Plant Health Care Workshop and Field Day

May 30, 2018

SYSTEMIC INSECTICIDES

www.treecarescience.com | info@treecarescience.com | 1-877-272-6747
• Arborologist- RTSA
• Technical Support Team
• NJ Certified Tree Expert
• BS degree Ohio State – Landscape Horticulture
• I’m here to support you

JEFF PICHER
jpicher@treecarescience.com

973-207-1443 stihltourdestrees.org (Tree Fund)
AGENDA AND INTENDED OUTCOMES

• How Rainbow helps you with training and support for you and your employees

• The Tool Box Approach to PHC using systemic pesticides

• How to add new PHC services

• RPH for PHC services
The Rainbow Tech Support Game Show

It’s time to put on your Arborists thinking caps.
List the most profitable Tree care services?
**PHC Revenue:** Return per Man-Hour

- Pruning & Removals
- Tree Injections
- AIR-SPADE
- Foliar Sprays
- Chlorosis Injections
- Soil Applied Insecticides
- GeoGreen Fertilizers
- Cambistat Treatments
Tree Care Services Sources of Client Value / Billings / Service Mix

- **PHC Premium Services**
  - Fertilizer, Foliar sprays, EAB
- **PHC General Service**
  - Pruning, removal, stump grinding
- **GTC**
  - Pruning, removal, stump grinding

Sources of Client Value

- Increased Competition
- Lower Competition
- Higher RPH
- Lower RPH
Using a Systemic Insecticide

Strengths

• Often a one time application
• Distribution to all plant parts
• Flexible application time
• Reduced pesticide exposure
• Can be combined with other services
• Ideal for large trees
Soil Injected and Bark spray products

• Application:
Key Factors to Evaluate Treatment Options

1. Research
2. Insecticide active ingredient
3. Dose
4. Application Method
5. Treatment timing
6. Cost
7. Tree & Environment Impact
Rapid Uptake

Dinotefuran vs. Imidacloprid Uptake

- Dinotefuran
- Imidacloprid

<table>
<thead>
<tr>
<th>Time after application</th>
<th>Dinotefuran</th>
<th>Imidacloprid</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 days</td>
<td>3000</td>
<td>0</td>
</tr>
<tr>
<td>30 days</td>
<td>12000</td>
<td>0</td>
</tr>
<tr>
<td>60 days</td>
<td>12000</td>
<td>0</td>
</tr>
<tr>
<td>120 days</td>
<td>5000</td>
<td>1000</td>
</tr>
</tbody>
</table>
Tree Care Application Techniques

Systemic Applications

Tree Injections
• Micro-infusion
• Macro-infusion

Soil Applications
• Soil Drench
• Soil Injection

Basal Systemic Bark Sprays

Non-systemic

Foliar Sprays

Trunk and Limb Sprays
Active Ingredient

Imidacloprid
Soil Injection Treatment Tips

• Apply around the base of tree
• Apply to the soil, below turf and mulch, imidacloprid binds in organic matter
• Short injection tip on probe- 4” to 6”
• Water is a carrier, more is not better. One year residual
Soft Scales: Xytect

Black Sooty Mold

Voids the waste in the form of quid sticky "honeydew"
Toledo, OH Soil Injection Trial
16-23 inch DBH Trees  One year prior peak

Spring Treated
2X rate

Fall Treated
standard rate

Dr. Dan Herms

June 2009
• A.I.: Dinotefuran 70%
• Package: water soluble packets
  – 20 pkts per re-sealable bag
• Unit treats: 100” DBH High
• 340” DBH Low

• Application Method:
  – Basal Drench/Soil Injection
  – Foliar Spray
  – Systemic Basal Bark Spray
Soil Application

Soil Applied Mixing Rates
Mix the packets in enough water to pour evenly around the tree. (About 1 gallon per 10” DBH usually works)

Shrub Soil Drench Mix Rate

<table>
<thead>
<tr>
<th>WATER</th>
<th># OF PACKETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 gallon</td>
<td>1</td>
</tr>
</tbody>
</table>

Apply 1 quart of solution per foot of shrub height at the high rate.

