

Insecticides & Miticides for PA Christmas Tree Pests

PA Dept. of Agriculture, Bureau of Plant Industry

ALWAYS READ THE PRODUCT LABEL. THE LABEL IS THE LAW. CONSULT THE LABEL TO TARGET THE MOST APPROPRIATE LIFESTAGE OF THE PEST. For all pests, any recommendations for control are listed near the pest name.

(Document Key: **Active Ingredient (in bold)** = Bio-rational Product)

Active Ingredients

Adelgids (Cooley Spruce Gall, E. Spruce Gall, Pine Bark)

For controlling Pine Bark Adelgid, apply specifically labeled products from late April through May, when adelgids are active. To control over-wintering forms, apply Damoil before new growth starts. Cooley Spruce Gall Adelgids on Douglas-fir and Colorado Spruce and Eastern Spruce Gall Adelgid on Norway Spruce are best controlled in the over-wintering stage. Thorough coverage, including inner branches, is essential. Spray from mid-September through early October, or just before bud break in the spring, when temperatures are above 60°F. After bud break, chemical controls are not effective. If only a few galls are present, pruning and destroying unopened green galls before mid-July is recommended.

Carbaryl, Chlorpyrifos, Deltamethrin, Endosulfan, Imidacloprid, Oxydemeton-methyl, **Paraffinic Oil (Emulsified)**, **Petroleum Oil**, **Potassium Salts of Fatty Acids**

Aphids (Balsam Twig, Cinara sp., Spotted Pine, W. Pine)

Control over-wintering forms with Damoil or Ultra-Fine Oil. When aphids are active and before populations build to damaging levels, apply specifically labeled products.

Abamectin, Acephate, Acetamiprid, **Azadirachtin**, **Beauveria bassiana ATCC 74040**, Bifenthrin, Carbaryl, Chlorpyrifos, **Clarified Hydrophobic Extract of Neem Oil**, Cyfluthrin, Deltamethrin, Diazinon, Dimethoate, Dinotefuran, Esfenvalerate, Imidacloprid, Lambda-cyhalothrin, Malathion, Methiocarb, **Mineral Oil**, Naled, Oxydemeton-methyl, **Paraffinic Oil (Emulsified)**, **Petroleum Oil**, **Potassium Salts of Fatty Acids**, Pymetrozine, **Pyrethrins**, Pyriproxyfen, **Sorbitol Octanoate**, Sucrose Octanoate Esters, Thiamethoxam

Bagworm

When practical, hand pick over-wintering bags before June. If chemical control is necessary, spray when the bags are small (early to mid-June).

Acephate, **Azadirachtin**, **Bacillus thuringiensis subsp. kurstaki**, Bifenthrin, Carbaryl, Chlorpyrifos, Deltamethrin, Diazinon, Diflubenzuron, Dimethoate, Imidacloprid, Lambda-cyhalothrin, Malathion, **Pyrethrins**, **Spinosad**, Tebufenozide

Bark Beetles

Most bark beetles are secondary, attacking only dying or dead trees. Sanitation is important in reducing the effect of these pests.

Azadirachtin, Bifenthrin, Carbaryl, Chlorpyrifos

Gypsy Moth

Control when larvae are small (early to mid-May).

Acephate, **Azadirachtin**, **Bacillus thuringiensis subsp. aizawai**, **Bacillus thuringiensis subsp. kurstaki**, Bifenthrin, Carbaryl, Chlorpyrifos, Cyfluthrin, Deltamethrin, Diflubenzuron, Imidacloprid, Lambda-cyhalothrin, Oxydemeton-methyl, Phosmet, **Potassium Salts of Fatty Acids**, **Pyrethrins**, **Spinosad**, Tebufenozide

Midges (Douglas-fir Needle, Pine Needle)

Applications for Pine Needle Midge should be made to the top 1/3 of the tree, when the needles are beginning to elongate.

Acephate, **Azadirachtin**, Chlorpyrifos, Dimethoate, Esfenvalerate, Lambda-cyhalothrin, **Pyrethrins**

Mites

Effective mite control requires two sprays, 7-10 days apart, unless prohibited on the label. Monitor populations regularly and apply control when increases are noted. Most Eriophyid and Spider Mites on conifers are "cool season" mites, with peak populations in the spring and fall. To avoid resistance, use a different class of miticide every third application.

