

Project Name: **Scale Efficacy**

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|-----|---------|---|-----------|-----------------------------------|---------------------------|
| New | Ongoing | X | Completed | Duration if ongoing or completed: | 2004 – 2015, 2018-2023 |
|-----|---------|---|-----------|-----------------------------------|---------------------------|

Project Description:

During the 2003 IR-4 Environmental 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 scale insects was one set. This concept then morphed into high priority projects. Scale insects, especially armored scale, present difficulties for growers and landscape managers. While there are several tools in different classes, product efficacy is often unknown for many species of new environmental horticulture crops. Screening for scale insect efficacy initially occurred in 2004 and continued through 2015. Starting after the 2017 workshop, scale efficacy became a high priority project and continued through 2023

Research Project Abstract (if available):

Abstract from 2023 Scale Efficacy Summary

Managing scale insects presents unique challenges. Products with contact modes of action must be applied at specific timings in order 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. 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. This research was conducted between 2004 and 2022, and this summary contains outcomes from 85 experiments received through the IR-4 Environmental Horticulture Program. Across the 24 scale species screened, the most efficacious products included ISM-555, RTSA-721, XXpire, horticultural oils, Talus, Rycar, Distance, Safari, Ventigra, dimethoate. Kontos, Tristar, Altus, Flagship, Mainspring, and Marathon also reduced populations. However, sensitivities across species varied by product and application method.

Target Species (Phytotoxicity, or common and Latin name of arthropod, pathogen, weed):

| | |
|---|---|
| Brown Soft Scale (<i>Coccus hesperidum</i>) | Lobate Lac Scale (<i>Paratachardina pseudolobata</i>)Maskell |
| Camelia Scale (<i>Lepidosaphes camelliae</i>) | Scale (<i>Lepidosaphes pallida</i>) |
| Cottony Cushion Scale (<i>Icerya purchasi</i>) | Scale, Calico (<i>Eulecanium cerasorum</i>) |
| Cottony Maple Scale (<i>Neopulvinaria innumerabilis</i>) | Scale, Cycad (<i>Aulacaspis yasumatsui</i>) |
| Crape Myrtle Bark Scale (<i>Eriococcus lagerstroemia</i>) | Scale, Elongate Hemlock (<i>Fiorinia externa</i>) |
| Euonymus Scale (<i>Unaspis euonymi</i>) | Scale, Hala (<i>Thysanococcus pandani</i>) |
| False Florida Red Scale (<i>Chrysomphalus bifasciculatus</i>) | Scale, Hemispherical; brown shield (<i>Saissetia coffeae</i>) |
| False Oleander Scale (<i>Pseudaulacaspis cockerelli</i>) | Scale, Holly Pit (<i>Asterolecanium puteanum</i>) |
| Fletcher Scale (<i>Parthenolecanium fletcheri</i>) | Scale, Magnolia (<i>Neolecanium cornuparvum</i>) |
| Florida Red Scale (<i>Chrysomphalus aonidum</i>) | Scale, Oystershell (<i>Diaspidiotus ostreiformis</i>) |
| Florida Wax Scale (<i>Ceroplastes floridensis</i>) | Scale, Pine Needle (<i>Phenacaspis pinifoliae</i>) |
| Gloomy Scale (<i>Melanaspis tenebricosa</i>) | Scale, Tea (<i>Fiorinia theae</i>) |
| Greedy Scale (<i>Hemiberlesia rapax</i>) | Wax Myrtle Scale (<i>Melanaspis deklei</i>) |
| Indian Wax Scale (<i>Ceroplastes ceriferus</i>) | White Peach Scale (<i>Pseudaulacaspis pentagona</i>) |
| Japanese Maple Scale (<i>Lopholeucaspis japonica</i>) | Winged Euonymus Scale (<i>Lepidosaphes yanagicola</i>) |

Target Crops (list tested crops if ongoing or completed project)

| | | |
|---------------------------------------|---------------------------------------|----------------------------|
| <i>Abies fraseri</i> | <i>Euonymus fortunei</i> | <i>Myrica cerifera</i> |
| <i>Acer palmatum</i> | <i>Euonymus japonicus</i> | <i>Nandina domestica</i> |
| <i>Acer saccharinum</i> | <i>Euonymus radicans</i> | <i>Pandanus sp.</i> |
| <i>Acer sp.</i> | <i>Euonymus sp.</i> | <i>Pinus sp.</i> |
| <i>Archontophoenix cunninghamiana</i> | <i>Fatsia japonica</i> | <i>Pittosporum sp.</i> |
| <i>Aucuba japonica</i> | <i>Gleditsia sp.</i> | <i>Rhaphiolepis indica</i> |
| <i>Aucuba sp.</i> | <i>Halesia carolina var. carolina</i> | <i>Strelitzia sp.</i> |

| | | |
|-------------------------------|-----------------------------|---------------------------|
| <i>Camellia japonica</i> | <i>Hibiscus sp.</i> | <i>Syringa sp.</i> |
| <i>Camellia sasanqua</i> | <i>Ilex cornuta</i> | <i>Syringa vulgaris</i> |
| <i>Camellia sp.</i> | <i>Ilex sp.</i> | <i>Taxus X media</i> |
| <i>Cuprocyparis leylandii</i> | <i>Ilex x meserveae</i> | <i>Ternstroemia sp.</i> |
| <i>Cycas revoluta</i> | <i>Lagerstroemia indica</i> | <i>Zamia integrifolia</i> |
| <i>Euonymus alatus</i> | <i>Magnolia grandiflora</i> | <i>Zelkova serrata</i> |
| <i>Euonymus fortunei</i> | <i>Magnolia virginiana</i> | |

Target Product(s)(list tested products or numbered compounds if ongoing or completed project)

