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# Christmas Tree Insect Control Recommendations, 2015

A diverse complex of insect pests affect Christmas trees and nearly every part of the tree from the terminal leader to the roots, can be infested by at least one insect pest. Some insects affect multiple conifer species while others are specialists and affect only one species. It is important to know about pest biology and pesticide activity as insecticides must be applied when the susceptible stage of the insect is present.

## Timing and Control

Monitoring degree-day accumulation will help you estimate when insects are active. Degree-day accumulation is a way of keeping track of how quickly temperatures warm up in the spring which greatly affects insect development. It is more accurate and reliable to base your scouting and control activities on accumulated degree-days than on the calendar. Generally, insect development progresses only if temperatures are at least 50 degrees F. Therefore, degree-day accumulations are usually based on a threshold temperature of 50 degrees F (DD50). Accumulated degree-days are calculated weekly by Michigan State University (MSU) and are available from the MSU Agricultural Weather site at www.enviroweather.msu.edu

| Insect | Life stage | $GDD_{50}$ Months | Control Options | Page # Pest Manual* 1998/2014 |
|---|---|---|---|---|
| **Admes mite** *Eurytetranycus admes* | Eggs, larva or adults | Spring to fall | abamectin, bifenthrin, bifenazate, chlorpyrifos, clofentezine, cyflumetofen, disulfoton, etoxazole, fenazaquin, hexythiazox, horticutural oil, insecticidal soap, oxydemeton-methyl, peppermint and rosemary oil, propargite, spirodiclofen | **NA/28** |
| **ants** *Formica spp.* | | Spring to fall | bifenthrin, carbaryl, chlorpyrifos, thiamethoxam | **113/137** |
| **aphids** (Cinara spp., spotted and white pine aphid) | when aphids abundant | Spring to fall | abamectin, acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, disulfoton, horticulture oil, imidacloprid, insecticidal soap, malathion, oxydemeton-methyl, peppermint and rosemary oil, pymetrozine, spirotetramat, thiamethoxam | **76/89** |
| **bagworm** *Thyridopteryx ephemeraeformis* | shortly before egg hatch when bags are still small | early to mid June | acephate, azdirachtin, Bacillus thuringiensis subsp. Kurstaki stain ABTX-351 or EG7841, biefenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, emamectin benzoate, flubendiamid, malathion, methoxyfenozide, permethrin, spinosad tebufenozide | **57/65** |

| Insect | Life stage | $GDD_{50}$ Months | Control Options | Page # Pest Manual* 1998/2014 |
|---|---|---|---|---|
| **balsam gall midge**<br>*Paradiplosis tumifex* | adults laying eggs<br><br>galls apparent | 150-300<br><br>550-700 | acephate, azdirachtin, bifenthrin, chlorpyrifos, cyfluthrin, esfenvalerate, thiamothoxam | **27/30** |
| **balsam fir sawfly**<br>*Neodiprion abieties* | Treat if the larvae are abundant in early to midsummer | June-July | acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, horticulture oil, imidacloprid, insecticidal soap, malathion, phosmet, spinosad, thiamethoxam | **NA/66** |
| **balsam shoot boring sawfly**<br>*Pleroneura brunneicornis* | Treat when caterpillars are small and before much feeding injury occurs | | acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, horticulture oil, imidacloprid, insecticidal soap, malathion, phosmet, spinosad, thiamethoxam | **NA/90** |
| **balsam twig aphid**<br>*Mindarus abietis* | egg hatch<br><br>stem mothers present (control target) | 60-100<br><br>100-140 | abamectin, acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, disulfoton, esfenvalerate, imidacloprid, insecticidal soap, horticulture oil, malathion, oxydemeton-methyl, peppermint and rosemary oil, pymetrozine, spirotetramat, thiamethoxam | **29/32** |
| **balsam wooly adelgid**<br>*Adelges piceae* | First generation of crawlers | May-July | acephate, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, esfenvalerate, horticulture oil, imidacloprid, insecticidal soap, oxydemeton-methyl, spirotetramat, thiamethoxam | **NA/91** |
| **conifer root aphid**<br>*Prociphilus americanus* | | | imidacloprid | **NA/139** |
| **Cooley spruce gall adelgid**<br>*Adelges cooleyi* | 1st adults active - *Spruce*<br>1st adults active - *Douglas-fir*<br>1st galls visible - *Spruce*<br>1st nymphs - *Douglas-fir*<br>2nd nymphs - *Douglas-fir*<br>2nd adults active | 25-120<br>90-180<br>200-310<br>90-150<br>600-1000<br>1500-1600 | acephate, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, esfenvalerate, horticulture oil, imidacloprid, insecticidal soap, oxydemeton-methyl, spirotetramat, thiamethoxam | **106/128** |

