Management of Insects and Mites in Tree Nurseries

Eric J. Rebek
Extension Entomologist

Insect and mite pests of nursery crops present unique challenges and opportunities with respect to their management and control. Nurseries produce a wide variety of ornamental plants, ranging from trees to bedding plants, annuals to perennials, and both woody and herbaceous crops. This diversity and high density of plants requires varied and often conflicting horticultural practices, and creates an environment that supports a larger number of arthropod species than is encountered in less diverse cropping systems. Many of these arthropods are pests, kept under control by beneficial arthropods such as predators and parasitoids (i.e., natural enemies). However, natural enemies are susceptible to broad-spectrum pesticides applied during nursery production. Thus, effective alternatives to chemical control should be incorporated into production systems, reducing negative impacts on natural enemies, pollinators, and other beneficial arthropods.

Integrated Pest Management (IPM) is a sustainable approach to managing pests that combines biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks. Many pest populations in nurseries can be reduced by implementing and following a comprehensive IPM plan. At a minimum, such a plan should include the following:

- Correct identification of arthropod pests and their associated plant damage
- Regular monitoring and scouting for pests, documented with accurate recordkeeping
- Inspection and, when necessary, quarantine of incoming nursery stock
- Maintaining health and vigor of nursery stock

Pesticides can be part of a comprehensive IPM plan, but pesticide use should not substitute for good horticultural practices or be used as ‘preventative insurance’ against pests. Such practices are rarely justifiable economically, and provide a recipe for the selection and proliferation of pests that are resistant to pesticides. Overreliance on chemical control may lead to rapid resurgence of pest populations as key natural enemies are eliminated following exposure to pesticides. Pesticides should be applied using specified application methods and equipment to ensure optimal control and safety. Follow ALL label directions and adhere to Worker Protection Standards and special precautions including protection of pollinators, aquatic organisms, and other non-target species. Pesticide recommendations in this publication are current as of the “Modified Date.”
<table>
<thead>
<tr>
<th>Pest</th>
<th>Common Name</th>
<th>Pesticide Trade Name</th>
<th>Pesticide Class*</th>
<th>REI**</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Baits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Includes red imported fire ants and harvester ants.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Abamectin</td>
<td>Award II Fire Ant Bait</td>
<td>6</td>
<td>See label</td>
<td>Baits may be applied as a broadcast or perimeter treatment around individual mounds. Apply when ants are foraging.</td>
</tr>
<tr>
<td></td>
<td>Fipronil</td>
<td>Chipco Choice or Quali-Pro Fipronil 0.0143G†</td>
<td>2B</td>
<td>24</td>
<td>Check registration for specific site uses. Some bait products are not registered for nurseries.</td>
</tr>
<tr>
<td></td>
<td>Hydramethylnon</td>
<td>Amdro Pro Fire Ant Killer</td>
<td>20A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pyriproxyfen</td>
<td>Distance Fire Ant Bait</td>
<td>7C</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-Methoprene</td>
<td>Extinguish Professional Fire Ant Bait</td>
<td>7A</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-Methoprene + Hydramethylnon</td>
<td>Extinguish Plus</td>
<td>7A + 20A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spinosad</td>
<td>Conserve Professional Fire Ant Bait</td>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Sprays and Granulars</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bifenthrin</td>
<td>Talstar†</td>
<td>3A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
<td>Observe phytotoxicity precautions. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
<tr>
<td></td>
<td>Cyfluthrin + Imidacloprid</td>
<td>Discus N/G</td>
<td>3A + 4A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lambda-cyhalothrin</td>
<td>Scimitar GC†</td>
<td>3A</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Permethrin</td>
<td>Astro</td>
<td>3A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APHIDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Abamectin</td>
<td>Avid 0.15 EC or Minx 2</td>
<td>6</td>
<td>12/12</td>
<td>Provides suppression only; do not use on roses, chrysanthemums, and gerbera.</td>
</tr>
<tr>
<td></td>
<td>Acephate</td>
<td>Orthene T, T&amp;O WSP</td>
<td>1B</td>
<td>24</td>
<td>Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Acetamiprid</td>
<td>Tristar 8.5 SL</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray. Use non-ionic spreader-sticker adjuvant, but observe phytotoxicity precautions associated with surfactant.</td>
</tr>
<tr>
<td></td>
<td>Azadirachtin</td>
<td>Azatin XL or Molt-X</td>
<td>UN</td>
<td>4/4</td>
<td>Use for suppression and adult feeding deterrence.</td>
</tr>
<tr>
<td></td>
<td>Bifenazate + Abamectin</td>
<td>Sirocco</td>
<td>UN + 6</td>
<td>12</td>
<td>Provides suppression only.</td>
</tr>
<tr>
<td></td>
<td>Bifenthrin</td>
<td>OnyxPro†</td>
<td>3A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
<td>Observe phytotoxicity precautions. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
</tbody>
</table>
**APHIDS (cont'd)**

