

COMMERCIAL CHRISTMAS TREE PRODUCTION INSECT CONTROL

| Insect or Mite  | Insecticide and Formulations                            | Amount of Formulation Per Gallon of Spray | Amount Per 100 Gallons of Water                                 | Minimum Interval (Hours) Between Application and Reentry | Precautions and Remarks  |
|---|---|---|---|--|--|
| <b>Adelgids</b><br>(balsam woolly adelgid, cooley, eastern spruce gall) | bifenthrin 25% (Sniper)                                 |   | 3.9-12.8 oz/acre  | 12   | Will also control twig aphids and spider mites but not rust mites.   |
|   | bifenthrin (OnyxPro)                                    |   | 1.8-14.4 oz/acre  | 12   |  |
|   | chlorpyrifos (Lorsban 4E, Nufos 4E)                     |   | 1 qt/acre   | 24   | DO NOT treat plants under extreme heat or drought stress. Control is achieved only when eggs and crawlers are not present. |
|   | dinotefuran (Safari)                                    |   | 4-8 oz/100 gal  | 12   | DO NOT apply more than 2.7 lb per acre.  |
|   | esfenvalerate (Asana XL)                                |   | 5.8-9.6 oz/100 gal  | 12   | Use full rate to control balsam woolly adelgid.  |
|   | imidacloprid (Couraze 1.6F, Pasada 1.6F, Provado 1.6 F) |   | 4-8 oz/acre OR<br>2 oz/100 gal                                  | 12   | Adding a spray adjuvant may improve coverage. DO NOT apply more than 40 oz/acre per year.                                  |
|   | lambda-cyhalothrin (Lambda-T, Silencer, Warrior)        |   | 2.58-5.12 oz/acre   | 24   | Maximum use 1.92 pt/acre per year.   |
|   | petroleum oil (Damoil)                                  |   | 2-4 gal/100 gal<br>dormant use<br>1-3 gal/100 gal<br>summer use | 4  |  |
|   | spirotetramat (Movento)                                 |   | 5-10 oz/acre  | 24   | Maximum use 20 oz/acre per year. Use adjuvant to increase penetration.   |
| <b>Ants</b>   | bifenthrin (OnyxPro)                                    |   | 1.8-14.4 oz/acre  | 12   |  |
|   | carbaryl (Sevin SL)                                     |   | 1 qt/acre   | 12   |  |
|   | chlorpyrifos (Lorsban 4E)                               |   | 1 qt/acre   | 24   | DO NOT treat plants under extreme heat or drought stress.  |
| <b>Aphids</b><br>(including balsam twig aphid and cinara aphid)         | abamectin (Avid 0.15 EC)                                |   | 8 oz/100 gal  | 12   | DO NOT apply more than 16 oz or less than 8 oz per acre. To suppress aphids, spray must contact young immatures.           |
|   | azadirachtin (Aza-Direct)                               |   | 1-2 pt/acre   | 4  | Under extremely heavy pest pressure, up to 3 1/2 pt may be used.   |
|   | <i>Beaveria bassiana</i> (Naturalis T&O)                | 0.3-1.0 oz/gal                            | 30-100 oz/100 gal   | 4  | Spray immediately after mixing.  |
|   | bifenthrin 25% (Sniper)                                 |   | 3.9-12.8 oz/acre  | 12   | Will also control twig aphid and spider mites but not rust mites.  |
|   | bifenthrin (OnyxPro)                                    |   | 1.8-14.4 oz/acre  | 12   |  |
|   | carbaryl (Sevin SL)                                     |   | 1 qt/acre   | 12   |  |
|   | chlorpyrifos (Lorsban 4E, Nufos 4E)                     |   | 1 qt/acre   | 24   | DO NOT treat plants under extreme heat or drought stress.  |
|   | cinnamaldehyde (Cinnamite)                              | 0.85 oz/gal                               | 85 oz/100 gal   | 4  |  |