Basal drench is fast and simple. Dig a shallow trench around the tree, mix Transtect with water, pour around the tree and you’re done!
Soil Application

Rates
0.6 oz packet per 5 – 17 inches DBH

0.6 oz packer 10-17 ft shrub height
Systemic Basal Bark Spray

Rate
Six WSP packets mixed with one gallon of water applied at

1.5 – 2.0 fluid oz / DBH inch
Armored Scales: Transtect

Damaged cells die producing leaf symptoms.
Hemlocks recover faster with dinotefuran (right) when compared to treatment of imidacloprid (Merit™, Xytect™) (left). Both photos taken 20 months after application.
Transtect™ Bark Spray on Ash

Mt Prospect, IL

Treated May 22, 2012 & May 23, 2013

Photo May 23, 2013

Untreated control

Transtect™ 70WSP Bark Drench (6 pkt/gal)
Transtect™ Bark Spray on Ash

Mt Prospect, IL

Treated May 22, 2012 & May 23, 2013

Photo May 23, 2013

Untreated control

Transtect™ 70WSP Bark Drench (6 pkt/gal)
Lepitect

97% Acephate – similar to Orthene

Soil injection and trunk injection labels

Broad spectrum insecticide –
- Bagworm, oakworms, cankerworms, tent caterpillars, spruce budworm, pine tip moth, gypsy moths
- Aphids, Japanese beetle adults, lacebugs, spider mites / honey locust mites,
- Promising data on gall forming insects- 30 day residual
Systemic Soil Injection

Trunk injected
97% Acephate – similar to Orthene

Soil injection and trunk injection labels

Broad spectrum insecticide –
- Bagworm, oakworms, cankerworms, tent caterpillars, spruce budworm, pine tip moth
- Aphids, Japanese beetle adults, lacebugs, spider / honey locust mites,
- Promising data on gall forming insects
Pest management

• Soil Application
• Dinotefuran
• (Transtect)
• Effective for soft and hard scales
• EAB, Japanese beetles, leaf miners
• Fast uptake- 4 month residual
Treatment Recap/ Pros and Cons
Soil Injection/Bark Spray

Imidacloprid

1. Best used as preventative and low EAB pressure
2. Tree under 25” DBH inches

Pros:
• Fast & easy to apply
• Cost effective
• Long application window

Cons:
• Slower uptake (3-6 weeks)
• Pounds per acre

Dinotefuran

Pros:
• Fast & easy to apply
• Just-in-time treatment

Cons:
• Can NOT do fall treatments
• Pounds per acre
Tree Injection

Active Ingredient
4% Emamectin benzoate

Rates
Low to moderate EAB pressure
5ml per DBH

High EAB pressure and very large trees
10ml per DBH inches
Tree Injection

Tree injection is the process of applying a treatment into the active xylem of a tree where it is to be distributed throughout the tree.

For tree injections to be successful, applications require the use of systemic products that move readily in the tree and are effective at treating the condition of concern.

Treatment Timing-Tree Phenology

• Uptake is best when trees are healthy, fully leafed out and vigorous

• Avoid treating when trees are stressed or have serious dieback
Active Ingredient

Emamectin Benzoate
Emerald Ash Borer

Location: West Lafayette, IN

Evaluations: Independent annual thinning evaluations
• Green Ash: Average tree size 33” DBH
• 5 replicates per treatment
• Applications were performed in 2013, 2016
Emerald Ash Borer

Location: Grand Rapids, MI

% Canopy Dieback

- ArborMectin™
- TREE-age®
- Untreated
Table 1. Insecticide options for professionals and homeowners for controlling EAB that have been tested in multiple university trials.

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Application Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products Intended for Sale to Professional Applicators</td>
<td></td>
</tr>
<tr>
<td>Imidacloprid</td>
<td>Soil injection or drench</td>
</tr>
<tr>
<td>Emamectin benzoate</td>
<td>Trunk injection</td>
</tr>
<tr>
<td>Dinotefuran</td>
<td>Systemic bark spray</td>
</tr>
<tr>
<td>Dinotefuran</td>
<td>Soil injection or drench</td>
</tr>
<tr>
<td>Azadirachtin</td>
<td>Trunk injection</td>
</tr>
</tbody>
</table>

EAB Treatment Timing

You want peak amounts of insecticide in the xylem of the tree when eggs hatch and the larvae start to feed.