<table>
<thead>
<tr>
<th>Pest Common Name</th>
<th>Pesticide Trade Name</th>
<th>Pesticide Class*</th>
<th>REI**</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aphids generally attack the tender terminals and leaves. Leaves may twist and curl and become distorted. Small infestations can often be washed off plants with strong water pressure (stream of water).</td>
<td>Cyfluthrin Decathlon 20 WP</td>
<td>3A</td>
<td>12</td>
<td>Provide phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Diazinon Diazinon 50 W†</td>
<td>1B</td>
<td>2-7 days</td>
<td>Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Dimethoate Dimethoate 4 E</td>
<td>1B</td>
<td>10–14 days</td>
<td>Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Dinotefuran Safari 20 SG</td>
<td>4A</td>
<td>12</td>
<td>Provides suppression only. Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
<tr>
<td></td>
<td>Fenpropathrin Tame 2.4 EC‡</td>
<td>3A</td>
<td>24</td>
<td>Must be tank mixed with Orthene T, T&amp;O WSP.</td>
</tr>
<tr>
<td></td>
<td>Imidacloprid Marathon II</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom. Do not apply to linden, basswood, or other Tilia spp.</td>
</tr>
<tr>
<td></td>
<td>Insecticidal soap M-Pede or Kopa</td>
<td>NS</td>
<td>12/12</td>
<td>Short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently.</td>
</tr>
<tr>
<td></td>
<td>Lambda-cyhalothrin Scimitar GC†</td>
<td>3A</td>
<td>24</td>
<td>For use in Christmas tree plantations only.</td>
</tr>
<tr>
<td></td>
<td>Malathion Fyfanon</td>
<td>1B</td>
<td>24</td>
<td>Short residual activity. Avoid applying at frequent intervals.</td>
</tr>
<tr>
<td></td>
<td>Mineral oil Ultra-Pure Oil or SuffOil-X</td>
<td>HO</td>
<td>4/4</td>
<td>Do not apply when buds are fully open and shoots are elongating. Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Paraffinic oil Sunspray Ultra Fine Oil</td>
<td>HO</td>
<td>4</td>
<td>Do not apply when buds are fully open and shoots are elongating. Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Permethrin Astro</td>
<td>3A</td>
<td>12</td>
<td>Has systemic activity. Prevents insects from feeding by blocking mouthparts.</td>
</tr>
<tr>
<td></td>
<td>Pymetrozine Endeavor</td>
<td>9B</td>
<td>12</td>
<td>Use for suppression only. Does not control adults.</td>
</tr>
<tr>
<td></td>
<td>Pyriproxyfen Distance or Fulcrum</td>
<td>7C</td>
<td>12/12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
<tr>
<td></td>
<td>Sulfoxaflor + Spinetoram XXpire WG</td>
<td>4C + 5</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
<tr>
<td></td>
<td>Thiamethoxam Flagship 25 WG</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Use as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
</tbody>
</table>

**BAGWORM**

<table>
<thead>
<tr>
<th>Pest Common Name</th>
<th>Pesticide Trade Name</th>
<th>Pesticide Class*</th>
<th>REI**</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acephate</td>
<td>Orthene T, T&amp;O WSP</td>
<td>1B</td>
<td>24</td>
<td>Insect must consume material. Most effective against young bagworms.</td>
</tr>
<tr>
<td>Azadirachtin</td>
<td>Azatin XL or Molt-X</td>
<td>UN</td>
<td>4/4</td>
<td>Insect must consume material. Most effective against young bagworms.</td>
</tr>
<tr>
<td>Bacillus thuringiensis subsp. kurstaki Dipel Pro DF</td>
<td>11A</td>
<td>4</td>
<td>Insect must consume material. Most effective against young bagworms.</td>
<td></td>
</tr>
<tr>
<td>Bifenthrin OnyxPro†</td>
<td>3A</td>
<td>12</td>
<td>Insect must consume material. Most effective against young bagworms.</td>
<td></td>
</tr>
<tr>
<td>Carbaryl Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
<td>Insect must consume material. Most effective against young bagworms.</td>
<td></td>
</tr>
<tr>
<td>Cyfluthrin Decathlon 20 WP</td>
<td>3A</td>
<td>12</td>
<td>Insect must consume material. Most effective against young bagworms.</td>
<td></td>
</tr>
<tr>
<td>Diazinon Diazinon 50 W†</td>
<td>1B</td>
<td>2-7 days</td>
<td>Observe phytotoxicity precautions.</td>
<td></td>
</tr>
</tbody>
</table>

CR-7092.3
**BAGWORM (cont’d)**

Small infestations can be removed by hand in winter before larvae emerge in May, but be sure to destroy all bags.

- **Dimethoate**
  - Pesticide: Dimethoate 4 E
  - REI: 1B
  - Days: 10-14 days
  - Comments: Observe phytotoxicity precautions.

- **Lambda-cyhalothrin**
  - Pesticide: Scimitar GC†
  - REI: 3A
  - Days: 24

- **Malathion**
  - Pesticide: Fyfanon
  - REI: 1B
  - Days: 24
  - Comments: For use in Christmas tree plantations only.

- **Permethrin**
  - Pesticide: Astro
  - REI: 3A
  - Days: 12

- **Spinosad**
  - Pesticide: Conserve SC or Entrust SC
  - REI: 5
  - Days: 4/4
  - Comments: Apply when bagworms are small and actively feeding.

- **Sulfoxaflor + Spinetoram**
  - Pesticide: XXpire WG
  - REI: 4C + 5
  - Days: 12

**BORERS**

- **Bifenthrin**
  - Pesticide: OnyxPro†
  - REI: 3A
  - Days: 12
  - Comments: Apply to lower branches and trunk when adults begin to emerge.

- **Carbaryl**
  - Pesticide: Sevin SL Carbaryl Insecticide
  - REI: 1A
  - Days: 12
  - Comments: Observe phytotoxicity precautions. BEE CAUTION: Do not apply to plants in bloom.

- **Chlorpyrifos**
  - Pesticide: Dursban 50 W†
  - REI: 1B
  - Days: 24
  - Comments: Apply to lower branches and trunk when adults begin to emerge.

- **Dinotefuran**
  - Pesticide: Safari 20 SG
  - REI: 4A
  - Days: 12
  - Comments: Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.

- **Imidacloprid**
  - Pesticide: Marathon II
  - REI: 4A
  - Days: 12
  - Comments: Systemic insecticide. Apply as a soil drench. BEE CAUTION: Do not apply to plants in bloom. Do not apply to linden, basswood, or other *Tilia* spp.

- **Permethrin**
  - Pesticide: Astro
  - REI: 3A
  - Days: 12
  - Comments: Apply to lower branches and trunk when adults begin to emerge.

**BOXELD bug and RED-SHOULDERED bug**

- **Acephate**
  - Pesticide: Orthene T, T&O WSP
  - REI: 1B
  - Days: 24
  - Comments: Observe phytotoxicity precautions.

- **Carbaryl**
  - Pesticide: Sevin SL Carbaryl Insecticide
  - REI: 1A
  - Days: 12
  - Comments: Observe phytotoxicity precautions. BEE CAUTION: Do not apply to plants in bloom.

- **Cyfluthrin**
  - Pesticide: Decathlon 20 WP
  - REI: 3A
  - Days: 12

- **Lambda-cyhalothrin**
  - Pesticide: Scimitar GC†
  - REI: 3A
  - Days: 24

- **Permethrin**
  - Pesticide: Astro
  - REI: 3A
  - Days: 12

Measure 1/2 to 1 3/4 inches long.