Abamectin, Acephate, Acequinocyl, **Azadirachtin**, **Beauveria bassiana ATCC 74040**, Bifenazate, Bifenthrin, Carbaryl, **Clarified Hydrophobic Extract of Neem Oil**, Chlorpyrifos, Clofentezine, Deltamethrin, Diazinon, Dimethoate, Etoxazole, Fenpropathrin, Fenpyroximate, Hexythiazox, Lambda-cyhalothrin, Malathion, Methiocarb, Naled, Oxydemeton-methyl, **Paraffinic Oil (Emulsified)**, **Petroleum Oil**, **Potassium Salts of Fatty Acids**, **Sorbitol Octanoate**, **Spinosad**, Spirodiclofen, Spiromesifen, Sucrose Octanoate Esters

Sawflies

Acephate, Acetamiprid, **Azadirachtin**, Bifenthrin, Carbaryl, Chlorpyrifos, Cyfluthrin, Deltamethrin, Diflubenzuron, Esfenvalerate, Imidacloprid, Lambda-cyhalothrin, **Mineral Oil**, **Paraffinic Oil (Emulsified)**, Phosmet, **Potassium Salts of Fatty Acids**, **Spinosad**

Active Ingredients

Scales (Cryptomeria, Elongate Hemlock, Pine Needle, Pine Tortoise, Striped Pine, Spruce Bud)

Scale control is generally directed toward the crawler stage and at least two applications, 7 days apart is recommended when crawlers are present. Striped Pine and Pine Tortoise scales can be controlled by a dormant spray of Ultra-Fine Oil or a crawler spray during late May through June. These scales (Striped Pine & Pine Tortoise) tend to be spotty and removal of a few infested trees prior to crawler emergence is effective in limiting spread.

Acephate, Azadirachtin, Bifenthrin, Buprofezin, Carbaryl, Chlorpyrifos, Dimethoate, Imidacloprid, **Mineral Oil**, Oxydemeton-methyl, **Petroleum Oil**, **Potassium Salts of Fatty Acids**, **Sorbitol Octanoate**, Sucrose Octanoate Esters, Thiamethoxam

Shoot & Tip Boring Moths (Eastern Pine Shoot Borer, European Pine Shoot Moth, Nantucket Pine Tip Moth)

Numerous compounds are specifically labeled for Eastern Pine Shoot Borer, European Pine Shoot Moth, and Nantucket Pine Tip Moth. Of these, Imidan 70-W is labeled for all three pests. To control Eastern Pine Shoot Borer, sprays should be applied in May to kill larvae before they bore into shoots. Most larvae have left shoots when damage is apparent and control will not be effective. Adults emerge from mid-April through June. Larvae of European Pine Shoot Moth should be controlled during the first two weeks of April, as they migrate to new shoots. Pines can also be treated in late-June or early-July, after eggs hatch. Nantucket Tip Pine Moth controls are directed at young larvae before they conceal themselves. Monitor adult emergence with pheromone traps and apply a registered insecticide 1-2 weeks after peak numbers of moths appear in traps (mid-May to mid-June). A second generation control may be needed between mid-July and late August, again based on male moth emergence.

Acephate, **Azadirachtin**, Bifenthrin, Carbaryl, Chlorpyrifos, Cyfluthrin, Deltamethrin, Diazinon, Diflubenzuron, Dimethoate, Esfenvalerate, Imidacloprid, Lambda-cyhalothrin, Malathion, **Mineral Oil**, Permethrin, Phosmet, **Pyrethrins**, **Spinosad**, Tebufenozide

Spittlebugs (Pine & Saratoga)

Adult spittlebugs should be controlled when 90% of the spittle masses are empty, usually in July.