| | |
|--|--|
| A16901B 45WG (Thiamethoxam + cyantraniliprole) | MOI 201 (MOI 201) |
| Acelepryn (Chlorantraniliprole) | NI02ES-1 (NI02ES-1) |
| Acelepryn (Dupont) (Chlorantraniliprole) | NoFly WP (Paecilomyces fumosoroseous strain FE 9901) |
| Acephate Pro 75 WSP (Acephate) | Onyx (Bifenthrin) |
| Aloft SC (Clothianadin + bifenthrin) | Orthene TTO 97 (Valent) (Acephate) |
| Altus (Flupyradifurone) | Paraffin Oil (Mineral oil) |
| Arena 50WDG (Clothianadin) | Pradia (Cyclaniliprole + Fonicamid) |
| Aria 50SG (Fonicamid) | QRD 416 (Extract of Chenopodium ambrosioides) |
| AzaGuard (Azadirachtin) | QRD 452 (Extract of Chenopodium ambrosioides) |
| Botanigard 22WP (Beauveria bassiana Strain GHA) | RTSA 721 (RTSA 721) |
| Bountify (MBI 306) (Burkholderia rinojensis strain A396) | Rycar (Pyrifluquinazon) |
| BW133 (BW133) | Safari 20SG (Dinotefuran) |
| BW238 ES (BW238 ES) | Safari 2G (Dinotefuran) |
| BW238 WP (BW238 WP) | Saf-T-Oil (Mineral oil) |
| BW279N (BW279N) | Sarisa 50SL (Cyclaniliprole) |
| Celero 16W5G (Clothianadin) | SP3014 (SP3014) |
| Cygon 2E (Dimethoate) | SuffOil X (Synergy) (Mineral oil) |
| Diazinon 4E (Diazinon) | Sun Spray Ultra-Fine Spray Oil (Mineral oil) |
| Discus (Imidacloprid + cyfluthrin) | Talstar Flowable Insecticide/Miticide (Bifenthrin) |
| Distance (Pyriproxyfen) | Talus 40SC (Buprofezin) |
| DPX-HGW86 (Cyantraniliprole) | Talus 70DF (Buprofezin) |
| Dursban Pro (Chlorpyrifos) | Talus WP (Buprofezin) |
| Flagship 0.22G (Thiamethoxam) | TetraCURB Concentrate (Rosemary Oil) |
| Flagship 25WG (Thiamethoxam) | TetraCURB Max (castor oil + rosemary oil + clove oil + peppermint oil) |
| GF-2626 1SC (Sulfoxaflor) | TetraCURB Organic (Rosemary Oil) |
| Horticultural Oil (Mineral oil) | Triact (Clarified hydrophobic extract of neem oil) |
| ISM-555 (ISM-555, A21377X) | TriStar 30SG (Acetamiprid) |
| Judo 2SC (Spiromesifen) | TriStar 70WSP (Acetamiprid) |
| KOC22018-8 (Botanical Oil Blend) | TriStar 8.5SL (Acetamiprid) |
| Kontos 240SC (Spirotetramat) | Ultra Pure Oil (BASF) (Mineral oil) |
| Mainspring GNL 200SC (Cyantraniliprole) | V-10433 (V-10433) |
| Marathon II (Imidacloprid) | Velifer (Beauveria bassiana Strain PPRI 5339) |
| MBI 203 SC2 (MBI 203) | Ventigra Insecticide (Afidopyropen) |
| Merit 2F (Imidacloprid) | Xxpire 40WG (Spinetoram + sulfoxaflor) |
| Merit 75WP (Imidacloprid) | |

Product Registration and Research Status

| | Fully Screened (also includes standards) | Partially Screened through IR-4 ¹ | Need Data for Additional Species ? |
|--|--|--|---|
| Labeled for Scale Generally & Commercialized | Acephate Pro 75WSP Cygon 2E Diazinon 4E Flagship 25WG * Orthene TTO Sun Spray Ultra-Fine oil | Aria 20SG Discus Distance Kontos* Safari 20SG * TriStar 30SG * | Aloft SC ² Arena 50WDG ² EcoTrol Hachi-Hachi M-Pede Rycar * |



Environmental Horticulture Program Research Project Sheet

<https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-extension-resources/>

| | | | |
|---|---|---|---|
| | Talstar NF Talus 40SC Talus 70DF Ultra Pure Oil | | Safari 2G SuffOil X Xpire * |
| Labeled for Specific Scale & Commercialized | Scimitar CS | Onyx | |
| Labeled for Specific Scale but NOT Commercialized | | | |
| Not yet registered or labeled for Scale | | A16901B Flagship 0.22G ISM-555 MBI-203 Bountify (MBI-306) NIO2ES-1 SP3014 TetraCURB Max V-10433 | BotaniGard 22WP Marathon II Merit 2F ² |
| No longer available for development for Scale | Acelepryn Celero 16WSG * GF-2626 1SC | MOI 201 QRD 452 | |

* 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

| PROS | CONS |
|--|--|
| Need more armored scale data continues to be an issue | Very few new tools for screening |
| Need more lac scale data | Several IRAC classes are available for resistance management |
| Successful project with data clearly contributing to expanded labels | Sites can be difficult to locate |
| Some labels are general, some are specific | Some labels are general, some are specific |
| Expansion needed for some labels | |
| Systemic product with more flexibility in application timing | |
| OHP & BASF may have products | |
| Distance (pyriproxyfen)? | |
| Comments: More data may be needed for products in current protocol to make registration decisions | |

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 1 of 4. Armored Scales

| MOA | Product (Active Ingredients) | Scale, Holly Pit (<i>Asterolecanium puteanum</i>) | Scale, Cycad (<i>Aulacaspis yasumatsui</i>) | Indian Wax Scale (<i>Ceroplastes ceriferus</i>) | Florida Red Scale (<i>Chrysomphalus aonidum</i>) | False Florida Red Scale (<i>Chrysomphalus bifasciculatus</i>) |
|-----------------------|--|--|--|---|--|---|
| FRAC NC | BW133 (BW133) | | | | | |
| FRAC NC | Horticultural Oil (Mineral oil) | | | | | |
| FRAC NC | MOI 201 (MOI 201) | | | | | |
| FRAC NC | Paraffin Oil (Mineral oil) | | | | | |
| FRAC NC | Saf-T-Oil (Mineral oil) | | | | | |
| FRAC NC | SuffOil X (Synergy) (Mineral oil) | | | | | |
| FRAC NC | Sun Spray Ultra-Fine Spray Oil (Mineral oil) | | | | | |
| FRAC NC | Ultra Pure Oil (BASF) (Mineral oil) | | | | | |
| FRAC NC & IRAC UNB | Bountify (MBI 306) (Burkholderia rinojensis strain A396) | | | | | |
| IRAC 16 | Talus 40SC (Buprofezin) | <i>1.0 (1 - 1) n1 Labeled</i> | | | | 3.0 (3 - 3) n1 Labeled |
| IRAC 16 | Talus 70DF (Buprofezin) | | 5.0 (5 - 5) n1 Labeled | | | |
| IRAC 16 | Talus WP (Buprofezin) | | | | | |
| IRAC 1B | Acephate Pro 75 WSP (Acephate) | | | | | |
| IRAC 1B | Cygon 2E (Dimethoate) | | | <i>1.0 (1 - 1) n1 Labeled</i> | | |
| IRAC 1B | Diazinon 4E (Diazinon) | | | | | |
| IRAC 1B | Dursban Pro (Chlorpyrifos) | | | | | |
| IRAC 1B | Orthene TTO 97 (Valent) (Acephate) | <i>1.0 (1 - 1) n1 Labeled</i> | | | <i>1.0 (1 - 1) n1 Labeled</i> | |
| IRAC 23 | Judo 2SC (Spiromesifen) | | | | | |
| IRAC 23 | Kontos 240SC (Spirotetramat) | | | | | |
| IRAC 28 | Acelepryn (Dupont) (Chlorantraniliprole) | | | | | |
| IRAC 28 | DPX-HGW86 (Cyantraniliprole) | | | | | |
| IRAC 28 | Mainspring GNL 200SC (Cyantraniliprole) | | | | | |
| IRAC 28 | Sarisa 50SL (Cyclaniliprole) | | <i>1.0 (1 - 1) n1</i> | | | |
| IRAC 28 + IRAC 29 | Pradia (Cyclaniliprole + Flonicamid) | | <i>1.0 (1 - 1) n1</i> | | | |
| IRAC 3A | Onyx (Bifenthrin) | | | | | |

