Project Name: Mealybug Efficacy

Project Description:
During the 2003 IR-4 Ornamental Horticulture Workshop certain studies were designated “Super A” to start devoting time and resources to groups of studies with the same general goal. Researching new and existing pest management tools for mealybugs was one set. This concept then morphed into high priority projects. Mealybugs, particularly newly invasive species, present difficulties for growers and landscape managers. While there are several tools in different classes, product efficacy is often unknown for newly invasive species or on mealybugs of new ornamental horticulture crops. Screening for mealybug efficacy initially occurred in 2004 and 2005 and then began again in 2008 with experiments continuing through 2012.

Research Project Abstract (if available):
Abstract from 2016 Scale & Mealybug Efficacy Summary
Managing scale and mealybug insects presents unique challenges. Products with contact modes of action have to be applied at specific timings to reach the most susceptible crawler stages. Products with systemic modes of action may work well for certain species and not others based on application timing and whether the insect feeds within phloem or xylem. In 2003, IR-4 initiated a high priority project to determine efficacy of several insecticides on several scale and mealybug species so data can be obtained to add appropriate species to existing registrations.

All products tested on citrus mealybug and Mexican mealybug, including Aria, Flagship, Safari, Talus, and TriStar, generally provided good to excellent efficacy on these species. A trial on Madeira mealybug showed excellent control when TriStar was mixed with Capsil surfactant and poor control without Capsil. NNI-0101, Safari and Talus provided good to excellent control of this species, while A16901B provided mediocre efficacy when applied as drench but good when applied as foliar treatment. Phormium mealybug control was good to excellent with all neonicotinoids tested – Flagship, Safari and TriStar. Good to excellent efficacy on Rhizoecus root mealybug was obtained with A16901B, Aria, Kontos, MBI-203, MBI-205 and Safari in single trials.

Target Species (Phytotoxicity, or common and Latin name of arthropod, pathogen, weed):
- Citrus Mealybug (*Planococcus citri*)
- Madeira Mealybug (*Phenacoccus madeirensis*)
- Mexican Mealybug (*Phenacoccus gossypii*)
- Miscanthus Mealybug (*Miscanthiococcus miscanthi*)
- Phormium Mealybug (*Balanococcus diminutus*)
- Rhizoecus hibisci (*Rhizoecus hibisci*)

Target Crops (list tested crops if ongoing or completed project):
- Coleus, Flamenettle (*Coleus sp.*)
- French marigold (*Tagetes patula*)
- New Zealand Flax (*Phormium sp.*)
- Rose (*Rosa sp.*)
- Parapara or Birdcatcher tree (*Pisonia brunoniana*)
- Silvergrass (*Miscanthus sinensis*)
- Zinnia (*Zinnia sp.*)

Target Product(s)(list tested products or numbered compounds if ongoing or completed project):
- A16901B
- Acelepryn (MBI203) DF
- Aria 20SG
- Distance
- Flagship 25WG
- Flagship 0.22G
- Grandevo
- Hachi-Hachi
- Kontos
- Marathon II
- Merit 2F
- Orthene TTO
- Precise Acephate
- Rycar
- QRD 400
- Safari 20SG
- Safari 2G
- SuffOil X
- Talstar NF
- Talus 40SC
- Talus 70DF
- TriStar 30SG
- TriStar 70WSP

Creation Date: 8/5/2013
Last Saved Date: 9/29/2017
### Product Registration and Research Status