Feed on seeds of boxelder, golden raintree, and soapberry, but don’t injure the tree.

For best results, spray in early summer when young nymphs are present.
<table>
<thead>
<tr>
<th>Pest Common Name</th>
<th>Pesticide Trade Name</th>
<th>Pesticide Class</th>
<th>REI**</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATERPILLARS</td>
<td>Acephate</td>
<td>Orthene T, T&amp;O WSP</td>
<td>1B</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Acetamiprid</td>
<td>Tristar 8.5 SL</td>
<td>4A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Azadirachtin</td>
<td>Azatin XL or Molt-X</td>
<td>UN</td>
<td>4/4</td>
</tr>
<tr>
<td></td>
<td><em>Bacillus thuringiensis</em> subsp. <em>kurstaki</em></td>
<td>Dipel Pro DF</td>
<td>11A</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Measure 1/2 to 2 inches long.</td>
<td>Bifenthrin</td>
<td>OnyxPro†</td>
<td>3A</td>
</tr>
<tr>
<td></td>
<td>Active spring through fall.</td>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
</tr>
<tr>
<td></td>
<td>Larvae feed on foliage. Some species roll and tie leaves with silk and some build webs or tents around foliage or in crotches of limbs.</td>
<td>Cyfluthrin</td>
<td>Decathlon 20 WP</td>
<td>3A</td>
</tr>
<tr>
<td></td>
<td>Diazinon</td>
<td>Diazinon 50 W†</td>
<td>1B</td>
<td>2-7 days</td>
</tr>
<tr>
<td></td>
<td>Insecticidal soap</td>
<td>M-Pede or Kopa</td>
<td>NS</td>
<td>12/12</td>
</tr>
<tr>
<td></td>
<td>Lambda-cyhalothrin</td>
<td>Scimitar GC†</td>
<td>3A</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Mineral oil</td>
<td>Ultra-Pure Oil or SuffOil-X</td>
<td>HO</td>
<td>4/4</td>
</tr>
<tr>
<td></td>
<td>Novaluron</td>
<td>Pedestal</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Paraffinic oil</td>
<td>Sunspray Ultra Fine Oil</td>
<td>HO</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Permethrin</td>
<td>Astro</td>
<td>3A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Spinosad</td>
<td>Conserve SC or Entrust SC</td>
<td>5</td>
<td>4/4</td>
</tr>
<tr>
<td></td>
<td>Sufloxaflor + Spinetoram</td>
<td>XXpire WG</td>
<td>4C + 5</td>
<td>12</td>
</tr>
<tr>
<td>ELM LEAF BEETLES</td>
<td>Acephate</td>
<td>Orthene T, T&amp;O WSP</td>
<td>1B</td>
<td>24</td>
</tr>
<tr>
<td>WILLOW LEAF BEETLES, and ELM CALLIGRAPHA BEETLES</td>
<td>Bifenthrin</td>
<td>OnyxPro†</td>
<td>3A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Cyfluthrin</td>
<td>Decathlon 20 WP</td>
<td>3A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Dinofeturan</td>
<td>Safari 20 SG</td>
<td>4A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>These leaf-feeding beetles are active late spring to late summer. Both adults and larvae feed on foliage, but larvae cause the most damage by skeletonizing the leaves.</td>
<td>Imidacloprid</td>
<td>Marathon II</td>
<td>4A</td>
</tr>
<tr>
<td></td>
<td>Lambda-cyhalothrin</td>
<td>Scimitar GC†</td>
<td>3A</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Spinosad</td>
<td>Conserve SC or Entrust SC</td>
<td>5</td>
<td>4/4</td>
</tr>
<tr>
<td></td>
<td>Sufloxaflor + Spinetoram</td>
<td>XXpire WG</td>
<td>4C + 5</td>
<td>12</td>
</tr>
<tr>
<td>Pest</td>
<td>Pesticide Common Name</td>
<td>Pesticide Trade Name</td>
<td>Pesticide Class*</td>
<td>REI**</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------</td>
<td>----------------------</td>
<td>------------------</td>
<td>-------</td>
</tr>
<tr>
<td>JAPANESE BEETLES and MAY/JUNE BEETLES</td>
<td>Acephate</td>
<td>Orthene T, T&amp;O WSP</td>
<td>1B</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Acetamiprid</td>
<td>Tristar 8.5 SL</td>
<td>4A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Bifenthrin</td>
<td>OnyxPro†</td>
<td>3A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Cyfluthrin</td>
<td>Decathlon 20 WP</td>
<td>3A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Dinotefuran</td>
<td>Safari 20 SG</td>
<td>4A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Fenpropathrin</td>
<td>Tame 2.4 EC†</td>
<td>3A</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Imidacloprid</td>
<td>Marathon II</td>
<td>4A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Japanese beetles are serious pests, feeding on foliage, fruits, and flowers of many landscape plants.</td>
<td>Lambda-cyhalothrin</td>
<td>Scimitar GC†</td>
<td>3A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permethrin</td>
<td>Astro</td>
<td>3A</td>
</tr>
<tr>
<td>LACE BUGS</td>
<td>Acephate</td>
<td>Orthene T, T&amp;O WSP</td>
<td>1B</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Bifenthrin</td>
<td>OnyxPro†</td>
<td>3A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Cyfluthrin</td>
<td>Decathlon 20 WP</td>
<td>3A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Dimethoate</td>
<td>Dimethoate 4 E</td>
<td>1B</td>
<td>10-14 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dinotefuran</td>
<td>Safari 20 SG</td>
<td>4A</td>
</tr>
<tr>
<td></td>
<td>Fenpropathrin</td>
<td>Tame 2.4 EC†</td>
<td>3A</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Imidacloprid</td>
<td>Marathon II</td>
<td>4A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Small infestations can be washed off plants/foliage with strong water pressure (stream of water).</td>
<td>Lambda-cyhalothrin</td>
<td>Scimitar GC†</td>
<td>3A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paraffinic oil</td>
<td>Sunspray Ultra Fine Oil</td>
<td>HO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permethrin</td>
<td>Astro</td>
<td>3A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sulfoxaflor + Spinetoram</td>
<td>XXpire WG</td>
<td>4C + 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thiamethoxam</td>
<td>Flagship 25 WG</td>
<td>4A</td>
</tr>
</tbody>
</table>