| MOA | Product (Active Ingredients) | Scale, Holly Pit (<i>Asterolecanium puteanum</i>) | Scale, Cycad (<i>Aulacaspis yasumatsui</i>) | Indian Wax Scale (<i>Ceroplastes ceriferus</i>) | Florida Red Scale (<i>Chrysomphalus aonidum</i>) | False Florida Red Scale (<i>Chrysomphalus bifasciculatus</i>) |
|----------------------|---|--|--|---|--|---|
| IRAC 3A | Talstar Flowable Insecticide/Miticide (Bifenthrin) | | | | | |
| IRAC 4A | Arena 50WDG (Clothianadin) | | | | | |
| IRAC 4A | Celero 16WSG (Clothianadin) | | | | 1.0 (1 - 1) n1 Labeled | |
| IRAC 4A | Flagship 0.22G (Thiamethoxam) | | | | | |
| IRAC 4A | Flagship 25WG (Thiamethoxam) | 1.0 (1 - 1) n1 Labeled | | | 1.0 (1 - 1) n1 Labeled | 5.0 (5 - 5) n1 Labeled |
| IRAC 4A | Marathon II (Imidacloprid) | | | | | |
| IRAC 4A | Merit 75WP (Imidacloprid) | | | | | |
| IRAC 4A | Safari 20SG (Dinotefuran) | 1.0 (1 - 1) n1 Labeled | | | 1.0 (1 - 1) n2 Labeled | 5.0 (5 - 5) n1 Labeled |
| IRAC 4A | Safari 2G (Dinotefuran) | 1.0 (1 - 1) n1 Labeled | | | | |
| IRAC 4A | TriStar 30SG (Acetamiprid) | 1.0 (1 - 1) n1 Labeled | | | 1.0 (1 - 1) n1 Labeled | 3.0 (3 - 3) n1 Labeled |
| IRAC 4A | TriStar 70WSP (Acetamiprid) | | | | | |
| IRAC 4A | TriStar 8.5SL (Acetamiprid) | | | | | |
| IRAC 4A + IRAC 28 | A16901B 45WG (Thiamethoxam + cyantraniliprole) | | | | | |
| IRAC 4A + IRAC 3 | Aloft SC (Clothianadin + bifenthrin) | 1.0 (1 - 1) n1 Labeled | | | | |
| IRAC 4A + IRAC 3A | Discus (Imidacloprid + cyfluthrin) | | | | | |
| IRAC 4C | GF-2626 1SC (Sulfoxaflor) | | | | | |
| IRAC 4D | Altus (Flupyradifurone) | | 3.0 (3 - 3) n1 Labeled | | | |
| IRAC 5 + IRAC 4C | Xxpire 40WG (Spinetoram + sulfoxaflor) | | | | | |
| IRAC 7C | Distance (Pyriproxyfen) | 1.0 (1 - 1) n1 Labeled | | | | 3.0 (3 - 3) n1 Labeled |
| IRAC 7C + IRAC 4A | Tank Mix: Distance + TriStar (Pyriproxifen + acetamiprid) | | | | | |
| IRAC 9D | Ventigra Insecticide (Afidopyropen) | | 5.0 (5 - 5) n1 Labeled | | | |
| IRAC UN | AzaGuard (Azadirachtin) | | 1.0 (1 - 1) n1 | | | |

| MOA | Product (Active Ingredients) | Scale, Holly Pit (<i>Asterolecanium puteanum</i>) | Scale, Cycad (<i>Aulacaspis yasumatsui</i>) | Indian Wax Scale (<i>Ceroplastes ceriferus</i>) | Florida Red Scale (<i>Chrysomphalus aonidum</i>) | False Florida Red Scale (<i>Chrysomphalus bifasciculatus</i>) |
|----------|--|--|--|--|---|--|
| IRAC UN | Rycar (Pyrifluquinazon) | 1.0 (1 - 1) n1 | | | | 3.0 (3 - 3) n1 |
| IRAC UN | Triact (Clarified hydrophobic extract of neem oil) | | | | | |
| IRAC UNE | QRD 452 (Extract of <i>Chenopodium ambrosioides</i>) | | | | | |
| IRAC UNE | TetraCURB Concentrate (Rosemary Oil) | | 1.0 (1 - 1) n1 | | | |
| IRAC UNE | TetraCURB Organic (Rosemary Oil) | | 1.0 (1 - 1) n1 | | | |
| IRAC UNF | Botanigard 22WP (<i>Beauveria bassiana</i> Strain GHA) | | | | | |
| IRAC UNF | Velifer (<i>Beauveria bassiana</i> Strain PPRI 5339) | | | | | |
| unknown | BW238 ES (BW238 ES) | | | | | |
| unknown | BW238 WP (BW238 WP) | | | | | |
| unknown | ISM-555 (ISM-555, A21377X) | | | | | |
| unknown | KOC22018-8 (Botanical Oil Blend) | | 1.0 (1 - 1) n1 | | | |
| unknown | MBI 203 SC2 (MBI 203) | | | | | |
| unknown | RTSA 721 (RTSA 721) | | | | | |
| unknown | SP3014 (SP3014) | | | | | |
| unknown | TetraCURB Max (castor oil + rosemary oil + clove oil + peppermint oil) | | | | | |
| unknown | V-10433 (V-10433) | | | | | |

Table 2 of 4. Armored Scales, continued

| MOA | Product (Active Ingredients) | Scale, Oystershell (<i>Diaspidiotus ostreiformis</i>) | Scale, Elongate Hemlock (<i>Fiorinia externa</i>) | Scale, Tea (<i>Fiorinia theae</i>) | Camelia Scale (<i>Lepidosaphes camelliae</i>) | Winged Euonymus Scale (<i>Lepidosaphes yanagicola</i>) |
|--------------------|--|---|---|--------------------------------------|---|--|
| FRAC NC | BW133 (BW133) | | | | | |
| FRAC NC | Horticultural Oil (Mineral oil) | | | | | |
| FRAC NC | MOI 201 (MOI 201) | 1.0 (1 - 1) n1 | | | | |
| FRAC NC | Paraffin Oil (Mineral oil) | | | | 5.0 (5 - 5) n1 | |
| FRAC NC | Saf-T-Oil (Mineral oil) | | | 3.0 (3 - 3) n1 | | |
| FRAC NC | SuffOil X (Synergy) (Mineral oil) | | | 4.0 (3 - 5) n2 | | |
| FRAC NC | Sun Spray Ultra-Fine Spray Oil (Mineral oil) | | | | | |
| FRAC NC | Ultra Pure Oil (BASF) (Mineral oil) | | | 4.0 (4 - 4) n1 | | |
| FRAC NC & IRAC UNB | Bountify (MBI 306) (<i>Burkholderia rinojensis</i> strain A396) | | | | | |
| IRAC 16 | Talus 40SC (Buprofezin) | 5.0 (5 - 5) n2 Labeled | 4.0 (4 - 4) n1 Labeled | 4.0 (4 - 4) n1 Labeled | | 5.0 (5 - 5) n2 Labeled |
| IRAC 16 | Talus 70DF (Buprofezin) | | | 3.7 (2 - 5) n7 Labeled | 5.0 (5 - 5) n1 Labeled | |
| IRAC 16 | Talus WP (Buprofezin) | | | | | |
| IRAC 1B | Acephate Pro 75 WSP (Acephate) | | | | | |
| IRAC 1B | Cygon 2E (Dimethoate) | | 3.0 (3 - 3) n2 Labeled | | | |
| IRAC 1B | Diazinon 4E (Diazinon) | | | | | 1.0 (1 - 1) n1 Labeled |
| IRAC 1B | Dursban Pro (Chlorpyrifos) | | | | | |
| IRAC 1B | Orthene TTO 97 (Valent) (Acephate) | 1.0 (1 - 1) n2 Labeled | | | 1.0 (1 - 1) n1 Labeled | 3.0 (3 - 3) n1 Labeled |
| IRAC 23 | Judo 2SC (Spiromesifen) | | 1.0 (1 - 1) n1 | | | |
| IRAC 23 | Kontos 240SC (Spirotetramat) | | | 5.0 (5 - 5) n1 Labeled | 5.0 (5 - 5) n1 Labeled | 2.0 (2 - 2) n1 Labeled |
| IRAC 28 | Acelepryn (Dupont) (Chlorantraniliprole) | | | | | |
| IRAC 28 | DPX-HGW86 (Cyantraniliprole) | | | | | |
| IRAC 28 | Mainspring GNL 200SC (Cyantraniliprole) | | | 3.0 (1 - 5) n6 | 1.0 (1 - 1) n1 | |
| IRAC 28 | Sarisa 50SL (Cyclaniliprole) | | | 3.3 (1 - 5) n4 | | |