<table>
<thead>
<tr>
<th>Product Registration and Research Status</th>
<th>Fully Screened (also includes standards)</th>
<th>Partially Screened through IR-4&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Need Data for Additional Species?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labeled for Mealybugs</td>
<td>Mesurol 75-W</td>
<td>Verticillium lecanii</td>
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</tr>
<tr>
<td>Generally &amp; Commercialized</td>
<td>Flagship 25WG</td>
<td>Aria 20SG</td>
<td>Celero 16WSG</td>
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<tr>
<td></td>
<td>Onyx</td>
<td>Distance</td>
<td>Botanigard 22WP</td>
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<td></td>
<td>Orthene TTO</td>
<td>Flagship 0.22G</td>
<td>EcoTrol</td>
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<tr>
<td></td>
<td>Precise Acephate</td>
<td>Grandevo (MBI203) DF</td>
<td>Marathon II</td>
</tr>
<tr>
<td></td>
<td>Scimitar CS</td>
<td>Kontos</td>
<td>M-Pede</td>
</tr>
<tr>
<td></td>
<td>Sun Spray Ultra-Fine oil</td>
<td>Safari 20SG *</td>
<td>Preferal</td>
</tr>
<tr>
<td></td>
<td>Talstar NF</td>
<td></td>
<td>Rycar *</td>
</tr>
<tr>
<td></td>
<td>Talus 40SC</td>
<td></td>
<td>Safari 2G</td>
</tr>
<tr>
<td></td>
<td>Talus 70DF</td>
<td></td>
<td>SuffOil X</td>
</tr>
<tr>
<td></td>
<td>Ultra Pure Oil</td>
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<td>TriStar 30SG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Xxpire</td>
</tr>
<tr>
<td>Labeled for Mealybugs</td>
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</tr>
<tr>
<td>Generally But NOT Commercialized</td>
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<tr>
<td>Labeled for Specific Mealybugs &amp; Commercialized</td>
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<tr>
<td>Labeled for Specific Mealybugs but NOT Commercialized</td>
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</tr>
<tr>
<td>Not yet registered or labeled for Mealybugs</td>
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<tr>
<td>No longer available for development for Mealybugs</td>
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<tr>
<td></td>
<td>Acelepryn</td>
<td>A16901B</td>
<td>Hachi-Hachi</td>
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<tr>
<td></td>
<td>QRD 400</td>
<td></td>
<td>Verticillium lecanii</td>
</tr>
</tbody>
</table>

* IR-4 Data contributed to registration decision – either adding pest to label or not pursuing further research

1 At least one species screened fully

2 Product not available for production ornamentals

### Area Characteristics

<table>
<thead>
<tr>
<th>Area</th>
<th>Characteristic</th>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability &amp; effectiveness of alternative management tools</td>
<td>Very few new tools for screening</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Damage potential of target</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Performance and crop safety of proposed products (from other systems)</td>
<td>Mealybugs tend to be managed well with a few exceptions Several IRAC classes are available for resistance management</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Compatibility with IPM, resistance management programs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographic distribution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturer interest in labeling products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
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</tbody>
</table>
## IR-4 Efficacy Trials to Date

Average rating on a scale of 1 – 5 with 1 = 0 to about 50% efficacy (not effective) and 5 = 95 to 100 efficacy (very effective); minimum to maximum rating; number of trials (See table on next page). For product/insect combinations that are blank, IR-4 has not screened this combination.