| Insect | Life stage | $GDD_{50}$ Months | Control Options | Page # Pest Manual* 1998/2014 |
|---|---|---|---|---|
| **Douglas-fir needle midge**<br>*Contarinia pseudotsuga* | Time application within a week after first adults are detected in traps. | 200-250 | acephate, azdirachtin, bifenthrin, chlorpyrifos, cyfluthrin, esfenvalerate, thiamothoxam | **NA/35** |
| **eastern pine shoot borer**<br>*Eucosma gloriola* | 1st adults active | 75-200 | acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, imidacloprid, malathion, permethrin, phosmet, spinosad | **79/98** |
| **eastern pine weevil (formerly northern pine weevil)**<br>*Pissodes nemorensis* | 1st adults active<br><br>2nd adults active | 25-100<br><br>1200-1400 | acephate, azadirachtin, bifenthrin, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, oxydemeton-methyl. phosmet | **85/100** |
| **eastern spruce gall adelgid**<br>*Adelges abietis* | 1st adults active<br><br>egg hatch, galls begin forming<br>2nd adults active | 25-100<br><br>250-310<br>1500-1600 | acephate, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, esfenvalerate, horticulture oil, imidacloprid, insecticidal soap, oxydemeton-methyl, spirotetramat, thiamethoxam | **107/131** |
| **elongated hemlock scale**<br>*Fiorinia externa* | dormant prior to bud break<br><br>When crawlers are active, may take several applications due to staggered life cycle | mid-March to mid-April<br><br>June-October | dormant oil<br><br>acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, horticultural oil, imidacloprid, insecticidal soap, malathion, oxydemeton-methyl, spirotetramat | **NA/39** |
| **eriophyid mites**<br>*Setoptus and Nalepella spp.* | when mites are present | May - September | abamectin, carbaryl, fenazaquin, horticulture oil, spirodiclofen | **35/40** |
| **European pine sawfly**<br>*Neodiprion sertifer* | 1st larvae | 100-195 | acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, horticulture oil, imidacloprid, insecticidal soal, malathion, phosmet, spinosad, thiamethoxam | **58/67** |

| Insect | Life stage | $GDD_{50}$ Months | Control Options | Page # Pest Manual* 1998/2014 |
|---|---|---|---|---|
| **European pine shoot moth**<br>*Rhyacionia buoliana* | 1st larvae<br><br><br>egg hatch<br>adults active | 50-220<br><br><br>900-1000<br>700-800 | acephate, azadirachtim, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, malathion, methoxyfenozide, phosmet, tebufenozide | **80/101** |
| **grasshopper**<br>*Melanoplus spp.* | Mid-summer | | acephate, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, esfenvalerate | **59/69** |
| **gypsy moth**<br>*Lymantria dispar* | egg hatch, 1st larvae<br><br>young caterpillars<br><br>pupation | 145-200<br><br>450<br><br>900-1200 | acephate, azadirachtin, *Bacillus thuringiensis (Bt),* bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, emamectin benzoate, flubendiamide, insecticidal soap, methoxyfenozide,oxydemeton-methyl, phosmet, spinosad, tebufenozide | **60/70** |
| **introduced pine sawfly**<br>*Diprion similis* | 1st larvae | 400-600 | acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, imidacloprid, insecticidal soap, malathion, phosmet, spinosad, thiamethoxam | **62/72** |
| **jack pine budworm**<br>*Choristoneura pinus pinus* | young larvae feeding<br><br><br>large larvae feeding<br>defoliation noticeable | 300-350<br><br><br><br>650-700 | acephate, azadirachtin, *Bacillus thuringiensis*, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, flubendiamide, methoxyfenozide, spinosad, tebufenozide | **63/73** |
| **jack pine tip beetle**<br>*Conopthorus resinosae* | shear off injured tips | summer to fall | Insecticides not needed & likely to be ineffective | **82/103** |
| **Japanese beetle**<br>*Popillia japonica* | adult foliar feeding | 950-2150 | azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, malathion, methoxyfenozide, permethrin, phosmet | |
| **Nantucket pine tip moth**<br>*Rhyacionia frustrana* | young larvae | mid-May -mid June | acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, imidacloprid, malathion, methoxyfenozide, permethrin, sphosmet, spinosad | **84/105** |