| MOA | Product (Active Ingredients) | Scale, Oystershell (<i>Diaspidiotus ostreiformis</i>) | Scale, Elongate Hemlock (<i>Fiorinia externa</i>) | Scale, Tea (<i>Fiorinia theae</i>) | Camelia Scale (<i>Lepidosaphes camelliae</i>) | Winged Euonymus Scale (<i>Lepidosaphes yanagicola</i>) |
|-------------------|--|---|---|--------------------------------------|---|--|
| IRAC 28 + IRAC 29 | Pradia (Cyclaniliprole + Flonicamid) | | | | | |
| IRAC 3A | Onyx (Bifenthrin) | | 2.0 (2 - 2) n1 <i>Labeled</i> | | | |
| IRAC 3A | Talstar Flowable Insecticide/Miticide (Bifenthrin) | | | | | |
| IRAC 4A | Arena 50WDG (Clothianadin) | | | | 1.0 (1 - 1) n1 | |
| IRAC 4A | Celero 16WVG (Clothianadin) | | | | | |
| IRAC 4A | Flagship 0.22G (Thiamethoxam) | | | | 1.0 (1 - 1) n1 | |
| IRAC 4A | Flagship 25WG (Thiamethoxam) | 1.0 (1 - 1) n2 <i>Labeled</i> | 4.0 (4 - 4) n1 Labeled | | 1.0 (1 - 1) n1 <i>Labeled</i> | 3.0 (3 - 3) n2 Labeled |
| IRAC 4A | Marathon II (Imidacloprid) | | | | | |
| IRAC 4A | Merit 75WP (Imidacloprid) | | | | | |
| IRAC 4A | Safari 20SG (Dinotefuran) | 2.8 (1 - 5) n5 <i>Labeled</i> | 3.8 (2 - 5) n4 Labeled | 4.5 (3 - 5) n4 Labeled | 1.0 (1 - 1) n1 <i>Labeled</i> | 1.0 (1 - 1) n3 Labeled |
| IRAC 4A | Safari 2G (Dinotefuran) | | | 3.0 (1 - 5) n3 Labeled | 1.0 (1 - 1) n1 <i>Labeled</i> | |
| IRAC 4A | TriStar 30SG (Acetamiprid) | 1.0 (1 - 1) n1 <i>Labeled</i> | | | 1.0 (1 - 1) n1 <i>Labeled</i> | |
| IRAC 4A | TriStar 70WSP (Acetamiprid) | 2.0 (1 - 3) n2 <i>Labeled</i> | 4.0 (4 - 4) n1 Labeled | | | 2.5 (2 - 3) n2 Labeled |
| IRAC 4A | TriStar 8.5SL (Acetamiprid) | | | | | |
| IRAC 4A + IRAC 28 | A16901B 45WG (Thiamethoxam + cyantraniliprole) | | | | 1.0 (1 - 1) n1 <i>Labeled</i> | |
| IRAC 4A + IRAC 3 | Aloft SC (Clothianadin + bifenthrin) | 1.0 (1 - 1) n1 <i>Labeled</i> | | | | |
| IRAC 4A + IRAC 3A | Discus (Imidacloprid + cyfluthrin) | | | | | |
| IRAC 4C | GF-2626 1SC (Sulfoxaflor) | | | | | |
| IRAC 4D | Altus (Flupyradifurone) | | | 3.0 (1 - 5) n3 Labeled | | |
| IRAC 5 + IRAC 4C | Xxpire 40WG (Spinetoram + sulfoxaflor) | | | 5.0 (5 - 5) n2 Labeled | 5.0 (5 - 5) n1 Labeled | |
| IRAC 7C | Distance (Pyriproxyfen) | | | 3.0 (1 - 5) n5 Labeled | 5.0 (5 - 5) n1 Labeled | 2.0 (2 - 2) n1 Labeled |

| MOA | Product (Active Ingredients) | Scale, Oystershell (<i>Diaspidiotus ostreiformis</i>) | Scale, Elongate Hemlock (<i>Fiorinia externa</i>) | Scale, Tea (<i>Fiorinia theae</i>) | Camelia Scale (<i>Lepidosaphes camelliae</i>) | Winged Euonymus Scale (<i>Lepidosaphes yanagicola</i>) |
|-------------------|--|---|---|--------------------------------------|---|--|
| IRAC 7C + IRAC 4A | Tank Mix: Distance + TriStar (Pyriproxifen + acetamiprid) | | | 3.3 (1 - 5) n4 | | |
| IRAC 9D | Ventigra Insecticide (Afidopyropen) | | | 2.7 (1 - 4) n3 Labeled | | |
| IRAC UN | AzaGuard (Azadirachtin) | | | 3.0 (3 - 3) n1 | | |
| IRAC UN | Rycar (Pyrifluquinazon) | | | | | |
| IRAC UN | Triact (Clarified hydrophobic extract of neem oil) | | | 1.0 (1 - 1) n1 Labeled | | |
| IRAC UNE | QRD 452 (Extract of <i>Chenopodium ambrosioides</i>) | | | | | |
| IRAC UNE | TetraCURB Concentrate (Rosemary Oil) | | | | | |
| IRAC UNE | TetraCURB Organic (Rosemary Oil) | | | | | |
| IRAC UNF | Botanigard 22WP (<i>Beauveria bassiana</i> Strain GHA) | | 1.0 (1 - 1) n1 | | | |
| IRAC UNF | Velifer (<i>Beauveria bassiana</i> Strain PPRI 5339) | | | | | |
| unknown | BW238 ES (BW238 ES) | | | | | |
| unknown | BW238 WP (BW238 WP) | | | | | |
| unknown | ISM-555 (ISM-555, A21377X) | | | | | |
| unknown | KOC22018-8 (Botanical Oil Blend) | | | | | |
| unknown | MBI 203 SC2 (MBI 203) | | | | | |
| unknown | RTSA 721 (RTSA 721) | | | | | |
| unknown | SP3014 (SP3014) | | | | | |
| unknown | TetraCURB Max (castor oil + rosemary oil + clove oil + peppermint oil) | | | | | |
| unknown | V-10433 (V-10433) | | | | | |

Table 3 of 5. Armored Scales, cont.