‘Labeled’ indicates that this insect species or genera is listed on the label. A rating of 2 or lower is considered unacceptable efficacy (red text). A rating of 3 or higher is considered commercially acceptable (black text). Non-labeled, completed product/insect combinations (3 or more trials) with an average rating of 3 or higher are highlighted with green text. For insect/product combinations that are blank, IR-4 has not screened this combination.
<table>
<thead>
<tr>
<th>Product (Active Ingredients)</th>
<th>Citrus Mealybug (Planococcus citri)</th>
<th>Madeira Mealybug (Phenacoccus madeirensis)</th>
<th>Mexican Mealybug (Phenacoccus gossypii)</th>
<th>Phormium Mealybug (Balanococcus diminutus)</th>
<th>Rhizoecus hibisci (Rhizoecus hibisci)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A16901B 45WG (Cyantraniliprole + thiamethoxam)</td>
<td>4.5 (4 - 5) n2 Labeled</td>
<td>3.4 (1 - 5) n5 Labeled</td>
<td></td>
<td>5.0 (5 - 5) n1 Labeled</td>
<td></td>
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<tr>
<td>Acelerpyn (aka DPX-E2Y45) 1.67 (Chlorantraniliprole)</td>
<td></td>
<td></td>
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<td></td>
<td>1.0 (1 - 1) n1</td>
</tr>
<tr>
<td>Aria 50SG (Flonicamid)</td>
<td>3.0 (1 - 5) n3 Labeled</td>
<td></td>
<td>5.0 (5 - 5) n1 Labeled</td>
<td>4.0 (4 - 4) n1</td>
<td></td>
</tr>
<tr>
<td>Distance (Pyriproxyfen)</td>
<td>2.3 (1 - 3) n3 Labeled</td>
<td>2.0 (1 - 3) n2 Labeled</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Flagship 0.22G (Thiamethoxam)</td>
<td></td>
<td>2.3 (1 - 3) n3 Labeled</td>
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<td></td>
<td></td>
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<tr>
<td>Flagship 25WG (Thiamethoxam)</td>
<td>4.4 (4 - 5) n5 Labeled</td>
<td>3.2 (2 - 5) n4 Labeled</td>
<td>4.0 (4 - 4) n1 Labeled</td>
<td>4.0 (4 - 4) n1 Labeled</td>
<td>4.0 (4 - 4) n1</td>
</tr>
<tr>
<td>Grandevo (MBI 203 DF) (Chromobacterium subsugae NRRL B-30655)</td>
<td>1.0 (1 - 1) n1 Labeled</td>
<td>1.0 (1 - 1) n1 Labeled</td>
<td></td>
<td></td>
<td>4.0 (4 - 4) n1</td>
</tr>
<tr>
<td>Hachi-Hachi EC (Tolfenpyrad)</td>
<td></td>
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<td>5.0 (5 - 5) n1</td>
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<tr>
<td>Horticultural Oil (Horticultural Oil)</td>
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<td>5.0 (5 - 5) n1</td>
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<tr>
<td>Kontos (BYI 8330 240SC) (Spirotetramat)</td>
<td>1.5 (1 - 2) n2 Labeled</td>
<td>4.0 (2 - 5) n3 Labeled</td>
<td></td>
<td>3.8 (3 - 5) n4 Labeled</td>
<td></td>
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<tr>
<td>Marathon II (Imidacloprid)</td>
<td>1.0 (1 - 1) n2 Labeled</td>
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<tr>
<td>MBI 205 (MBI205)</td>
<td>2.0 (2 - 2) n1</td>
<td>5.0 (5 - 5) n1</td>
<td></td>
<td>2.0 (2 - 2) n1</td>
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<tr>