CR-7092.6
<table>
<thead>
<tr>
<th>Pest</th>
<th>Pesticide Common Name</th>
<th>Pesticide Trade Name</th>
<th>Pesticide Class*</th>
<th>REI**</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAFMINERS and NEEDLEMINERS</td>
<td>Abamectin</td>
<td>Avid 0.15 EC or Minx 2</td>
<td>6</td>
<td>12/12</td>
<td>Repeat at 7-day intervals or as necessary to maintain control.</td>
</tr>
<tr>
<td></td>
<td>Acephate</td>
<td>Orthene T, T&amp;O WSP</td>
<td>1B</td>
<td>12</td>
<td>Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Acetamiprid</td>
<td>Tristar 8.5 SL</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray.</td>
</tr>
<tr>
<td></td>
<td>Azadirachtin</td>
<td>Azatin XL or Molt-X</td>
<td>UN</td>
<td>4/4</td>
<td>Foliar application for control of larvae. Use with paraffinic oil.</td>
</tr>
<tr>
<td></td>
<td>Larvae measure 1/8 to 1/4 inch long.</td>
<td>Bifenazate + Abamectin</td>
<td>Sirocco</td>
<td>UN + 6</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Leafminers are the tiny larvae of several moth, fly, and sawfly species that feed between the upper and lower leaf surfaces.</td>
<td>Bifenthrin</td>
<td>OnyxPro†</td>
<td>3A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Active spring through summer.</td>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Seldom cause extensive damage. Prune and burn twigs or leaves when possible.</td>
<td>Diazinon</td>
<td>Diazinon 50 W†</td>
<td>1B</td>
<td>2-7 days</td>
</tr>
<tr>
<td></td>
<td>Dimethoate</td>
<td>Dimethoate 4 E</td>
<td>1B</td>
<td>10-14 days</td>
<td>Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Dinotefuran</td>
<td>Safari 20 SG</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
<tr>
<td></td>
<td>Fenpropathrin</td>
<td>Tame 2.4 EC†</td>
<td>3A</td>
<td>24</td>
<td>May be tank mixed with Orthene T, T&amp;OWSP.</td>
</tr>
<tr>
<td></td>
<td>Imidacloprid</td>
<td>Marathon II</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
<tr>
<td></td>
<td>Insecticidal soap</td>
<td>M-Pede or Kopa</td>
<td>NS</td>
<td>12/12</td>
<td>Short residual activity. Avoid applying too frequently.</td>
</tr>
<tr>
<td></td>
<td>Lambda-cyhalothrin</td>
<td>Scimitar GC†</td>
<td>3A</td>
<td>24</td>
<td>Controls adults only.</td>
</tr>
<tr>
<td></td>
<td>Malathion</td>
<td>Fyfanon</td>
<td>1B</td>
<td>24</td>
<td>For use in Christmas tree plantations only.</td>
</tr>
<tr>
<td></td>
<td>Mineral oil</td>
<td>Ultra-Pure Oil or SuffOil-X</td>
<td>HO</td>
<td>4/4</td>
<td>Short residual activity. Avoid applying too frequently.</td>
</tr>
<tr>
<td></td>
<td>Novaluron</td>
<td>Pedestal</td>
<td>15</td>
<td>12</td>
<td>Use for suppression only.</td>
</tr>
<tr>
<td></td>
<td>Paraffinic oil</td>
<td>Sunspray Ultra Fine Oil</td>
<td>UN</td>
<td>4</td>
<td>Observe phytotoxicity precautions. Use with azadirachtin.</td>
</tr>
<tr>
<td></td>
<td>Permethrin</td>
<td>Astro</td>
<td>3A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pyriproxyfen</td>
<td>Distance or Fulcrum</td>
<td>7C</td>
<td>12/12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spinosad</td>
<td>Conserve SC or Entrust SC</td>
<td>5</td>
<td>4/4</td>
<td>Apply when stippling or mining first appear. Three sequential applications at 7-day intervals can maximize control of leaf-mining flies.</td>
</tr>
</tbody>
</table>