|   | dimethoate (Dimethoate 400)                             |   | 1.0-1.5 pt/acre   | 10 days  |  |
|   | esfenvalerate (Asana XL)                                |   | 5.8-9.6 oz/100 gal  | 12   |  |
|   | imidacloprid (Couraze 1.6F, Pasada 1.6F, Provado 1.6 F) |   | 4-8 oz/acre OR<br>2 oz/100 gal                                  | 12   | Adding a spray adjuvant may improve control. DO NOT apply more than 40 oz/acre per year.                                   |
| lambda-cyhalothrin (Lambda-T, Silencer, Warrior)                        |   | 2.58-5.12 oz/acre                         | 24  | Maximum use 1.92 pt/acre per year.                       |  |

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|---|--|--|---|---|---|
| <b>Aphids</b> (cont.)<br>(including balsam twig aphid and cinara aphid) | petroleum oil (Damoil)                           |  | 2-4 gal/100 gal<br>dormant use<br>1-3 gal/100 gal<br>summer use | 4   |   |
|   | pymetrozine (Endeavor)                           |  | up to 10 oz/acre  | 12  |   |
|   | spirotetramat (Movento)                          |  | 5-10 oz/acre  | 24  | Maximum use 20 oz/acre per year. Use adjuvant to increase penetration.  |
|   | thiamethoxam (Flagship 25WP)                     |  | 2-4 oz/100 gal OR<br>4-8 oz/acre                                | 12  | Maximum use 8 oz/acre per year.   |
| <b>Bagworm</b>  | azadirachtin (Aza-Direct)                        |  | 1-2 pt/acre   | 4   | Under extremely heavy pest pressure, up to 3 1/2 pt may be used.  |
|   | bifenthrin (OnyxPro)                             |  | 1.8-14.4 oz/acre  | 12  |   |
|   | carbaryl (Sevin SL)                              |  | 1 qt/acre   | 12  |   |
|   | diflubenzuron (Dimilin 25W)                      |  | 2-4 oz/acre   | 12  | Apply to early instars in mid to late June.   |
|   | dimethoate (Dimethoate 400)                      |  | 1.0-1.5 pt/acre   | 10 days   |   |
|   | lambda-cyhalothrin (Lambda-T, Silencer, Warrior) |  | 2.58-5.12 oz/acre   | 24  | Maximum use 1.92 pt/acre per year.  |
|   | spinosad (Conserve SC)                           |  | 4-16 oz/acre  | 4   |   |
|   | tebufenozide (Confirm)                           |  | 4-8 oz/acre   | 4   | Apply to early instar larvae; foliage development should be a minimum of 20%. DO NOT apply more than 16 oz/acre per year. |
| <b>Elongate Hemlock Scale</b>   | bifenthrin 25% (Sniper)                          |  | 3.9-12.8 oz/acre  | 12  | Will also control twig aphid and spider mites but not rust mites.   |
|   | buprofezin (Talus 70 DF)                         |  | 14 oz/acre  | 12  |   |
|   | dimethoate (Dimethoate 400)                      |  | 1.0-1.5 pt/acre   | 10 days   |   |
|   | dinotefuran (Safari)                             |  | 4-8 oz/100 gal  | 12  | DO NOT apply more than 2.7 lb per acre.   |
|   | esfenvalerate (Asana XL)                         |  | 5.8-9.6 oz/100 gal  | 12  | Best results when mixed with dimethoate.  |
| <b>European Pine Shoot Moth</b>   | azadirachtin (Aza-Direct)                        |  | 1-2 pt/acre   | 4   | Under extremely heavy pest pressure, up to 3 1/2 pt may be used.  |
|   | chlorpyrifos (Lorsban 4E)                        |  | 1 qt/acre   | 24  | DO NOT treat plants under extreme heat or drought stress.   |
|   | dimethoate (Dimethoate 400)                      |  | 1.0-1.5 pt/acre   | 10 days   |   |
|   | phosmet (Imidan 70-W)                            |  | 1.3-1.5 lb/acre   | 13 days   |   |