<td>Merit 75WP (Imidacloprid)</td>
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<td>1.0 (1 - 1) n1 Labeled</td>
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<tr>
<td>Mesurol 75-W (Methicarb)</td>
<td>3.0 (3 - 3) n1</td>
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<tr>
<td>Natural Solutions - V. lecanii (Verticillium lecanii)</td>
<td>3.0 (3 - 3) n1</td>
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<tr>
<td>Orthene TTO 97 (Valent) (Acephate)</td>
<td>5.0 (5 - 5) n3 Labeled</td>
<td>5.0 (5 - 5) n1 Labeled</td>
<td></td>
<td>1.0 (1 - 1) n1</td>
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<tr>
<td>Precise Acephate (Acephate)</td>
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<td></td>
<td></td>
<td></td>
<td>1.0 (1 - 1) n1 Labeled</td>
</tr>
<tr>
<td>QRD 400 (Extract of Chenopodium ambrosioides)</td>
<td>1.5 (1 - 2) n2</td>
<td>3.0 (3 - 3) n1</td>
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<tr>
<td>Rycar (SP3009/NNI-0101) (Pyrifluquinazon)</td>
<td>5.0 (5 - 5) n1 Labeled</td>
<td>4.0 (3 - 5) n2 Labeled</td>
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<tr>
<td>Safari 20SG (Dinotefuran)</td>
<td>3.9 (1 - 5) n7 Labeled</td>
<td>4.0 (3 - 5) n2 Labeled</td>
<td>5.0 (5 - 5) n1 Labeled</td>
<td>5.0 (5 - 5) n2 Labeled</td>
<td>4.5 (4 - 5) n2</td>
</tr>
<tr>
<td>Safari 2G (V-10112 2G) (Dinotefuran)</td>
<td>3.5 (2 - 5) n2 Labeled</td>
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<tr>
<td>Product (Active Ingredients)</td>
<td>Citrus Mealybug (<em>Planococcus citri</em>)</td>
<td>Madeira Mealybug (<em>Phenacoccus madeirensis</em>)</td>
<td>Mexican Mealybug (<em>Phenacoccus gossypii</em>)</td>
<td>Phormium Mealybug (<em>Balanococcus diminutus</em>)</td>
<td>Rhozoeus hibisci (<em>Rhizoecus hibisci</em>)</td>
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<tr>
<td>SuffOil X (Synergy) (Petroleum Oil)</td>
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<td>Talstar NF (Bifenthrin)</td>
<td>3.0 (3 - 3) n2 Labeled</td>
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<td>Talus 40SC (Buprofezin)</td>
<td>3.8 (3 - 4) n5 Labeled</td>
<td>5.0 (5 - 5) n1 Labeled</td>
<td>5.0 (5 - 5) n1 Labeled</td>
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<tr>
<td>Talus 70DF (Buprofezin)</td>
<td>3.0 (3 - 3) n1 Labeled</td>
<td>4.5 (4 - 5) n2 Labeled</td>
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<tr>
<td>TriStar 30SG (Acetamiprid)</td>
<td>5.0 (5 - 5) n1 Labeled</td>
<td>4.0 (4 - 4) n1 Labeled</td>
<td>5.0 (5 - 5) n1 Labeled</td>
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<tr>
<td>TriStar 70WSP (Acetamiprid)</td>
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<td>4.0 (4 - 4) n1 Labeled</td>
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<td>4.0 (4 - 4) n1 Labeled</td>
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</table>
## Registered and Experimental Products for Scale & Mealybug Management