CR-7092.7
<table>
<thead>
<tr>
<th>Pest</th>
<th>Pesticide Common Name</th>
<th>Pesticide Trade Name</th>
<th>Pesticide Class*</th>
<th>REI**</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>MITES</td>
<td>Abamectin</td>
<td>Avid 0.15 EC or Minx 2</td>
<td>6</td>
<td>12/12</td>
<td>Allow a minimum of 14 days between applications.</td>
</tr>
<tr>
<td></td>
<td>Acequinocyl</td>
<td>Shuttle O</td>
<td>20B</td>
<td>12</td>
<td>Not effective against rust mites, broad mites, nor flat mites.</td>
</tr>
<tr>
<td></td>
<td>Bifenazate</td>
<td>Floramite SC</td>
<td>UN</td>
<td>12</td>
<td>Do not make more than two applications per year.</td>
</tr>
<tr>
<td></td>
<td>Bifenazate + Abamectin</td>
<td>Sirocco</td>
<td>UN + 6</td>
<td>12</td>
<td>Not effective against rust mites, broad mites, cyclamen mites, flat mites, nor rust mites.</td>
</tr>
<tr>
<td></td>
<td>Bifenthrin</td>
<td>OnyxPro†</td>
<td>3A</td>
<td>12</td>
<td>Apply only once per cropping cycle.</td>
</tr>
<tr>
<td></td>
<td>Clofentezine</td>
<td>Ovation SC</td>
<td>10A</td>
<td>12</td>
<td>Activity predominantly against eggs and immature mites.</td>
</tr>
<tr>
<td></td>
<td>Cyflumetofen</td>
<td>Sultan</td>
<td>25</td>
<td>12</td>
<td>Short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently.</td>
</tr>
<tr>
<td></td>
<td>Etoxazole</td>
<td>TetraSan 5 WDG</td>
<td>10B</td>
<td>12</td>
<td>For use in Christmas tree plantations only.</td>
</tr>
<tr>
<td></td>
<td>Fenbutatin-oxide</td>
<td>Vendra 50 WP† or Meraz Miticide WSP</td>
<td>12B</td>
<td>48/48</td>
<td>Do not tank mix with paraffinic oil.</td>
</tr>
<tr>
<td></td>
<td>Fenpropathrin</td>
<td>Tame 2.4 EC†</td>
<td>3A</td>
<td>24</td>
<td>Activity predominantly against eggs and immature mites.</td>
</tr>
<tr>
<td></td>
<td>Hexythiazox</td>
<td>Hexyon DF</td>
<td>10A</td>
<td>12</td>
<td>Short residual activity. Avoid applying too frequently.</td>
</tr>
<tr>
<td></td>
<td>Insecticidal soap</td>
<td>M-Pede or Kopa</td>
<td>NS</td>
<td>12/12</td>
<td>Do not apply when buds are fully open and shoots are elongating. Avoid phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Lambda-cyhalothrin</td>
<td>Scimitar GC†</td>
<td>3A</td>
<td>24</td>
<td>For use in Christmas tree plantations only.</td>
</tr>
<tr>
<td></td>
<td>Malathion</td>
<td>Fyfanon</td>
<td>1B</td>
<td>24</td>
<td>For use in Christmas tree plantations only. Avoid applying too frequently.</td>
</tr>
<tr>
<td></td>
<td>Mineral oil</td>
<td>Ultra-Pure Oil or SuffOil-X</td>
<td>HO</td>
<td>4/4</td>
<td>Do not apply when buds are fully open and shoots are elongating. Avoid phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Paraffinic oil</td>
<td>Sunspray Ultra Fine Oil</td>
<td>HO</td>
<td>4</td>
<td>Do not apply when buds are fully open and shoots are elongating. Avoid phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Propargite</td>
<td>Omite 30 WS†</td>
<td>12C</td>
<td>14 days</td>
<td>Do not tank mix with petroleum-based oils.</td>
</tr>
<tr>
<td></td>
<td>Pyridaben</td>
<td>Sanmite</td>
<td>21A</td>
<td>12</td>
<td>Do not tank mix with petroleum-based oils.</td>
</tr>
<tr>
<td></td>
<td>Spinosad</td>
<td>Conserve SC or Entrust SC</td>
<td>5</td>
<td>4/4</td>
<td>Apply when spider mites first appear prior to webbing.</td>
</tr>
<tr>
<td></td>
<td>Spirodiclofen</td>
<td>Envidor 2 SC</td>
<td>23</td>
<td>24</td>
<td>For use in Christmas tree plantations only. Apply only once per season.</td>
</tr>
<tr>
<td></td>
<td>Sulfoxaflor + Spinetoram</td>
<td>XXpore WG</td>
<td>4C + 5</td>
<td>12</td>
<td>Provides suppression of spider mites only.</td>
</tr>
</tbody>
</table>
PINE TIP MOTHS

Larvae measure 1/2 inch long. Active March to September.

- Larvae bore into buds trunk, stems, and twigs. Most species of 2- and 3-needle pines are subject to attack; however, slash, Austrian, and long-leaf pines are somewhat resistant. Infested shoots usually turn yellow and later, red and brown. Dead, hollowed-out buds and twigs are usually present.
- Females emerge and lay eggs from late March through late May. Larvae must be controlled before they bore into plant.

For best protection with sprays, apply at 20-day intervals from late March through the end of June.

For more information, see EPP-7645: Nantucket Pine Tip Moth.

<table>
<thead>
<tr>
<th>Pest</th>
<th>Pesticide Common Name</th>
<th>Pesticide Trade Name</th>
<th>Pesticide Class*</th>
<th>REI**</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PINE TIP MOTHS</td>
<td>Acephate</td>
<td>Orthene T, T&amp;O WSP</td>
<td>1B</td>
<td>12</td>
<td>Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Bifenthrin</td>
<td>OnyxPro†</td>
<td>3A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cyfluthrin</td>
<td>Decathlon 20 WP</td>
<td>3A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dimethoate</td>
<td>Dimethoate 4 E</td>
<td>1B</td>
<td>10-14 days</td>
<td>Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Imidacloprid</td>
<td>Marathon II</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench.</td>
</tr>
<tr>
<td></td>
<td>Lambda-cyhalothrin</td>
<td>Scimitar GC†</td>
<td>3A</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Permethrin</td>
<td>Astro</td>
<td>3A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pyridalyl</td>
<td>Overture 35 WP</td>
<td>UN</td>
<td>12</td>
<td>For use on trees or shrubs in enclosed production facilities only.</td>
</tr>
<tr>
<td></td>
<td>Spinosad</td>
<td>Conserve SC or Entrust SC</td>
<td>5</td>
<td>4/4</td>
<td>Apply when young larvae first appear.</td>
</tr>
</tbody>
</table>

Use pheromone traps to time insecticide applications. Applications should be made 10 to 14 days after moth flight begins. Multiple applications are usually needed.

PLANT GALLS

Plant galls on branches can be removed by pruning and destroying the gall-infested material.

Plant galls are usually a cosmetic problem and difficult to control with insecticides. Timing of application is critical.

For more information, see EPP-7168: Plant Galls Caused by Insects and Mites.