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|---|---|---|---|---|
| **northern pitch twig moth**<br>*Retinia albicapitana* | clip flagged branches or break open blister and crush larvae | | Insecticides not needed & likely to be ineffective | **109/132** |
| **Pales weevil**<br>*Hylobius pales* | 1st adults active<br><br>2nd adults active | 25-100<br><br>1200-1400 | acephate, azadirachtin, bifenthrin, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, oxydemeton-methyl. phosmet | **86/106** |
| **pine bark adelgid**<br>*Pineus strobi* | | April - mid-May | bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, horticulture oil, imidacloprid, insecticidal soap, oxydemeton-methyl, spirotetramat, thiamethoxam | **117/142** |
| **pine bark beetle (pine engraver)**<br>*Ips spp.* | | | azadirachtin, bifenthrin, carbaryl | **NA/153** |
| **pine chafer**<br>*Anomela oblivia* | 1st adults active | 450-600 | azadirachtin, cyfluthrin, esfenvalerate | **64** |
| **pine false webworm**<br>*Acantholyda erythrocephala* | | | | **71/75** |
| **pine needle midge**<br>*Contarinia baeri* | 1st adults active | 400-500 | acephate, azdirachtin, bifenthrin, chlorpyrifos, cyfluthrin, esfenvalerate, thiamothoxam | **65** |
| **pine needle scale**<br>*Chionaspis pinifoliae* | 1st generation egg hatch<br><br>1st generation - hyaline stage (control target)<br>2nd generation egg hatch<br>2nd generation - hyaline stage (control target) | 250-400<br><br>400-500<br><br>1250-1350<br>1500 | acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, horticultural oil, imidacloprid, insecticidal soap, malathion, oxydemeton-methyl, spirotetramat | **44/50** |
| **pine root collar weevil**<br>*Hylobius radicis* | 1st adults active<br><br>2nd adults active | 300-350<br><br>1200-1400 | acephate, azadirachtin, bifenthrin, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, oxydemeton-methyl. phosmet | **118/143** |