<table>
<thead>
<tr>
<th>Foliar Applied Insecticides (active ingredients)</th>
<th>IRAC Class</th>
<th>Registered Use Site(s)</th>
<th>Knock Down</th>
<th>Residual Control (days)</th>
<th>REI</th>
<th>Scale-Mealybug Efficacy</th>
<th>Life Stages</th>
<th>Treatment Program</th>
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<tr>
<td>Astro, Permethrin.Pro, etc. (permethrin)</td>
<td>3A</td>
<td>G, I</td>
<td>F</td>
<td>5-7</td>
<td>12 h</td>
<td>?</td>
<td>?</td>
<td>?</td>
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<tr>
<td>BotaniCard, Mycotrol-O, Naturalis L (Beauveria bassiana)</td>
<td>M</td>
<td>G, I, N, S</td>
<td>M</td>
<td>3</td>
<td>4 h</td>
<td>P-G</td>
<td>?</td>
<td>?</td>
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<tr>
<td>Cygon, Dimethoate (dimethoate)</td>
<td>1B</td>
<td>N</td>
<td>F</td>
<td>5-7</td>
<td>48 h</td>
<td>G</td>
<td>?</td>
<td>?</td>
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<tr>
<td>Discus Tablet (cyfluthrin-imidacloprid)</td>
<td>3A + 4A</td>
<td>N</td>
<td>F</td>
<td>5-7</td>
<td>12 h</td>
<td>?</td>
<td>?</td>
<td>?</td>
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<tr>
<td>Distance (pyriproxyfen)</td>
<td>7D</td>
<td>G, I, L, S</td>
<td>S</td>
<td>?</td>
<td>12 h</td>
<td>P-E</td>
<td>P-E</td>
<td>P-F</td>
</tr>
<tr>
<td>Duraguard, Dursban (chlorpyrifos)</td>
<td>1B</td>
<td>G, N</td>
<td>F</td>
<td>5-7</td>
<td>24 h</td>
<td>F</td>
<td>?</td>
<td>P</td>
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<tr>
<td>Flagship 25WG (thiamethoxam)</td>
<td>4A</td>
<td>G, I, L, N, S</td>
<td>F</td>
<td>7-14</td>
<td>12 h</td>
<td>P-E</td>
<td>P-G</td>
<td>F-E</td>
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<tr>
<td>Grandevo, MBI-203 DF (Chromobacterium subsutage strain PRAA-41)</td>
<td>-</td>
<td>G, N</td>
<td>S</td>
<td>?</td>
<td>4 h</td>
<td>G</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Hachi-Hachi EC (tolfenpyrad)</td>
<td>21A</td>
<td>G</td>
<td>F</td>
<td>7-14</td>
<td>12 h</td>
<td>?</td>
<td>?</td>
<td>?</td>
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<tr>
<td>Kontos, BYI-8330 (spirotetramat)</td>
<td>23</td>
<td>G, I, N</td>
<td>S</td>
<td>7-14</td>
<td>24 h</td>
<td>P-E</td>
<td>P-E</td>
<td>E</td>
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<tr>
<td>Malathion</td>
<td>1B</td>
<td>G, N</td>
<td>F</td>
<td>5-7</td>
<td>12 h</td>
<td>E</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Marathon (imidacloprid)</td>
<td>4A</td>
<td>G, I, N</td>
<td>F</td>
<td>?</td>
<td>12 h</td>
<td>G</td>
<td>?</td>
<td>?</td>
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<tr>
<td>Mavrik (fluvalinate)</td>
<td>3</td>
<td>G, I, N</td>
<td>F</td>
<td>14</td>
<td>12 h</td>
<td>?</td>
<td>?</td>
<td>?</td>
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<tr>
<td>Met 52, Tick Ex (Metarhizium anisopliae F52)</td>
<td>-</td>
<td>G, N</td>
<td>M</td>
<td>5-7</td>
<td>4 h</td>
<td>?</td>
<td>E</td>
<td>?</td>
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<tr>
<td>M-Pede, Safer Soap (potassium salts of fatty acids)</td>
<td>-</td>
<td>G, I, N</td>
<td>F</td>
<td>Contact</td>
<td>12 h</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>NoFly WP (Paecilomyces fumosoroseus strain FE 9901)</td>
<td>-</td>
<td>G</td>
<td>M</td>
<td>3-7</td>
<td>4 h</td>
<td>P-G</td>
<td>P-G</td>
<td>P-G</td>
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<tr>
<td>Orthene T&amp;O, Acephate 97 UP (acephate)</td>
<td>1B</td>
<td>G, N</td>
<td>F</td>
<td>7</td>
<td>24 h</td>
<td>P-E</td>
<td>F-G</td>
<td>P-G</td>
</tr>
<tr>
<td>Preferal, PFR-97 (Isaria fumosoroseus)</td>
<td>-</td>
<td>G, L, N, S</td>
<td>S</td>
<td>Contact</td>
<td>4 h</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Prevent Pyronyl Crop Spray, Pyrene Crop Spray, etc. (pyrethrins + BPO)</td>
<td>3A +</td>
<td>G, N</td>
<td>F</td>
<td>Contact</td>
<td>12 h</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Rycar, NNI-0101 (pyrifluquinazon)</td>
<td>UN</td>
<td>G</td>
<td>?</td>
<td>10</td>
<td>12 h</td>
<td>P-E</td>
<td>?</td>
<td>G-E</td>
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</table>