<table>
<thead>
<tr>
<th>Pest</th>
<th>Pesticide Common Name</th>
<th>Pesticide Trade Name</th>
<th>Pesticide Class*</th>
<th>REI**</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLANT GALLS</td>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
<td>Observe phytotoxicity precautions. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
<tr>
<td></td>
<td>Dimethoate</td>
<td>Dimethoate 4 E</td>
<td>1B</td>
<td>10-14 days</td>
<td>Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Spinosad</td>
<td>Conserve SC or Entrust SC</td>
<td>5</td>
<td>4/4</td>
<td>For use against dipterous (fly) gall midges only.</td>
</tr>
<tr>
<td></td>
<td>Thiamethoxam</td>
<td>Flagship 25 WG</td>
<td>4A</td>
<td>12</td>
<td>Apply during egg laying. Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
<tr>
<td>Pest Common Name</td>
<td>Trade Name</td>
<td>Class*</td>
<td>REI**</td>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
<td>--------</td>
<td>-------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>SCALES and MEALYBUGS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acephate</td>
<td>Orthene T, T&amp;O WSP</td>
<td>1B</td>
<td>12</td>
<td>Observe phytotoxicity precautions.</td>
<td></td>
</tr>
<tr>
<td>Acetamiprid</td>
<td>Tristar 8.5 SL</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray.</td>
<td></td>
</tr>
<tr>
<td>Bifenthrin</td>
<td>OnyxPro†</td>
<td>3A</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
<td>Observe phytotoxicity precautions. BEE CAUTION: Do not apply to plants in bloom.</td>
<td></td>
</tr>
<tr>
<td>Active during growing season.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyfluthrin</td>
<td>Decathlon 20 WP</td>
<td>3A</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft scales and mealybugs produce honeydew while armored scales do not.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diazinon</td>
<td>Diazinon 50 W†</td>
<td>1B</td>
<td>2-7 days</td>
<td>Observe phytotoxicity precautions.</td>
<td></td>
</tr>
<tr>
<td>Dimethoate</td>
<td>Dimethoate 4 E</td>
<td>1B</td>
<td>10-14 days</td>
<td>Observe phytotoxicity precautions.</td>
<td></td>
</tr>
<tr>
<td>Dinotefuran</td>
<td>Safari 20 SG</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
<td></td>
</tr>
<tr>
<td>Some insecticide products do not control armored scales.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fenpropatrin</td>
<td>Tame 2.4 EC†</td>
<td>3A</td>
<td>24</td>
<td>May be tank mixed with Orthene T, T&amp;O WSP.</td>
<td></td>
</tr>
<tr>
<td>Most non-systemic contact insecticides cannot penetrate protective, waxy layer of scales. Thus, apply sprays to target crawler (nymph) stage. Use double-sided sticky tape to monitor crawler activity.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imidacloprid</td>
<td>Marathon II</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom. Do not apply to linden, basswood, or other Tilia spp.</td>
<td></td>
</tr>
<tr>
<td>Some insecticide products do not control armored scales.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insecticidal soap</td>
<td>M-Pede or Kopa</td>
<td>NS</td>
<td>12/12</td>
<td>Short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently.</td>
<td></td>
</tr>
<tr>
<td>Check label for specific scale pests; some products are only effective against soft scales.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lambda-cyhalothrin</td>
<td>Scimitar GC†</td>
<td>3A</td>
<td>24</td>
<td>For use in Christmas tree plantations only.</td>
<td></td>
</tr>
<tr>
<td>Malathion</td>
<td>Fyfanon</td>
<td>1B</td>
<td>24</td>
<td>Short residual activity. Avoid applying too frequently.</td>
<td></td>
</tr>
<tr>
<td>Mineral oil</td>
<td>Ultra-Pure Oil or SuffOil-X</td>
<td>HO</td>
<td>4/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paraffinic oil</td>
<td>Sunspray Ultra Fine Oil</td>
<td>HO</td>
<td>4</td>
<td>Do not apply when buds are fully open and shoots are elongating. Observe phytotoxicity precautions.</td>
<td></td>
</tr>
<tr>
<td>Paraffinic oil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyriproxyfen</td>
<td>Distance or Fulcrum</td>
<td>7C</td>
<td>12/12</td>
<td>Works only on crawlers.</td>
<td></td>
</tr>
<tr>
<td>Sulfoxaflor + Spinetoram</td>
<td>XXplore WG</td>
<td>4C + 5</td>
<td>12</td>
<td>Provides suppression only.</td>
<td></td>
</tr>
<tr>
<td>Thiamethoxam</td>
<td>Flagship 25 WG</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
<td></td>
</tr>
<tr>
<td>Pest</td>
<td>Common Name</td>
<td>Trade Name</td>
<td>Class*</td>
<td>REI**</td>
<td>Comments</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td>------------</td>
<td>--------</td>
<td>--------</td>
<td>-----------</td>
</tr>
<tr>
<td>THRIPS</td>
<td>Abamectin Avid 0.15 EC or Minx 2</td>
<td>6</td>
<td>12/12</td>
<td>Provides suppression only; do not use on roses, chrysanthemums, and gerbera.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acephate Orthene T, T&amp;O WSP</td>
<td>1B</td>
<td>12</td>
<td>Observe phytotoxicity precautions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acetamiprid Tristar 8.5 SL</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Azadirachtin Azatin XL or Molt-X</td>
<td>UN</td>
<td>4/4</td>
<td>Controls immature stages only.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bifenazate + Abamectin Sirocco</td>
<td>UN + 6</td>
<td>12</td>
<td>Provides suppression only.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bifenthrin OnyxPro†</td>
<td>3A</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carbaryl Sevin SL Carbaryl Insecticide</td>
<td>1A</td>
<td>12</td>
<td>Observe phytotoxicity precautions. BEE CAUTION: Do not apply to plants in bloom.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cyfluthrin Decathlon 20 WP</td>
<td>3A</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diazinon Diazinon 50 W†</td>
<td>1B</td>
<td>2-7 days</td>
<td>Observe phytotoxicity precautions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dimethoate Dimethoate 4 E</td>
<td>1B</td>
<td>10-14 days</td>
<td>Observe phytotoxicity precautions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dinotefuran Safari 20 SG</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fenpropathrin Tame 2.4 EC†</td>
<td>3A</td>
<td>24</td>
<td>May be tank mixed with Orthene T, T&amp;O WSP.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lambda-cyhalothrin Scimitar GC†</td>
<td>3A</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mineral oil Ultra-Pure Oil or SuffOil-X</td>
<td>HO</td>
<td>4/4</td>
<td>Short residual activity. Avoid applying at frequent intervals.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novaluron Pedestal</td>
<td>15</td>
<td>12</td>
<td>Do not apply when buds are fully open and shoots are elongating. Observe phytotoxicity precautions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paraffinic oil Sunspray Ultra Fine Oil</td>
<td>HO</td>
<td>4</td>
<td>Do not apply when buds are fully open and shoots are elongating. Observe phytotoxicity precautions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spinosad Conserve SC or Entrust SC</td>
<td>5</td>
<td>4/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sulfoxaflor + Spinetoram XXpire WG</td>
<td>4C + 5</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thiamethoxam Flagship 25 WG</td>
<td>4A</td>
<td>12</td>
<td>Provides suppression only. Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
<td></td>
</tr>
</tbody>
</table>

