New fact sheets at:
http://www.uaex.edu/Other_Areas/publications/pdf/fsa-7086.pdf
And http://www.agrilifebookstore.org/product-p/eht-049.htm



Crape Myrtle Bark Scale Eggs



Crape Myrtle Bark Scale Populations - USA



In 2014, CMBS was also detected in Mobile, AL; Fayette County, TN; and Bernalillo County, New Mexico. In March 2015, CMBS was found in south Mississippi.

Crape Myrtle Bark Scale Control in the Landscape

- As needed, use a JD9-C spray gun at 125 – 150 psi with dishwashing soap or insecticidal soap solution as a pressure wash to physically remove scale
- Apply a dormant application of horticultural oil

Crape Myrtle Bark Scale Control in the Landscape

- Target crawlers with insecticide sprays when they emerge around early June and again for second generation crawlers in early August

Safety and Use of Neonicotinoid Insecticides in the Landscape

If flowering weeds such as dandelions and white clover are present:

- Mow the turf immediately before spraying any insecticide. This will remove 90% or more of the flowers and reduce pollinator foraging.
- Mow frequently to remove blooms when neonicotinoids are used
- Remove weeds with herbicide

by Dr. Doug Richmond, Purdue University

Safety and Use of Neonicotinoid Insecticides in Landscapes

- Maintain buffers (a buffer strip of turfgrass 2-3 feet between the treated turf and the margin of the landscape bed)
  - This will minimize the potential for unintended uptake by the roots of flowering ornamentals

by Dr. Doug Richmond, Purdue University

Questions?

https://tiny.utk.edu/ag/insectandmite
https://tiny.utk.edu/ag/turfinsect