| MOA | Product (Active Ingredients) | Wax Myrtle Scale (<i>Melanaspis deklei</i>) | Gloomy Scale (<i>Melanaspis tenebricosa</i>) | False Oleander Scale (<i>Pseudaulacaspis cockerelli</i>) | Scale, Pine Needle (<i>Phenacaspis pinifoliae</i>) | Scale, Hemispherical; brown shield (<i>Saissetia coffeae</i>) | Euonymus Scale (<i>Unaspis euonymi</i>) |
|-----------------------|--|--|---|---|---|--|--|
| FRAC NC | BW133 (BW133) | | | | | | |
| FRAC NC | Horticultural Oil (Mineral oil) | | | | 1.5 (1 - 2) n2 | | 4.3 (3 - 5) n3 |
| FRAC NC | MOI 201 (MOI 201) | | | | | | |
| FRAC NC | Paraffin Oil (Mineral oil) | 3.0 (3 - 3) n1 | | 4.0 (4 - 4) n1 | | | |
| FRAC NC | Saf-T-Oil (Mineral oil) | | | | | | |
| FRAC NC | SuffOil X (Synergy) (Mineral oil) | | | 5.0 (5 - 5) n1 | | | |
| FRAC NC | Sun Spray Ultra-Fine Spray Oil (Mineral oil) | 3.0 (3 - 3) n1 | | | 5.0 (5 - 5) n1 | | 5.0 (5 - 5) n1 |
| FRAC NC | Ultra Pure Oil (BASF) (Mineral oil) | | | | | | |
| FRAC NC & IRAC UNB | Bountify (MBI 306) (Burkholderia rinojensis strain A396) | | | | | 2.0 (2 - 2) n1 | |
| IRAC 16 | Talus 40SC (Buprofezin) | 3.0 (3 - 3) n2 Labeled | | 1.0 (1 - 1) n1 Labeled | | 3.0 (3 - 3) n1 Labeled | 4.3 (3 - 5) n4 Labeled |
| IRAC 16 | Talus 70DF (Buprofezin) | | 5.0 (5 - 5) n1 Labeled | 2.5 (1 - 5) n4 Labeled | 5.0 (5 - 5) n3 Labeled | | 4.0 (1 - 5) n6 Labeled |
| IRAC 16 | Talus WP (Buprofezin) | | | | | | 5.0 (5 - 5) n1 Labeled |
| IRAC 1B | Acephate Pro 75 WSP (Acephate) | | | | | | 5.0 (5 - 5) n1 Labeled |
| IRAC 1B | Cygon 2E (Dimethoate) | | | | | | 3.7 (3 - 5) n3 Labeled |
| IRAC 1B | Diazinon 4E (Diazinon) | | | | | | 5.0 (5 - 5) n1 Labeled |
| IRAC 1B | Dursban Pro (Chlorpyrifos) | | | | | | |
| IRAC 1B | Orthene TTO 97 (Valent) (Acephate) | | | 1.0 (1 - 1) n1 Labeled | | | 3.0 (2 - 4) n2 Labeled |
| IRAC 23 | Judo 2SC (Spiromesifen) | | | | | | |
| IRAC 23 | Kontos 240SC (Spirotetramat) | | 5.0 (5 - 5) n1 Labeled | 1.0 (1 - 1) n1 Labeled | 2.5 (1 - 5) n4 Labeled | | 2.0 (1 - 3) n3 Labeled |
| IRAC 28 | Acelepryn (Dupont) (Chlorantraniliprole) | | | | | | |
| IRAC 28 | DPX-HGW86 (Cyantraniliprole) | | | | | | |

| MOA | Product (Active Ingredients) | Wax Myrtle Scale (<i>Melanaspis deklei</i>) | Gloomy Scale (<i>Melanaspis tenebricosa</i>) | False Oleander Scale (<i>Pseudaulacaspis cockerelli</i>) | Scale, Pine Needle (<i>Phenacaspis pinifoliae</i>) | Scale, Hemispherical; brown shield (<i>Saissetia coffeae</i>) | Euonymus Scale (<i>Unaspis euonymi</i>) |
|-------------------|--|--|---|---|---|--|--|
| IRAC 28 | Mainspring GNL 200SC (Cyantraniliprole) | | | 5.0 (5 - 5) n1 | 1.5 (1 - 2) n2 | 1.0 (1 - 1) n1 | 3.0 (1 - 5) n2 |
| IRAC 28 | Sarisa 50SL (Cyclaniliprole) | | | 1.5 (1 - 2) n2 | 1.5 (1 - 2) n2 | | |
| IRAC 28 + IRAC 29 | Pradia (Cyclaniliprole + Flonicamid) | | | 2.5 (1 - 4) n2 | | | |
| IRAC 3A | Onyx (Bifenthrin) | | | | | | |
| IRAC 3A | Talstar Flowable Insecticide/Miticide (Bifenthrin) | | | | | | |
| IRAC 4A | Arena 50WDG (Clothianadin) | | | 2.0 (2 - 2) n1 | | | |
| IRAC 4A | Celero 16WWSG (Clothianadin) | | | | | | |
| IRAC 4A | Flagship 0.22G (Thiamethoxam) | | 5.0 (5 - 5) n1 | 2.0 (2 - 2) n1 | 1.0 (1 - 1) n3 | | 2.2 (1 - 4) n6 |
| IRAC 4A | Flagship 25WG (Thiamethoxam) | | 5.0 (5 - 5) n1 Labeled | 2.0 (2 - 2) n2 Labeled | 2.0 (1 - 3) n2 Labeled | | 2.3 (1 - 4) n8 Labeled |
| IRAC 4A | Marathon II (Imidacloprid) | | | | | | |
| IRAC 4A | Merit 75WP (Imidacloprid) | | | | | | |
| IRAC 4A | Safari 20SG (Dinotefuran) | 3.0 (3 - 3) n2 Labeled | 5.0 (5 - 5) n1 Labeled | 3.0 (2 - 4) n2 Labeled | 3.3 (1 - 5) n4 Labeled | | 3.8 (1 - 5) n11 Labeled |
| IRAC 4A | Safari 2G (Dinotefuran) | | 5.0 (5 - 5) n1 Labeled | 3.0 (3 - 3) n1 Labeled | 2.0 (1 - 3) n2 Labeled | | 4.0 (2 - 5) n5 Labeled |
| IRAC 4A | TriStar 30SG (Acetamiprid) | | 5.0 (5 - 5) n1 Labeled | 1.0 (1 - 1) n1 Labeled | 5.0 (5 - 5) n2 Labeled | | 2.6 (1 - 5) n8 Labeled |
| IRAC 4A | TriStar 70WSP (Acetamiprid) | | | 1.0 (1 - 1) n1 Labeled | | | |
| IRAC 4A | TriStar 8.5SL (Acetamiprid) | | | 1.0 (1 - 1) n1 | | | |
| IRAC 4A + IRAC 28 | A16901B 45WG (Thiamethoxam + cyantraniliprole) | | 5.0 (5 - 5) n1 Labeled | 1.0 (1 - 1) n1 Labeled | 1.0 (1 - 1) n2 Labeled | | 2.3 (1 - 5) n3 Labeled |
| IRAC 4A + IRAC 3 | Aloft SC (Clothianadin + bifenthrin) | | | | 5.0 (5 - 5) n1 Labeled | | 4.0 (3 - 5) n2 Labeled |
| IRAC 4A + IRAC 3A | Discus (Imidacloprid + cyfluthrin) | | | | | | |
| IRAC 4C | GF-2626 1SC (Sulfoxaflor) | | | | 2.0 (2 - 2) n1 | | |
| IRAC 4D | Altus (Flupyradifurone) | | | 2.0 (1 - 3) n2 Labeled | 2.0 (2 - 2) n1 Labeled | | |
| IRAC 5 + IRAC 4C | Xxpire 40WG (Spinetoram + sulfoxaflor) | 2.0 (2 - 2) n1 Labeled | | 4.0 (3 - 5) n2 Labeled | 3.3 (3 - 4) n3 Labeled | | 3.5 (2 - 5) n2 Labeled |