Azadirachtin, Bifenthrin, Carbaryl, Chlorpyrifos, Cyfluthrin, Esfenvalerate, Imidacloprid, Lambda-cyhalothrin, Naled, **Pyrethrins**

Weevils (Northern Pine, Pales, Pine Root Collar, & White Pine)

Acephate, **Azadirachtin**, **Beauveria bassiana ATCC 74040**, **Beauveria bassiana Strain GHA**, Bifenthrin, Chlorpyrifos, Diflubenzuron, Esfenvalerate, Indoxacarb, Lambda-cyhalothrin, Naled, Oxydemeton-methyl, Phosmet, **Pyrethrins**

Zimmerman Pine Moth

Acephate, Bifenthrin, Chlorpyrifos, Diflubenzuron, Dimethoate, Endosulfan, Naled, Tebufenozide

Insecticide & Miticide Information

Call 1-800-PENN IPM (736-6476) for Christmas tree pest scouting reports (April through June; special report in early August)

Penn State Christmas trees website: <http://www.ctrees.cas.psu.edu/>

To view chemical labels, go to: <http://www.cdms.net/LabelsMsds/LMDefault.aspx?t=>

DISCLAIMER

This publication (prepared by the Dept. of Agriculture) contains information pertaining to pesticides currently registered by the Pennsylvania Department of Agriculture for distribution and sale in the Commonwealth of Pennsylvania. Where trade names are used, no discrimination is intended and no endorsement by the Pennsylvania Department of Agriculture is implied. There has been no attempt to rank chemicals in order of effectiveness. Every effort has been made to provide correct and up-to-date control suggestions. However, pesticide labels change constantly and human errors are possible. It is the applicator's responsibility to read the label before using any pesticide. Controls on this sheet supersede those given on sheets from previous years.

ALWAYS READ THE PESTICIDE LABEL TO DETERMINE SPECIFIC USES AND RATES BEFORE MIXING AND APPLYING THE COMPOUND. IF ANY QUESTIONS ARISE, CONTACT THE DEALER OR MANUFACTURER. IT IS ILLEGAL TO APPLY ANY PESTICIDE IN EXCESS OF LABELED RATES. LABELED USES MAY VARY FOR EACH FORMULATION OF THE SAME CHEMICAL. PURCHASE THE FORMULATION INTENDED FOR YOUR PARTICULAR USE.

Document Key

Active Ingredient | Chemical Class | IRAC # | Trade Names = Bio-rational Product

L = Need Special Local Needs Label

R = RESTRICTED USE PESTICIDE

IRAC Codes

The Insecticide Resistance Action Committee (IRAC) is a group whose members are companies manufacturing insecticides and acaricides and operating in the areas of crop protection, plant biotechnology, and/or public health. The mission of IRAC is to (a) aid communication and education on insecticide and acaricide resistance and (b) promote the development of resistance management strategies in crop protection and vector control to maintain efficiency and support sustainable agriculture and improved public health. The IRAC has developed a mode of action classification based upon known ways in which different products act. For more information, please visit <http://www.irac-online.org>.

Classification of Pesticides Listed under Each Pest

Knowledge of pesticide classification has become increasingly important in Christmas tree pest management programs. Using different classes of pesticides slows the development of resistance in the target pest, thus extending the useful life of chemicals, a worthwhile goal for all growers. It is important to rotate classes or different types of chemicals, not just brand names.

Class of Chemicals and Active Ingredients

The following table is arranged by active ingredients and linked to their respective chemical class, IRAC codes, and all trade names currently registered in Pennsylvania. **AS ALWAYS, READ AND FOLLOW ALL LABEL INSTRUCTIONS BEFORE USING ANY PESTICIDE PRODUCT. NEVER USE ANY PESTICIDE IN A MANNER INCONSISTENT WITH THE US EPA APPROVED LABELING!**