Information presented is based on the best data available on October 1, 2017.
## Registered and Experimental Products for Scale & Mealybug Management

<table>
<thead>
<tr>
<th>Foliar Applied Insecticides (active ingredients)</th>
<th>IRAC Class</th>
<th>Registered Use Site(s)</th>
<th>Knock Down (days)</th>
<th>Residual Control (days)</th>
<th>REI</th>
<th>Scale-Mealybug Efficacy</th>
<th>Life Stages</th>
<th>Treatment Program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Armored Scales</td>
<td>Cushion Scales</td>
<td>Soft Scales</td>
</tr>
<tr>
<td>Safari 20SG (dinotebruan)</td>
<td>4A</td>
<td>G, N</td>
<td>M</td>
<td>?</td>
<td>12 h</td>
<td>P-E</td>
<td>P-E</td>
<td>P-E</td>
</tr>
<tr>
<td>Supracide (methidathion)</td>
<td>1B</td>
<td>N</td>
<td>F</td>
<td>?</td>
<td>48 h</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Surround WP (kaolin)</td>
<td>-</td>
<td>G</td>
<td>?</td>
<td>Contact</td>
<td>4 h</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Talstar, Oxyx (bifenthin)</td>
<td>3A</td>
<td>G, L, N, F</td>
<td>7</td>
<td>12 h</td>
<td>P-E</td>
<td>?</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>Talus (buprozein)</td>
<td>16</td>
<td>G, L, N, S</td>
<td>14</td>
<td>12 h</td>
<td>P-E</td>
<td>P-E</td>
<td>P-G</td>
<td>F-E</td>
</tr>
<tr>
<td>Tame (fenpropithrin)</td>
<td>3A</td>
<td>G, I, L, N, S</td>
<td>F</td>
<td>7</td>
<td>24 h</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>TriStar (acetamiprid)</td>
<td>4A</td>
<td>G, L, N, S</td>
<td>F</td>
<td>?</td>
<td>12 h</td>
<td>P-E</td>
<td>G-E</td>
<td>G-E</td>
</tr>
<tr>
<td>Ultra pure oil, SuffOil-X, etc. (paraffinic oil)</td>
<td>-</td>
<td>G, N</td>
<td>F</td>
<td>Contact</td>
<td>4 h</td>
<td>P-E</td>
<td>P-E</td>
<td>?</td>
</tr>
</tbody>
</table>

### Experimental Products

<table>
<thead>
<tr>
<th>Foliar Applied Insecticides (active ingredients)</th>
<th>IRAC Class</th>
<th>Registered Use Site(s)</th>
<th>Knock Down (days)</th>
<th>Residual Control (days)</th>
<th>REI</th>
<th>Scale-Mealybug Efficacy</th>
<th>Life Stages</th>
<th>Treatment Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aloft (bifenthrin + clothianidin)</td>
<td>3A + 4A</td>
<td>TBD</td>
<td>F</td>
<td>?</td>
<td>12 h</td>
<td>P-G</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Arena, Celero 16WG (clothianidin)</td>
<td>4A</td>
<td>TBD</td>
<td>?</td>
<td>?</td>
<td>12 h</td>
<td>P-E</td>
<td>P</td>
<td>F-E</td>
</tr>
</tbody>
</table>

Registered Use Sites: G = Greenhouse; L = Lath House; I = Indoors; N = Nursery; S = Shade House; TBD = To Be Determined
Knockdown: Fast (< 1 day), Medium (1-7 days), Slow (>7 days).
Efficacy: P = Poor (< 70% control); F = Fair (70% to 85% control); G = Good (85% to 95% control), E = Excellent (>95% control) on immatures and/or adults 1 to 3 weeks after first app.

Residual Control taken from product technical and label info, recommendations on earliest application intervals; Scale, Mealybug Efficacy taken from the 2017 IR-4 efficacy summary draft and 19 AMT reports. Effect on biological control agents for scales/mealybugs taken from Koppert, Biobest and some extension publications/recommendations.


Information presented is based on the best data available on October 1, 2017.
Cushion scales: *Icerya purchasi*,
Soft scales: *Ceroplastes floridensis, Eulecanium cerasorum, Lecanium fletcheri* and *Pulvinaria innumerabilis*
Mealybugs: *Balanococcus diminutus, Phenacoccus gossypii, Phenacoccus madeirensis, Planococcus citri* and *Rhizoecus hibisci*

* Results of efficacy trials have been variable for entomopathogens and impact on beneficial organisms is presumed to be less than that of traditional pesticide chemistries but the data are sparse.
** This insecticide is toxic to many BCA’s but has a short residual and may be suitable for treating hot spots and re-introducing BCA’s soon thereafter.
* Milstop has a New York 2ee recommendation to control mealybugs, aphids, spider mites, stink bugs and whiteflies.

Information presented is based on the best data available on *October 1, 2017*. 