| MOA | Product (Active Ingredients) | Wax Myrtle Scale (<i>Melanaspis deklei</i>) | Gloomy Scale (<i>Melanaspis tenebricosa</i>) | False Oleander Scale (<i>Pseudaulacaspis cockerelli</i>) | Scale, Pine Needle (<i>Phenacaspis pinifoliae</i>) | Scale, Hemispherical; brown shield (<i>Saissetia coffeae</i>) | Euonymus Scale (<i>Unaspis euonymi</i>) |
|----------------------|---|--|---|---|---|---|--|
| IRAC 7C | Distance (Pyriproxyfen) | 2.0 (1 - 3) n2 Labeled | 5.0 (5 - 5) n1 Labeled | 2.5 (1 - 5) n4 Labeled | 4.0 (3 - 5) n2 Labeled | | 3.9 (1 - 5) n10 Labeled |
| IRAC 7C + IRAC 4A | Tank Mix: Distance + TriStar (Pyriproxifen + acetamiprid) | | | | | | |
| IRAC 9D | Ventigra Insecticide (Afidopyropen) | | | 1.0 (1 - 1) n2 Labeled | 5.0 (5 - 5) n1 Labeled | 3.0 (3 - 3) n1 Labeled | |
| IRAC UN | AzaGuard (Azadirachtin) | | | 1.7 (1 - 3) n3 | | | |
| IRAC UN | Rycar (Pyrifluquinazon) | | 5.0 (5 - 5) n1 | 2.0 (2 - 2) n1 | 4.5 (4 - 5) n2 | | 2.6 (1 - 5) n7 |
| IRAC UN | Triact (Clarified hydrophobic extract of neem oil) | | | | | | 4.0 (4 - 4) n1 Labeled |
| IRAC UNE | QRD 452 (Extract of <i>Chenopodium ambrosioides</i>) | | | | | | 3.0 (3 - 3) n1 |
| IRAC UNE | TetraCURB Concentrate (Rosemary Oil) | | | 1.0 (1 - 1) n1 | | | |
| IRAC UNE | TetraCURB Organic (Rosemary Oil) | | | 1.0 (1 - 1) n1 | | | |
| IRAC UNF | Botanigard 22WP (<i>Beauveria bassiana</i> Strain GHA) | | | | | | |
| IRAC UNF | Velifer (<i>Beauveria bassiana</i> Strain PPRI 5339) | | | | | 3.0 (3 - 3) n1 | |
| unknown | BW238 ES (BW238 ES) | | | | | | |
| unknown | BW238 WP (BW238 WP) | | | | | | |
| unknown | ISM-555 (ISM-555, A21377X) | | | | | 4.0 (4 - 4) n1 | |
| unknown | KOC22018-8 (Botanical Oil Blend) | | | 3.0 (3 - 3) n1 | | | |
| unknown | MBI 203 SC2 (MBI 203) | | | | | 1.0 (1 - 1) n1 | |
| unknown | RTSA 721 (RTSA 721) | | | | | | |
| unknown | SP3014 (SP3014) | | | | | 3.0 (3 - 3) n1 | |
| unknown | TetraCURB Max (castor oil + rosemary oil + clove oil + peppermint oil) | | | | | 4.0 (4 - 4) n1 | |
| unknown | V-10433 (V-10433) | | | | | 1.0 (1 - 1) n1 | |

Table 4 of 5. Soft Scales

| MOA | Product (Active Ingredients) | Florida Wax Scale (<i>Ceroplastes floridensis</i>) | Scale, Calico (<i>Eulecanium cerasorum</i>) | Scale, Magnolia (<i>Neolecanium cornuparvum</i>) | Cottony Maple Scale (<i>Neopulvinaria innumerabilis</i>) | Fletcher Scale (<i>Parthenolecanium fletcheri</i>) |
|--------------------|--|---|--|---|---|---|
| FRAC NC | BW133 (BW133) | | | | | |
| FRAC NC | Horticultural Oil (Mineral oil) | | | | | |
| FRAC NC | MOI 201 (MOI 201) | | | | | |
| FRAC NC | Paraffin Oil (Mineral oil) | | | | | |
| FRAC NC | Saf-T-Oil (Mineral oil) | | | | | |
| FRAC NC | SuffOil X (Synergy) (Mineral oil) | | | | | |
| FRAC NC | Sun Spray Ultra-Fine Spray Oil (Mineral oil) | | | | | |
| FRAC NC | Ultra Pure Oil (BASF) (Mineral oil) | | | | | |
| FRAC NC & IRAC UNB | Bountify (MBI 306) (<i>Burkholderia rinojensis</i> strain A396) | | | | | |
| IRAC 16 | Talus 40SC (Buprofezin) | 3.0 (2 - 4) n2 Labeled | | | 1.0 (1 - 1) n1 Labeled | 2.0 (1 - 3) n2 Labeled |
| IRAC 16 | Talus 70DF (Buprofezin) | | | 3.0 (3 - 3) n1 Labeled | | |
| IRAC 16 | Talus WP (Buprofezin) | | | | | 3.0 (3 - 3) n1 Labeled |
| IRAC 1B | Acephate Pro 75 WSP (Acephate) | | | | | |
| IRAC 1B | Cygon 2E (Dimethoate) | | | | | |
| IRAC 1B | Diazinon 4E (Diazinon) | | | | | |
| IRAC 1B | Dursban Pro (Chlorpyrifos) | | | | | 5.0 (5 - 5) n1 |
| IRAC 1B | Orthene TTO 97 (Valent) (Acephate) | 1.0 (1 - 1) n2 Labeled | | | | |
| IRAC 23 | Judo 2SC (Spiromesifen) | | | | | |
| IRAC 23 | Kontos 240SC (Spirotetramat) | | 2.0 (2 - 2) n1 Labeled | | | |
| IRAC 28 | Acelepryn (Dupont) (Chlorantraniliprole) | | 1.0 (1 - 1) n1 | | | |
| IRAC 28 | DPX-HGW86 (Cyantraniliprole) | | 1.0 (1 - 1) n1 Labeled | | | |
| IRAC 28 | Mainspring GNL 200SC (Cyantraniliprole) | | 5.0 (5 - 5) n1 | | | |
| IRAC 28 | Sarisa 50SL (Cyclaniliprole) | | | | | |