<u>Active Ingredient</u>	<u>Chemical Class</u>	<u>IRAC #</u>	<u>Trade Names</u>
abamectin	Macrocyclic Lactone	6	Minx (Cleary Chemicals Corp); Quali-Pro Abamectin 0.15 EC (FarmSaver.com LLC); Abacide 2 (J.J. Mauget Co); Flora-Mek 0.15EC (PROKoZ Inc); Lucid (Rotam North America Inc); Avid 0.15 EC (Syngenta Crop Protection Inc); Timectin 0.15 EC T&O (Tide International USA Inc)
acephate	Organophosphates	1B	Orthene Turf, Tree & Ornamental WSP (AMVAC Chemical Corp); ACE-jet (ARBORJET); Acephate 75SP (Control Solutions Inc.); Acephate 90 Prill (Makhteshim Agan of North America Inc.); Avatar (Phoenix Environmental Care LLC); Lepitect (Rainbow Treecare Scientific Advancements); Acephate 97 (Tenkoz Inc); Acephate 90% SP (Tide International USA Inc.); Acephate 97UP (United Phosphorus Inc)
acequinocyl		20B	Shuttle 15 SC (Arysta LifeScience North America LLC)
acetamiprid	Nicotinoid	4A	TriStar 30 SG (Cleary Chemicals Corp)
azadirachtin	Biological/Botanical	18B	Amazin Plus 1.2% ME, Ecozin Plus 1.2% ME (AMVAC Chemical Corp); Aza-Direct (Gowan Co); Ornazin 3% EC (SePRO Corp)
<i>Bacillus thuringiensis</i> subsp. <i>aizawai</i>	Microbials	11B1	XenTari (Valent Biosciences Corp)
<i>Bacillus thuringiensis</i> subsp. <i>kurstaki</i>	Microbials	11B2	Crymax & Javelin WG (Certis USA LLC); Biobit HP, DiPel ES, DiPel Pro DF, Foray 76B (Valent Biosciences Corp)

Active Ingredient	Chemical Class	IRAC #	Trade Names
<i>Beauveria bassiana</i> ATCC 74040	Microbials		Naturalis L (Troy Biosciences Inc)
<i>Beauveria bassiana</i> strain GHA	Microbials		BotaniGard 22 WP, BotaniGard ES, Mycotrol O (Laverlam International Corp)
bifenazate	Carbazate	25	Floramite SC (Chemtura USA Corp)
bifenthrin	Synthetic Pyrethroids	3	^R OynxPro & ^R Talstar Select (FMC Corp, Agricultural Products Group); ^R Bifen 2 AG Gold (J Oliver Products); ^R Menace GC 7.9% Flowable (Nufarm Americas Inc); ^R Firebird Pro (Phoenix Environmental Care LLC); ^R Bifenthrin 2 EC (Trace Mountain LLC); ^R UP-Star SC (United Phosphorous Inc)
buprofezin	Insect Growth Regulators	16	Talus 40SC & 70DF (SePRO Corp)
carbaryl	Carbamates	1A	Sevin 4F, 80 Solupak, 80S, 80WSP, SL, XLR Plus (Bayer CropScience LP, Bayer Environmental Science, LESCO Inc & PROKoZ Inc); Carbaryl 4L & 80S (Drexel Chemical Co & Loveland Products Inc)
chlorpyrifos	Organophosphates	1B	^R Nufos 4E (Cheminova Inc); ^R Dursban 50W, ^R Hatchet, ^R Lorsban 4E, ^R Lorsban Advanced (Dow AgroSciences LLC); ^R Chlorpyrifos 4E-AG (Drexel Chemical Co); ^R Quali-Pro Chlorpyrifos 4E (FarmSaver.com LLC); Lorsban 75WG (Gowan Co); ^R Whirlwind (Helena Chemical Co); ^R Warhawk (Loveland Products Inc); ^R Chlorpyrifos 4E AG (Makhteshim Agan of North America Inc); ^R Govern 4E (TENKOZ Inc); ^R Yuma 4E (Winfield Solutions LLC)
clarified hydrophobic extract of neem oil	Biological/Botanical		Triact 70 (OHP Inc)
clofentezine	Tetrazine	10A	Apollo SC (Makhteshim Agan of North America Inc); Ovation SC (The Scotts Co LLC)
cyfluthrin	Synthetic Pyrethroids	3	Decathlon 20 WP (OHP Inc)
deltamethrin	Synthetic Pyrethroids	3	^R DeltaGard GC 5 SC (Bayer Environmental Science)
diazinon	Organophosphates	1B	^R Diazinon 50W & AG500 (Makhteshim Agan of North America Inc)
diflubenzuron	Insect Growth Regulators	15	^R Dimilin 25W & ^R Dimilin 4L (Chemtura Corp)
dimethoate	Organophosphates	1B	Dimethoate 267 (Arysta LifeScience North America LLC); ^L Dimethoate 4E (Arysta LifeScience North America LLC, Cheminova Inc); Dimethoate 4EC (Drexel Chemical Co); Dimethoate 400 (Loveland Products Inc); Cygon 2E (Value Garden Supply); Dimate 4EC (Winfield Solutions LLC)
dinotefuran	Nicotinoid	4A	Safari 2 G & 20 SG (Valent USA Corp)
endosulfan	Organochlorine	2A	^R Endosulfan 3EC (Drexel Chemical Co); ^R Thionex 3EC (Makhteshim Agan of North America Inc)
esfenvalerate	Synthetic Pyrethroids	3	^R Asana XL (E.I. du Pont de Nemours & Co); ^R S-FenvaloStar (LG International (America) Inc); ^R Adjourn (Makhteshim Agan of North America Inc)
etoxazole	Oxazoline	10B	Tetrasan 5 WDG & Zeal (Valent USA Corp)
fenpropathrin	Synthetic Pyrethroids	3	Tame 2.4 EC Spray (Valent USA Corp)
fenpyroximate	Phenoxypryazoles	21	Akari 5SC (SePRO Corp)
hexythiazox	Tetrazine	10A	Hexygon DF & Savey DF (Gowan Co)
imidacloprid	Nicotinoid	4A	Impulse 1.6 FL (Albaugh, Inc); IMA-jet (ARBORJET); Provado 1.6F (Bayer CropScience LP); Couraze 1.6F (Cheminova Inc); Prey 1.6 & Sherpa (Loveland Products Inc); Pasada 1.6F (Makhteshim Agan of North America Inc); Nuprid 1.6F (Nufarm Americas Inc); Discus (OHP Inc); Xytect Infusible (Rainbow Treecare Scientific Advancements);
indoxacarb	Oxadiazine	22	^L Avaunt (E.I. du Pont de Nemours & Co)