| <b>Midge</b><br>(Douglas fir needle midge, pine needle midge)           | chlorpyrifos (Lorsban 4E)                        |  | 1 qt/acre   | 24  | DO NOT treat plants under extreme heat or drought stress.   |
|   | esfenvalerate (Asana XL)                         |  | 5.8-9.6 oz/100 gal  | 12  |   |
| <b>Nantucket Pine Tip Moth</b>  | azadirachtin (Aza-Direct)                        |  | 1-2 pt/acre   | 4   | Under extremely heavy pest pressure, up to 3 1/2 pt may be used.  |
|   | carbaryl (Sevin SL)                              |  | 1 qt/acre   | 12  |   |

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|--|--|--|---|---|--|
| <b>Nantucket Pine Tip Moth</b>                                   | diflubenzuron (Dimilin 25W)                                |  | 2-4 oz/acre   | 12  | Apply when second generation instars are present or 70% of first generation pupal cases are empty.   |
|  | dimethoate (Dimethoate 400)                                |  | 1.0-1.5 pt/acre   | 10 days   |  |
|  | esfenvalerate (Asana XL)                                   |  | 5.8-9.6 oz/100 gal  | 12  | Apply as needed for control. Spray sufficient gallonage to obtain good coverage of entire tree.  |
|  | permethrin (Permethrin 3.2 EC, Pounce)                     |  | 4-8 oz/100 gal  | 12  | Begin applications when adults appear. Repeat applications may be made in 5- to 7-day intervals as needed.   |
|  | phosmet (Imidan 70-W)                                      |  | 1.3-1.5 lb/acre   | 13 days   |  |
|  | tebufenozide (Confirm)                                     |  | 8 oz/acre   | 4   | Apply to early instar larvae after each foliage flush at approximately 25% foliage expansion. Allow at least 6 hours between application and rainfall to ensure thorough spray drying. |
| <b>Pine Chafer</b>   | esfenvalerate (Asana XL)                                   |  | 5.8-9.6 oz/100 gal  | 12  | Maximum use 1.92 pt/acre per year.   |
|  | lambda-cyhalothrin (Lambda-T, Silencer, Warrior)           |  | 2.58-5.12 oz/acre   | 24  |  |
| <b>Rosette Bud Mite</b>  | dimethoate (Dimethoate 400)                                |  | 1.3 pt/acre   | 10 days   | Maximum use 20 oz/acre per year. Use adjuvant to increase penetration.   |
|  | spirotetramat (Movento)                                    |  | 5-10 oz/acre  | 24  |  |
| <b>Rust Mite</b>   | abamectin (Ardent 0.15 EC)                                 |  | 4 oz/100 gal  | 12  | DO NOT treat plants under extreme heat or drought stress.  |
|  | chlorpyridan (Sanmite)                                     |  | 4 oz/100 gal OR<br>10.7 oz/acre                                 | 12  |  |
|  | chlorpyrifos (Lorsban 4E)                                  |  | 1 qt/acre   | 24  |  |
|  | dimethoate (Dimethoate 400)                                |  | 1.0-1.5 pt/acre   | 10 days   |  |
|  | petroleum oil (Damoil)                                     |  | 2-4 gal/100 gal<br>dormant use<br>1-3 gal/100 gal<br>summer use | 4   |  |
|  | spirodiclofen (Envidor 2SC)                                |  | 18-24.7 oz/acre   | 24  |  |
| <b>Sawfly</b><br>(redheaded pine,<br>red pine,<br>European pine) | carbaryl (Sevin SL)  |  | 1 qt/acre   | 12  | Apply to early instars.  |
|  | chlorpyrifos (Nufos 4E)                                    |  | 1 qt/acre   | 24  |  |
|  | diflubenzuron (Dimilin 25W)                                |  | 4-8 oz/acre   | 12  |  |
|  | esfenvalerate (Asana XL)                                   |  | 5.8-9.6 oz/100 gal  | 12  |  |