| MOA | Product (Active Ingredients) | Florida Wax Scale (<i>Ceroplastes floridensis</i>) | Scale, Calico (<i>Eulecanium cerasorum</i>) | Scale, Magnolia (<i>Neolecanium cornuparvum</i>) | Cottony Maple Scale (<i>Neopulvinaria innumerabilis</i>) | Fletcher Scale (<i>Parthenolecanium fletcheri</i>) |
|----------------------|---|---|--|---|---|---|
| IRAC 28 + IRAC 29 | Pradia (Cyclaniliprole + Flonicamid) | | | | | |
| IRAC 3A | Onyx (Bifenthrin) | | | | | |
| IRAC 3A | Talstar Flowable Insecticide/Miticide (Bifenthrin) | | 1.0 (1 - 1) n1 | | 1.0 (1 - 1) n1 | |
| IRAC 4A | Arena 50WDG (Clothianadin) | 5.0 (5 - 5) n1 | 3.0 (3 - 3) n1 | | | |
| IRAC 4A | Celero 16WSG (Clothianadin) | 3.7 (3 - 5) n3 Labeled | | | | |
| IRAC 4A | Flagship 0.22G (Thiamethoxam) | | | 5.0 (5 - 5) n1 | | |
| IRAC 4A | Flagship 25WG (Thiamethoxam) | 3.8 (3 - 5) n5 Labeled | | | 3.0 (3 - 3) n1 Labeled | 3.5 (3 - 4) n2 Labeled |
| IRAC 4A | Marathon II (Imidacloprid) | 5.0 (5 - 5) n1 Labeled | | | 1.0 (1 - 1) n1 Labeled | |
| IRAC 4A | Merit 75WP (Imidacloprid) | | 1.0 (1 - 1) n2 Labeled | | | |
| IRAC 4A | Safari 20SG (Dinotefuran) | 4.5 (4 - 5) n2 Labeled | 3.0 (1 - 5) n5 Labeled | | 1.0 (1 - 1) n2 Labeled | 2.0 (2 - 2) n2 Labeled |
| IRAC 4A | Safari 2G (Dinotefuran) | | 1.0 (1 - 1) n1 Labeled | | | |
| IRAC 4A | TriStar 30SG (Acetamiprid) | 5.0 (5 - 5) n1 Labeled | | | 1.0 (1 - 1) n1 Labeled | |
| IRAC 4A | TriStar 70WSP (Acetamiprid) | 5.0 (5 - 5) n3 Labeled | | | | 3.0 (3 - 3) n1 Labeled |
| IRAC 4A | TriStar 8.5SL (Acetamiprid) | | | | | |
| IRAC 4A + IRAC 28 | A16901B 45WG (Thiamethoxam + cyantraniliprole) | | | 4.0 (4 - 4) n1 Labeled | | |
| IRAC 4A + IRAC 3 | Aloft SC (Clothianadin + bifenthrin) | | | | | |
| IRAC 4A + IRAC 3A | Discus (Imidacloprid + cyfluthrin) | | | | | 3.0 (3 - 3) n2 Labeled |
| IRAC 4C | GF-2626 1SC (Sulfoxaflor) | | | 5.0 (5 - 5) n1 | | |
| IRAC 4D | Altus (Flupyradifurone) | | | | | |
| IRAC 5 + IRAC 4C | Xxpire 40WG (Spinetoram + sulfoxaflor) | | 3.0 (3 - 3) n1 Labeled | 5.0 (5 - 5) n1 Labeled | | |
| IRAC 7C | Distance (Pyriproxyfen) | 4.0 (4 - 4) n1 Labeled | 1.0 (1 - 1) n1 Labeled | 5.0 (5 - 5) n1 Labeled | | 1.0 (1 - 1) n1 Labeled |

| MOA | Product (Active Ingredients) | Florida Wax Scale (<i>Ceroplastes floridensis</i>) | Scale, Calico (<i>Eulecanium cerasorum</i>) | Scale, Magnolia (<i>Neolecanium cornuparvum</i>) | Cottony Maple Scale (<i>Neopulvinaria innumerabilis</i>) | Fletcher Scale (<i>Parthenolecanium fletcheri</i>) |
|----------------------|--|---|--|---|---|---|
| IRAC 7C + IRAC 4A | Tank Mix: Distance + TriStar (Pyriproxifen + acetamiprid) | | | | | |
| IRAC 9D | Ventigra Insecticide (Afidopyropen) | | | | | |
| IRAC UN | AzaGuard (Azadirachtin) | | | | | |
| IRAC UN | Rycar (Pyrifluquinazon) | | | | | |
| IRAC UN | Triact (Clarified hydrophobic extract of neem oil) | | | | | |
| IRAC UNE | QRD 452 (Extract of <i>Chenopodium ambrosioides</i>) | | | | | |
| IRAC UNE | TetraCURB Concentrate (Rosemary Oil) | | | | | |
| IRAC UNE | TetraCURB Organic (Rosemary Oil) | | | | | |
| IRAC UNF | Botanigard 22WP (<i>Beauveria bassiana</i> Strain GHA) | | | | | |
| IRAC UNF | Velifer (<i>Beauveria bassiana</i> Strain PPRI 5339) | | | | | |
| unknown | BW238 ES (BW238 ES) | | | | | |
| unknown | BW238 WP (BW238 WP) | | | | | |
| unknown | ISM-555 (ISM-555, A21377X) | | | | | |
| unknown | KOC22018-8 (Botanical Oil Blend) | | | | | |
| unknown | MBI 203 SC2 (MBI 203) | | | | | |
| unknown | RTSA 721 (RTSA 721) | | | 3.0 (3 - 3) n2 | | |
| unknown | SP3014 (SP3014) | | | | | |
| unknown | TetraCURB Max (castor oil + rosemary oil + clove oil + peppermint oil) | | | | | |
| unknown | V-10433 (V-10433) | | | | | |

Table 5 of 5. Cushion, Felt, Lac, Palm and Pit Scales

| MOA | Product (Active Ingredients) | Crape Myrtle Bark Scale (<i>Eriococcus lagerstroemia</i>) | Cottony Cushion Scale (<i>Icerya purchasi</i>) | Scale, Holly Pit (<i>Asterolecanium puteanum</i>) | Lobate Lac Scale (<i>Paratachardina pseudolobata</i>) | Scale, Hala (<i>Thysanococcus pandani</i>) |
|--------------------|--|---|--|---|---|--|
| FRAC NC | BW133 (BW133) | 1.0 (1 - 1) n1 | | | | |
| FRAC NC | Horticultural Oil (Mineral oil) | | 2.0 (2 - 2) n1 | | | |
| FRAC NC | MOI 201 (MOI 201) | | | | | |
| FRAC NC | Paraffin Oil (Mineral oil) | | | | | |
| FRAC NC | Saf-T-Oil (Mineral oil) | | | | | |
| FRAC NC | SuffOil X (Synergy) (Mineral oil) | | | | | |
| FRAC NC | Sun Spray Ultra-Fine Spray Oil (Mineral oil) | | | | | |
| FRAC NC | Ultra Pure Oil (BASF) (Mineral oil) | | | | | |
| FRAC NC & IRAC UNB | Bountify (MBI 306) (<i>Burkholderia rinojensis</i> strain A396) | 1.0 (1 - 1) n2 | | | | |
| IRAC 16 | Talus 40SC (Buprofezin) | | | 1.0 (1 - 1) n1 Labeled | | |
| IRAC 16 | Talus 70DF (Buprofezin) | 2.0 (2 - 2) n1 Labeled | 3.0 (1 - 5) n4 Labeled | | 5.0 (5 - 5) n1 Labeled | 3.0 (3 - 3) n1 Labeled |
| IRAC 16 | Talus WP (Buprofezin) | | | | | |
| IRAC 1B | Acephate Pro 75 WSP (Acephate) | | | | | |
| IRAC 1B | Cygon 2E (Dimethoate) | | | | | |
| IRAC 1B | Diazinon 4E (Diazinon) | | | | | |
| IRAC 1B | Dursban Pro (Chlorpyrifos) | | | | | |
| IRAC 1B | Orthene TTO 97 (Valent) (Acephate) | | 3.0 (3 - 3) n2 Labeled | 1.0 (1 - 1) n1 Labeled | | |
| IRAC 23 | Judo 2SC (Spiromesifen) | | | | | |
| IRAC 23 | Kontos 240SC (Spirotetramat) | | 3.7 (1 - 5) n3 Labeled | | | |
| IRAC 28 | Acelepryn (Dupont) (Chlorantraniliprole) | | | | | |
| IRAC 28 | DPX-HGW86 (Cyantraniliprole) | | | | | |
| IRAC 28 | Mainspring GNL 200SC (Cyantraniliprole) | | | | | |
| IRAC 28 | Sarisa 50SL (Cyclaniliprole) | | | | 4.0 (4 - 4) n1 | 1.0 (1 - 1) n1 |
| IRAC 28 + IRAC 29 | Pradia (Cyclaniliprole + Flonicamid) | | | | 3.0 (3 - 3) n1 | 1.0 (1 - 1) n1 |
| IRAC 3A | Onyx (Bifenthrin) | | | | | |