What time of year should I treat?

<table>
<thead>
<tr>
<th>Month</th>
<th>Imidacloprid</th>
<th>Emamectin Benzoate</th>
<th>Dinotefuran</th>
<th>Azadirachtin</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>You can apply if the ground is not frozen</td>
<td>You can apply once you have 3/4 leaf development</td>
<td>Moves into the tree in 7 to 10 days, apply throughout the growing season</td>
<td>You can apply once you have 3/4 leaf development</td>
</tr>
<tr>
<td>February</td>
<td>You can apply if the ground is not frozen</td>
<td>Do NOT apply once leaves have dropped</td>
<td>Do NOT apply in the fall</td>
<td></td>
</tr>
<tr>
<td>March</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>August</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>September</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>October</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>You can apply if the ground is not frozen</td>
<td>Do NOT apply once leaves have dropped</td>
<td>Do NOT apply in the fall</td>
<td></td>
</tr>
</tbody>
</table>
## 3 Treatment Methods
### Which Method to use?

1. What do you currently do?
2. What is the EAB pressure?
3. Treatment timing during the year?
4. Budget?
5. Environmental Concern?

<table>
<thead>
<tr>
<th>Soil Application</th>
<th>Bark Spray</th>
<th>Tree Injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imidaclorpid</td>
<td>Dinotefuran</td>
<td>Emamectin Benzoate</td>
</tr>
<tr>
<td>Dinotefuran</td>
<td></td>
<td>Azadirachtin</td>
</tr>
<tr>
<td></td>
<td>Tree Size</td>
<td>EAB Pressure</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Azadirachtin</strong></td>
<td>Under 20” DBH</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Dinotefuran</strong></td>
<td>Under 30” DBH</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Imidacloprid</strong></td>
<td>Under 30” DBH</td>
<td>Moderate to high</td>
</tr>
<tr>
<td><strong>Emamectin Benzoate</strong></td>
<td>Any size</td>
<td>Moderate to high</td>
</tr>
</tbody>
</table>
# Rates for EAB

<table>
<thead>
<tr>
<th></th>
<th>Imidacloprid 2F</th>
<th>Imidacloprid 75WSP</th>
<th>Dinotefuran 70WSP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Smaller</strong></td>
<td>Smaller</td>
<td>15” DBH</td>
<td>Soil Application</td>
</tr>
<tr>
<td>than 15” DBH</td>
<td>than 15” DBH</td>
<td>and Larger</td>
<td>Bark Spray</td>
</tr>
<tr>
<td><strong>15” DBH and</strong></td>
<td>15” DBH</td>
<td>and Larger</td>
<td></td>
</tr>
<tr>
<td><strong>Larger</strong></td>
<td>15” DBH</td>
<td>and Larger</td>
<td></td>
</tr>
<tr>
<td></td>
<td>One WSP packet</td>
<td>One WSP packet</td>
<td>Six WSP packets</td>
</tr>
<tr>
<td></td>
<td>treats 24 DBH</td>
<td>treats 12 DBH</td>
<td>mixed with one</td>
</tr>
<tr>
<td></td>
<td>inch</td>
<td>inch</td>
<td>gallon of water</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>applied at 1.5 – 2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fluid oz / DBH inch</td>
</tr>
</tbody>
</table>
# Trees Treated Per Hour

<table>
<thead>
<tr>
<th>Soil Injection, soil drench</th>
<th>Trunk Injection</th>
<th>Bark Spray</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relative Application Speed</strong></td>
<td><strong>Trees Treated/Hour</strong></td>
<td><strong>Relative Application Speed</strong></td>
</tr>
<tr>
<td>Slow</td>
<td>6</td>
<td>Slow</td>
</tr>
<tr>
<td>Medium</td>
<td>10</td>
<td>Medium</td>
</tr>
<tr>
<td>Fast</td>
<td>20</td>
<td>Fast</td>
</tr>
</tbody>
</table>
Soil injection