|  | imidacloprid (Couraze 1.6F,<br>Pasada 1.6F, Provado 1.6 F) |  | 4-8 oz/acre OR<br>2 oz/100 gal                                  | 12  |  |

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|---|--|--|---|---|---|
| <b>Sawfly</b> (cont.)<br>(redheaded pine, red pine, European pine)                  | lambda-cyhalothrin (Lambda-T, Silencer, Warrior) |  | 2.58-5.12 oz/acre   | 24  | Maximum use 1.92 pt/acre per year.  |
|   | malathion (Malathion 8 or Gowan)                 | 2 Tbsp/gal                                       | 1 pt/100 gal  | 12  |   |
|   | phosmet (Imidan 70-W)                            |  | 1.3-1.5 lb/acre   | 13 days   |   |
| <b>Scale</b><br>(pine needle, pine tortoise, spruce bud, black pine, stripped pine) | azadirachtin (Aza-Direct)                        |  | 1-2 pt/acre   | 4   | Under extremely heavy pest pressure, up to 3 1/2 pint may be used.<br>DO NOT treat plants under extreme heat and drought stress. Apply when scale crawlers are active.<br>DO NOT apply more than 2.7 lb per acre.   |
|   | chlorpyrifos (Lorsban 4E)                        |  | 1 qt/acre   | 24  |   |
|   | dinotefuran (Safari)                             |  | 4-8 oz/100 gal  | 12  |   |
| See also <b>elongate hemlock scale</b>  | lambda-cyhalothrin (Lambda-T, Silencer, Warrior) |  | 2.58-5.12 oz/acre   | 24  | Maximum use 1.92 pt/acre/year.  |
|   | petroleum oil (Damoil)                           |  | 2-4 gal/100 gal<br>dormant use<br>1-3 gal/100 gal<br>summer use | 4   |   |
|   | thiamethoxam (Flagship 25WP)                     |  | 2-4 oz/100 gal OR<br>4-8 oz/acre                                | 12  |   |
| <b>Seed Bug</b>   | lambda-cyhalothrin (Lambda-T, Silencer, Warrior) |  | 2.58-5.12 oz/acre   | 24  | Maximum use 1.92 pt/acre per year.  |
|   | permethrin (Permethrin 3.2 EC)                   |  | 30 oz/acre  | 12  |   |
| <b>Spider Mite</b><br>(spruce spider mite)  | abamectin (Ardent 0.15 EC)                       |  | 4 oz/100 gal  | 12  | DO NOT apply more than 16 oz or less than 8 oz per acre.<br>Spray immediately after mixing.<br>Add an adjuvant like Silwet L-77 or Slygard 309 to the Floramite solution.<br>Will also control twig aphids and spider mites but not rust mites.<br>DO NOT treat plants under extreme heat or drought stress. If eggs are present, reapply in 7 to 10 days to control newly hatched nymphs.<br>Most effective when applied at first sign of mite activity and mite eggs. |
|   | abamectin (Avid 0.15 EC)                         |  | 4-8 oz/100 gal  | 12  |   |
|   | <i>Beauveria bassiana</i> (Naturalis T&O)        | 0.3-1.0 oz/gal                                   | 30-100 oz/100 gal   | 4   |   |
|   | bifenazate (Floramite)                           |  | 2-8 oz/100 gal  | 12  |   |
|   | bifenthrin 25% (Sniper)                          |  | 3.9-12.8 oz/acre  | 12  |   |
|   | bifenthrin (OnyxPro)                             |  | 1.8-14.4 oz/acre  | 12  |   |
|   | chlorpyridan (Sanmite)                           |  | 4 oz/100 gal OR<br>10.7 oz/acre                                 | 12  |   |
|   | chlorpyrifos (Lorsban 4E, Nufos 4E)              |  | 1 qt/acre   | 24  |   |
|   | clofentezine (Apollo SC)                         |  | 4-8 oz/acre   | 12  |   |

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|--|--|---|---------------------------------|---|---|