| MOA | Product (Active Ingredients) | Crape Myrtle Bark Scale (<i>Eriococcus lagerstroemia</i>) | Cottony Cushion Scale (<i>Icerya purchasi</i>) | Scale, Holly Pit (<i>Asterolecanium puteanum</i>) | Lobate Lac Scale (<i>Paratachardina pseudolobata</i>) | Scale, Hala (<i>Thysanococcus pandani</i>) |
|----------------------|---|---|--|---|---|--|
| IRAC 3A | Talstar Flowable Insecticide/Miticide (Bifenthrin) | | | | | |
| IRAC 4A | Arena 50WDG (Clothianadin) | | | | | |
| IRAC 4A | Celero 16WSG (Clothianadin) | | 1.0 (1 - 1) n1 <i>Labeled</i> | | | |
| IRAC 4A | Flagship 0.22G (Thiamethoxam) | | 3.3 (1 - 5) n4 | | | |
| IRAC 4A | Flagship 25WG (Thiamethoxam) | | 4.5 (4 - 5) n2 <i>Labeled</i> | 1.0 (1 - 1) n1 <i>Labeled</i> | | |
| IRAC 4A | Marathon II (Imidacloprid) | | | | 5.0 (5 - 5) n1 <i>Labeled</i> | |
| IRAC 4A | Merit 75WP (Imidacloprid) | | | | | |
| IRAC 4A | Safari 20SG (Dinotefuran) | 2.0 (2 - 2) n1 <i>Labeled</i> | 3.0 (1 - 5) n4 <i>Labeled</i> | 1.0 (1 - 1) n1 <i>Labeled</i> | | |
| IRAC 4A | Safari 2G (Dinotefuran) | | 5.0 (5 - 5) n2 <i>Labeled</i> | 1.0 (1 - 1) n1 <i>Labeled</i> | | |
| IRAC 4A | TriStar 30SG (Acetamiprid) | | 5.0 (5 - 5) n2 <i>Labeled</i> | 1.0 (1 - 1) n1 <i>Labeled</i> | | |
| IRAC 4A | TriStar 70WSP (Acetamiprid) | | 3.0 (3 - 3) n1 <i>Labeled</i> | | | |
| IRAC 4A | TriStar 8.5SL (Acetamiprid) | | | | | |
| IRAC 4A + IRAC 28 | A16901B 45WG (Thiamethoxam + cyantraniliprole) | | 2.0 (1 - 5) n4 <i>Labeled</i> | | | |
| IRAC 4A + IRAC 3 | Aloft SC (Clothianadin + bifenthrin) | | | 1.0 (1 - 1) n1 <i>Labeled</i> | | |
| IRAC 4A + IRAC 3A | Discus (Imidacloprid + cyfluthrin) | | | | | |
| IRAC 4C | GF-2626 1SC (Sulfoxaflor) | | 2.0 (1 - 3) n2 | | | |
| IRAC 4D | Altus (Flupyradifurone) | 2.0 (2 - 2) n1 <i>Labeled</i> | | | 5.0 (5 - 5) n1 <i>Labeled</i> | 3.0 (3 - 3) n1 <i>Labeled</i> |
| IRAC 5 + IRAC 4C | Xxpire 40WG (Spinetoram + sulfoxaflor) | | 3.0 (1 - 5) n2 <i>Labeled</i> | | | |
| IRAC 7C | Distance (Pyriproxyfen) | 2.0 (2 - 2) n1 <i>Labeled</i> | 3.0 (1 - 5) n4 <i>Labeled</i> | 1.0 (1 - 1) n1 <i>Labeled</i> | | |
| IRAC 7C + IRAC 4A | Tank Mix: Distance + TriStar (Pyriproxifen + acetamiprid) | | | | | |

| MOA | Product (Active Ingredients) | Crape Myrtle Bark Scale (<i>Eriococcus lagerstroemia</i>) | Cottony Cushion Scale (<i>Icerya purchasi</i>) | Scale, Holly Pit (<i>Asterolecanium puteanum</i>) | Lobate Lac Scale (<i>Paratachardina pseudolobata</i>) | Scale, Hala (<i>Thysanococcus pandani</i>) |
|----------|--|---|--|---|---|--|
| IRAC 9D | Ventigra Insecticide (Afidopyropen) | | | | 5.0 (5 - 5) n1 Labeled | 2.0 (2 - 2) n1 Labeled |
| IRAC UN | AzaGuard (Azadirachtin) | | | | 1.0 (1 - 1) n1 | 1.0 (1 - 1) n1 |
| IRAC UN | Rycar (Pyrifluquinazon) | | 5.0 (5 - 5) n2 | 1.0 (1 - 1) n1 | | |
| IRAC UN | Triact (Clarified hydrophobic extract of neem oil) | | | | | |
| IRAC UNE | QRD 452 (Extract of <i>Chenopodium ambrosioides</i>) | | | | | |
| IRAC UNE | TetraCURB Concentrate (Rosemary Oil) | | | | | 2.0 (2 - 2) n1 |
| IRAC UNE | TetraCURB Organic (Rosemary Oil) | | | | | 1.0 (1 - 1) n1 |
| IRAC UNF | Botanigard 22WP (<i>Beauveria bassiana</i> Strain GHA) | | | | | |
| IRAC UNF | Velifer (<i>Beauveria bassiana</i> Strain PPRI 5339) | | | | | |
| unknown | BW238 ES (BW238 ES) | 1.0 (1 - 1) n1 | | | | |
| unknown | BW238 WP (BW238 WP) | 1.0 (1 - 1) n1 | | | | |
| unknown | ISM-555 (ISM-555, A21377X) | 5.0 (5 - 5) n2 | | | | |
| unknown | KOC22018-8 (Botanical Oil Blend) | | | | | 2.0 (2 - 2) n1 |
| unknown | MBI 203 SC2 (MBI 203) | 2.5 (1 - 4) n2 | | | | |
| unknown | RTSA 721 (RTSA 721) | 5.0 (5 - 5) n2 | | | | |
| unknown | SP3014 (SP3014) | 2.0 (1 - 3) n2 | | | | |
| unknown | TetraCURB Max (castor oil + rosemary oil + clove oil + peppermint oil) | | | | | |
| unknown | V-10433 (V-10433) | 1.0 (1 - 1) n2 | | | | |