Imidacloprid
12ml/inch rate
Annual Treatment:
• $5.99

Tree Injection

Emamectin benzoate
5ml/inch of DBH
2 Year Treatment:
• $67.20

Bark Sprays

Dinotefuran
6pkt/gal water
Annual Treatment:
• $39.42

27” DBH Ash Treatment Costs

Updated: May 2018

2 Year Treatment Cost

$11.98 Total

$67.20 Total

$78.84 Total
<table>
<thead>
<tr>
<th>Insecticides</th>
<th>Fungicides</th>
<th>Misc</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transtect™</td>
<td>Myclotect™</td>
<td>Bacastat™</td>
<td>iQ tree infuser, HTI 2000 soil injector</td>
</tr>
<tr>
<td>Lepitect™</td>
<td>Arbotect®</td>
<td>VERIDUR® Mn</td>
<td>Q-connect Q-gun</td>
</tr>
<tr>
<td>Xytect™</td>
<td>Alamo®</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aracinate™</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tree Injection Uses in Landscape

- Dutch elm disease: ARBOTECH™
- Oak wilt: ALAMO™
- Laurel wilt: VERDUR™
- Chlorosis (Fe): VERDUR MN™
- Chlorosis (Mn): BACASTAT™
- Bacterial leaf scorch: XYTECT 10%™
- Fire blight: LEPITECT INFUSIBLE™
- Foliar feeding insects: ARACINATE™
- Boring insects: Caterpillars
- Spider mites: Eriophyid mites
- Pine wilt nematode
Plug-less System
Stainless steel tip seats snuggly into a 15/64" hole.

Save time and money by not messing with plugs.

Indicator light lets you know when the injection is finished and safe to remove.

Precision Dosing
No wasted product.
No mixing in the field.

Set the total dose and inject away

No calibration required and is dead-on accurate to 1/1000 of a milliliter

Smart Battery
Holds 2 lithium ion batteries

Easy to recharge

10 hours field time (Up to 5 hours of field Time per battery)
Q connect

- Similar to macro-infusion but for small volume treatments.
Training

1. Seminars
2. Online Training (Webinars)
3. Provide CEU’s
4. In-house Training
Expert Training That Gets Results

• Regional and in house Training for Sales and Technician Staff
• Sales and Diagnostic Ride-A-Longs
• Convenient Online Webinars
• Visits to Rainbow’s Service Team
• Technical support via phone and E-mail
• In–field application training
Rainbow Has Over
160 Plant Health Care
Protocols

Solutions for All of the Common Tree and Shrub Problems

- Wood boring insects
- Sucking and chewing insects
- Twig Girdlers
- Leaf Fungi
- Vascular Fungi
- Root Fungal Diseases
- Bacterial diseases
- Foliar Diseases
- Tree Nutrition
- Soil problems
- Chlorosis Issues
- Others
Diagnostic Field Guides

Japanese Beetles

**Signs of Damage**

Individual leaves are missing leaf tissue between the leaf veins, causing a lace-like appearance.

**Physical Appearance**

- Adults are 5/16" long with a metallic green head and thorax, and copper-brown wing covers.
- Japanese beetles are a mix of light white and dark brown, with a shiny red or purple sheen, and may sometimes appear as if the abdomen is divided into two sections.

**Biological Information**

- Larvae are white, C-shaped and about 1/4"-1/2" long. These grubs can be significant root pests.

**Treatment Strategy**

- Sprays are required to control adults feeding on trees. Apply sprays with a tank mix of 'Hygan' Plus Tendril™ during early summer. Timing is critical.

- Application of 'Hygan' Plus Tendril™ provides acceptable levels of stand-alone control, however, multiple applications may be required to provide adequate control.

**Treatments**

- **Foliar Sprays**
  - Product: 'Hygan' Plus Tendril™
  - Application: 6 oz spray per 100 gallons of water
  - Timing: Early June or late July

- **Soil Applications**
  - Product: 'Hygan' Plus Tendril™
  - Application: 6 oz per tree
  - Timing: Fall or early spring

- **Spray Application Schedule**
  - Sprays should be applied every 14-21 days.
Marketing Support

Opportunity Guides

Sell Sheets
How to Get Started

1. Identify Problems and Solutions

2. Contact Me or Bob Dolan for Technical Support

3. Schedule Training With Sales and Technicians