CR-7092.11
<table>
<thead>
<tr>
<th>Pest</th>
<th>Pesticide Common Name</th>
<th>Pesticide Trade Name</th>
<th>Pesticide Class*</th>
<th>REI**</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHITEFLIES</td>
<td>Abamectin</td>
<td>Avid 0.15 EC or Minx 2</td>
<td>6</td>
<td>12/12</td>
<td>Provides suppression only; do not use on roses, chrysanthemums, and gerbera.</td>
</tr>
<tr>
<td>Measure 1/8 inch long.</td>
<td>Acetamiprid</td>
<td>Tristar 8.5 SL</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray.</td>
</tr>
<tr>
<td>Active summer through early fall.</td>
<td>Azadirachtin</td>
<td>Azatin XL or Molt-X</td>
<td>UN</td>
<td>4/4</td>
<td>Controls immature stages only.</td>
</tr>
<tr>
<td>Tiny insects. Adults have yellow bodies and white wings. Adults and nymphs commonly found on underside of leaves.</td>
<td>Bifenazate + Abamectin</td>
<td>Sirocco</td>
<td>UN + 6</td>
<td>12</td>
<td>Provides suppression only.</td>
</tr>
<tr>
<td>Adults and nymphs feed on plant sap with piercing-sucking mouthparts and cause yellowing of leaves. Often &quot;white clouds&quot; of adults fly out of disturbed foliage. For effective whitefly control, ensure thorough coverage by wetting plants to dripping point. Aim for coverage of the underside of leaves and penetrate dense foliage. Repeat applications are frequently needed.</td>
<td>Bifenthrin</td>
<td>OnyxPro†</td>
<td>3A</td>
<td>12</td>
<td>Labeled for ash whitefly control. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
<tr>
<td></td>
<td>Carbaryl</td>
<td>Sevin SL Carbaryl</td>
<td>1A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cyfluthrin</td>
<td>Decathlon 20 WP</td>
<td>3A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diazinon</td>
<td>Diazinon 50 W†</td>
<td>1B</td>
<td>2-7 days</td>
<td>Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Dimethoate</td>
<td>Dimethoate 4 E</td>
<td>1B</td>
<td>10-14 days</td>
<td>Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Dinotefuran</td>
<td>Safari 20 SG</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
<tr>
<td></td>
<td>Fenpropathrin</td>
<td>Tame 2.4 EC†</td>
<td>3A</td>
<td>24</td>
<td>May be tank mixed with Orthene T, T&amp;O WSP.</td>
</tr>
<tr>
<td></td>
<td>Imidacloprid</td>
<td>Marathon II</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom. Do not apply to linden, basswood, or other Tilia spp</td>
</tr>
<tr>
<td></td>
<td>Insecticidal soap</td>
<td>M-Pede or Kopa</td>
<td>NS</td>
<td>12/12</td>
<td>Short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently.</td>
</tr>
<tr>
<td></td>
<td>Lambda-cyhalothrin</td>
<td>Scimitar GC†</td>
<td>3A</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mineral oil</td>
<td>Ultra-Pure Oil or SuffOil-X</td>
<td>HO</td>
<td>4/4</td>
<td>Short residual activity. Avoid applying at frequent intervals.</td>
</tr>
<tr>
<td></td>
<td>Novaluron</td>
<td>Pedestal</td>
<td>15</td>
<td>12</td>
<td>Active on nymphs.</td>
</tr>
<tr>
<td></td>
<td>Paraffinic oil</td>
<td>Sunspray Ultra Fine Oil</td>
<td>HO</td>
<td>4</td>
<td>Do not apply when buds are fully open and shoots are elongating. Observe phytotoxicity precautions.</td>
</tr>
<tr>
<td></td>
<td>Permethrin</td>
<td>Astro</td>
<td>3A</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pymetrozine</td>
<td>Endeavor</td>
<td>9B</td>
<td>12</td>
<td>Has systemic activity. Prevents insects from feeding by blocking mouthparts.</td>
</tr>
<tr>
<td></td>
<td>Pyridaben</td>
<td>Sanmite</td>
<td>21</td>
<td>12</td>
<td>Works on nymphs and adults.</td>
</tr>
<tr>
<td></td>
<td>Pyriproxyfen</td>
<td>Distance or Fulcrum</td>
<td>7C</td>
<td>12/12</td>
<td>Only effective against nymphs.</td>
</tr>
<tr>
<td></td>
<td>Sulfoxaflor + Spinetoram</td>
<td>XXpLire WG</td>
<td>4C + 5</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thiamethoxam</td>
<td>Flagship 25 WG</td>
<td>4A</td>
<td>12</td>
<td>Systemic insecticide. Apply as a foliar spray or soil drench. BEE CAUTION: Do not apply to plants in bloom.</td>
</tr>
</tbody>
</table>

† Restricted Use Pesticide
** REI = Restricted Entry Interval (in hours, unless otherwise noted); workers not allowed to enter into treated area until the REI has elapsed.
*The numbers associated with the pesticide class column were developed by the Insecticide Resistance Action Committee (IRAC) in 2005. It is intended to help in the selection of insecticides for preventative resistance management. If you make multiple applications for a specific pest or group of pests during a growing sequence, simply select a registered insecticide with a different number for each generation (14-21 days). You can rotate within the same number if more than one subgroup is available (Example: 2A and 2B). To further delay resistance from developing, integrate other control methods into your pest management programs.