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|---|---|---|---|---|
| **pine root tip weevil**<br>*Hylobius rhizophagus* | | | cyfluthrin | **89/110** |
| **Pine shoot beetle**<br>*Tomicus piniperda* | new adults emerge<br><br>begin shoot-feeding<br>optimal control window | <br><br>500-550<br>450-500 | bifenthrin, chlorpyrifos, cyfluthrin | **90/111** |
| **pine spittlebug**<br>*Aphrophora parallela* | when 95% of spittle masses on pines are empty | late June to mid July | bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, esfenvalerate, spirotetramat | **92/113** |
| **pine thrips**<br>*Gnophothrips spp.* | | | acephate, azadirachtin, carbaryl, bifenthrin, malathion, oxydemeton-methyl, thiamethoxam | **45/51** |
| **pine tortoise scale**<br>*Toumeyella parvicornis* | egg hatch begins; 1st crawlers<br><br>egg hatch ends<br>crawlers settling | 400-500<br><br>1000-1200 | acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, horticultural oil, imidacloprid, insecticidal soap, malathion, oxydemeton-methyl, spirotetramat | **93/114** |
| **pine tube moth**<br>*Argyrotaenia pinatubana* | | | Insecticide rarely needed | **66/77** |
| **pine tussock moth**<br>*Dasychira pinicola* | larvae feeding on foliage | late May to mid June | acephate, azadirachtin, *Bacillus thuringiensis (Bt)*, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, emamectin benzoate, flubendiamide, insecticidal soap, methoxyfenozide,oxydemeton-methyl, phosmet, spinosad, tebufenozide | **67/78** |
| **pine webworm**<br>*Pococera robustella* | | | | **71/79** |
| **red-headed pine sawfly**<br>*Neodiprion lecontei* | 1st larvae | 400-600 | acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, esfenvalerate, imidacloprid, malathion, phosmet, spinosad, thiamethoxam | **68/80** |

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|---|---|---|---|---|
| **Saratoga spittlebug** *Aphrophora saratogensis* | When all or nearly all (90%) spittlemasses on sweetfern plants are empty. Control sweetfern in plantation. | late June to mid-July | bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, esfenvalerate, spirotetramat | **95/115** |
| **spruce budscale** *Physokermes piceae* | egg hatch, 1st crawlers | 700-1150 | acephate, azadirachtin, bifenthrin, buprofezin, carbaryl, chlorpyrifos, cyfluthrin, disulfoton, horticultural oil, insecticidal soap, malathion, oxydemeton-methyl, spirotetramat | **99/119** |
| **spruce budworm** *Choristoneura fumiferana* | 1st larvae | 200-300 | acephate, *Bacillus thuringiensis*, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, diflubenzuron, emamectin benzoate, esfenvalerate, flubendiamide, methoxyfenozide, spinosad, tebufenozide | **69/82** |
| **spruce-fir looper** *Macaria signaria* | | | bifenthrin, cyfluthrin, diflubenzuron, emamectin benzoate, methoxyfenozide, spinosad | **NA/83** |
| **spruce gall midge** *Mayetiola piceae* | adult emerge<br>eggs hatch (control window) | 70-100<br>130-145 | azadirachtin, carbaryl, chlorpyrifos, cyfluthrin, thiamethoxam | **NA/133** |
| **spruce needleminers** *Taniva albolineana, Epinotia nanana, Coleotchnites piceaella* | 1st larvae | 150-200 | bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, esfenvalerate, permethrin, spinosad | **70/84** |
| **spruce spider mite** *Oligonychus ununguis* | 1st egg hatch | 150-175 | abamectin, bifenthrin, bifenazate, chlorpyrifos, clofentezine, cyflumetofen, disulfoton, etoxazole, fenazaquin, hexythiazox, horticutural oil, insecticidal soap, oxydemeton-methyl, peppermint and rosemary oil, propargite, spirodiclofen | **51/84** |
| **striped pine scale** *Toumeyella pini (King)* | egg hatch | 750-800 | acephate, azadirachtin, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, horticultural oil, imidacloprid, insecticidal soap, malathion, oxydemeton-methyl, spirotetramat | **93/114*** |

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| **white grubs**<br>*Phyllophaga and Polyphylla spp.*<br>*Rhizotrogus majalis* | | | carbaryl, imidacloprid | **123/151** |
| **white pine weevil**<br>*Pissodes strobi* | 1st adults active<br><br>2nd adults active | 25-220<br><br>1200-1400 | acephate, azadirachtin, bifenthrin, chlorpyrifos, cyfluthrin, diflubenzuron, esfenvalerate, oxydemeton-methyl. phosmet | **101/122** |
| **Zimmerman pine moth**<br>*Dioryctria zimmermani* | 1st larvae<br><br>adult flight | 25-100<br><br>1700 | acephate, bifenthrin, chlorpyrifos, cyfluthrin, diflubenzuron, methoxyfenozide | **126/156** |

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