| <b>Spider Mite</b><br>(spruce spider mite)                                     | cinnamaldehyde (Cinnamite)                       |   | 85 oz/100 gal                   | 4   | DO NOT exceed the maximum seasonal use rate of 27.4 fl oz of Sultan per crop growing cycle. DO NOT make more than two (2) applications of Sultan per crop per year. |
|  | cyflumetofen (Sultan Miticide)                   |   | 13.7 fl oz/100 gal              | 12  |   |
|  | dimethoate (Dimethoate 400)                      |   | 1.0-1.5 pt/acre                 | 10 days   |   |
|  | etoxazole (TetraSan 5 WDG)                       |   | 8-16 oz/100 gal                 | 12  |   |
|  | fenpyroximate (Akari 5 SC)                       |   | 16-24 oz/100 gal                | 12  |   |
|  | hexathiazox (Savey) 50 WP                        | 3-6 oz/acre                               | 2 oz/100 gal                    | 12  |   |
|  | propargite (Ornamite-CR)                         |   | 3.0-7.5 lb/acre                 | 7 days  |   |
| spirodichlofen (Envidor 2SC)   |  | 18-24.7 oz/acre                           | 24                              | No more than 3 applications per year. Compatibility restrictions. |   |
| spiromesifen (Judo)  |  | 1-4 oz/100 gal                            | 12                              | DO NOT apply more than 4 times per season.                        |   |
| <b>Spittlebug</b>  | chlorpyrifos (Lorsban 4E)                        |   | 1 qt/acre                       | 24  | DO NOT treat plants under extreme heat or drought stress.   |
|  | esfenvalerate (Asana XL)                         |   | 5.8-9.6 oz/100 gal              | 12  |   |
|  | lambda-cyhalothrin (Lambda-T, Silencer, Warrior) |   | 2.58-5.12 oz/acre               | 24  | Maximum use 1.92 pt/acre per year.  |
| <b>Spruce Needle Miner</b>   | chlorpyrifos (Lorsban 4E)                        |   | 1 qt/acre                       | 24  | DO NOT treat plants under extreme heat or drought stress.   |
| <b>Weevil</b><br>(pales, northern pine, pitch eating, root collar, white pine) | azadirachtin (Aza-Direct)                        |   | 1-2 pt/acre                     | 4   | Under extremely heavy pest pressure, up to 3 1/2 pint may be used.  |
|  | chlorpyrifos (Lorsban 4E, Nufos 4E)              | 2 Tbsp/gal                                | 3 qt/100 gal                    | 24  | Apply as a cut stump drench.  |
|  | diflubenzuron (Dimilin 25W)                      |   | see label                       | 12  | Treat prior to egg deposition.  |
|  | esfenvalerate (Asana XL)                         |   | 5.8-9.6 oz/100 gal              | 12  |   |
|  | phosmet (Imidan 70-W)                            |   | 1.3-1.5 lb/acre                 | 13 days   |   |
| <b>White Grub</b>  | chlorpyrifos (Lorsban 4E)                        |   | 1 qt/acre                       | 24  | Incorporate into the soil if possible.  |
|  | imidacloprid (Admire Pro)                        |   | 7-14 oz/acre                    | 12  | Maximum per season: 14 oz/acre  |
|  | thiamethoxam (Flagship 25WG)                     |   | 8 oz/acre                       | 12  | Apply from adult flight through peak hatch of targeted species.   |
| <b>Zimmerman Pine Moth</b>   | azadirachtin (Aza-Direct)                        |   | 1-2 pt/acre                     | 4   | Under extremely heavy pest pressure, up to 3 1/2 pint may be used.  |
|  | diflubenzuron (Dimilin 25W)                      |   | 4-8 oz/acre                     | 12  | Apply to early instars.   |
|  | dimethoate (Dimethoate 400)                      |   | 1.0-1.5 pt/acre                 | 10 days   |   |