<table>
<thead>
<tr>
<th>Number</th>
<th>Pesticide Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>Carbamates</td>
</tr>
<tr>
<td>1B</td>
<td>Organophosphates</td>
</tr>
<tr>
<td>2A</td>
<td>Cyclodiene organochlorines</td>
</tr>
<tr>
<td>2B</td>
<td>Phenylpyrazoles (Fiproles)</td>
</tr>
<tr>
<td>3A</td>
<td>Pyrethroids, Pyrethrins</td>
</tr>
<tr>
<td>3B</td>
<td>DDT, Methoxychlor</td>
</tr>
<tr>
<td>4A</td>
<td>Neonicotinoids</td>
</tr>
<tr>
<td>4B</td>
<td>Nicotine</td>
</tr>
<tr>
<td>4C</td>
<td>Sulfoxaflor</td>
</tr>
<tr>
<td>4D</td>
<td>Butenolides</td>
</tr>
<tr>
<td>5</td>
<td>Spinosyns</td>
</tr>
<tr>
<td>6</td>
<td>Avermectins, Milbemycins</td>
</tr>
<tr>
<td>7A</td>
<td>Juvenile hormone analogues</td>
</tr>
<tr>
<td>7B</td>
<td>Fenoxycarb</td>
</tr>
<tr>
<td>7C</td>
<td>Pyriproxylen</td>
</tr>
<tr>
<td>8A</td>
<td>Alkyl halides</td>
</tr>
<tr>
<td>8B</td>
<td>Chloropicrin</td>
</tr>
<tr>
<td>8C</td>
<td>Sulfuryl fluoride (fumigant)</td>
</tr>
<tr>
<td>8D</td>
<td>Borax</td>
</tr>
<tr>
<td>8E</td>
<td>Tartar emetic</td>
</tr>
<tr>
<td>8F</td>
<td>Methyl isothiocyanate generators</td>
</tr>
<tr>
<td>9B</td>
<td>Pyrmetrozine</td>
</tr>
<tr>
<td>9C</td>
<td>Fionicamid</td>
</tr>
<tr>
<td>10A</td>
<td>Clofentezine, Hexythiazox, Difludizox</td>
</tr>
<tr>
<td>10B</td>
<td>Etoxazole</td>
</tr>
<tr>
<td>11A</td>
<td>Bacillus thuringiensis and the insecticidal proteins</td>
</tr>
<tr>
<td>11B</td>
<td>Bacillus sphaericus</td>
</tr>
<tr>
<td>12A</td>
<td>Diafentiuron</td>
</tr>
<tr>
<td>12B</td>
<td>Organotin miticide</td>
</tr>
<tr>
<td>12C</td>
<td>Propargite</td>
</tr>
<tr>
<td>12D</td>
<td>Tetradifon</td>
</tr>
<tr>
<td>13</td>
<td>Chlorfenapyr, DNOC, Sulfluramid</td>
</tr>
<tr>
<td>14</td>
<td>Nereistoxin analogues</td>
</tr>
<tr>
<td>15</td>
<td>Benzoylureas</td>
</tr>
<tr>
<td>16</td>
<td>Buprofezin</td>
</tr>
<tr>
<td>17</td>
<td>Cyromazine</td>
</tr>
<tr>
<td>18</td>
<td>Diacylhydrazines</td>
</tr>
<tr>
<td>19</td>
<td>Amitraz</td>
</tr>
<tr>
<td>20A</td>
<td>Hydramethylnon</td>
</tr>
<tr>
<td>20B</td>
<td>Acequinocyl</td>
</tr>
<tr>
<td>20C</td>
<td>Fluacrypyrim</td>
</tr>
<tr>
<td>21A</td>
<td>METI acaricides and insecticides</td>
</tr>
<tr>
<td>21B</td>
<td>Rotenone</td>
</tr>
<tr>
<td>22A</td>
<td>Tetronic acid derivatives</td>
</tr>
<tr>
<td>22B</td>
<td>Metaflumizone</td>
</tr>
<tr>
<td>23</td>
<td>Beta-ketonitrile derivatives</td>
</tr>
<tr>
<td>24A</td>
<td>Phosphine</td>
</tr>
<tr>
<td>24B</td>
<td>Cyanides</td>
</tr>
<tr>
<td>25</td>
<td>(unassigned)</td>
</tr>
<tr>
<td>26</td>
<td>(unassigned)</td>
</tr>
<tr>
<td>27</td>
<td>(unassigned)</td>
</tr>
<tr>
<td>28</td>
<td>Diamides</td>
</tr>
<tr>
<td>UN</td>
<td>Unknown mode of action</td>
</tr>
<tr>
<td>NS</td>
<td>Non-specified, multi-site</td>
</tr>
<tr>
<td>M</td>
<td>Microbials</td>
</tr>
<tr>
<td>BLO</td>
<td>Biological organisms</td>
</tr>
</tbody>
</table>

**NOTES:**

1. Before purchasing and using any pesticide, read the label carefully for registered use(s), rates, and application frequency. Also note toxicity category on the label of each pesticide since toxicity ratings may affect reentry intervals and note any ventilation requirements. Wear protective clothing as recommended on each pesticide label.

2. When using horticultural oils it is important to not use oils with insecticidal soap or any sulfur containing compounds. Also, do not use horticultural oils in sprayers in which fungicides have been used. Frequent agitation is required when using horticultural oil sprays.

3. Insecticides with a broad spectrum of activity in the chemical classes pyrethroids, organophosphates, carbamates, and neonicotinoids may be harmful to natural enemies (parasitoids and predators). Some broad-spectrum insecticides are more selective than others, and selectivity further depends on how, when, and where the insecticide is applied. Be sure to check the label for the kinds of insects controlled by the product, or contact your county extension educator for information on the use of insecticides with natural enemies.
The Oklahoma Cooperative Extension Service  
Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

The pesticide information presented in this publication was current with federal and state regulations at the time of printing. The user is responsible for determining that the intended use is consistent with the label of the product being used. Use pesticides safely. Read and follow label directions. The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, and Title IX of the Education Amendments of 1972 (Higher Education Act), the Americans with Disabilities Act of 1990, and other federal and state laws and regulations, does not discriminate on the basis of race, color, national origin, genetic information, sex, age, sexual orientation, gender identity, religion, disability, or status as a veteran, in any of its policies, practices or procedures. This provision includes, but is not limited to admissions, employment, financial aid, and educational services. The Director of Equal Opportunity, 408 Whitehurst, OSU, Stillwater, OK 74078-1035; Phone 405-744-5371; email: eeo@okstate.edu has been designated to handle inquiries regarding non-discrimination policies: Director of Equal Opportunity. Any person (student, faculty, or staff) who believes that discriminatory practices have been engaged in based on gender may discuss his or her concerns and file informal or formal complaints of possible violations of Title IX with OSU’s Title IX Coordinator 405-744-9154.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of $1.00 per copy. Revised 0518 GH.