Active Ingredient	Chemical Class	IRAC #	Trade Names
lambda-cyhalothrin	Synthetic Pyrethroids	3	^R Lambda T (Helena Chemical Co); ^R Kendo EC (Helm Agro US, Inc); ^R LambdaStar & ^R LambdaStar 1 CS (LG International (America) Inc.); ^R Silencer (Makhteshim Agan of North America Inc); ^R Kaiso 24WG (Nufarm Americas Inc); ^R Scimitar GC, ^R Warrior, ^R Warrior II (Syngenta Crop Protection Inc); ^R Province (Tenkoz, Inc); ^R Lambda-Cy EC (United Phosphorus Inc); ^R Grizzly Z & ^R Taiga Z (Winfield Solutions LLC)
malathion	Organophosphates	1B	Malathion 5EC (Arysta LifeScience North America LLC); 5 lb. Malathion Spray & Malathion 50% E.I. (Prentiss Inc)
methiocarb	Carbamates	1A	^R Mesuro 75-W (Gowan Co)
methidathion	Organophosphates	1B	^R Supracide 25-W & ^R Supracide 2E (Gowan Co)
mineral oil	Horticultural Oils		Omni Supreme Spray (Helena Chemical Co)
naled	Organophosphates	1B	^R Dibrom 8 Emulsive (Amvac Chemical Corp)
oxydemeton-methyl	Organophosphates	1B	^R MSR Spray Concentrate (Gowan Co)
paraffinic oil (emulsified)	Horticultural Oils		Ultra-Fine Oil (Whitmire Micro-Gen Research Laboratories Inc)
permethrin	Synthetic Pyrethroids	3	^R Ambush & Ambush 25W (Amvac Chemical Corp); ^R Perm-UP 25DF (United Phosphorous Inc)
petroleum oil	Horticultural Oils		Damoil (Drexel Chemical Co); Glacial Spray Fluid (Loveland Products Inc); PureSpray Green Spray Oil 10E (Petro-Canada); Ultra-Pure Oil (Whitmire Micro-Gen Research Laboratories, Inc)
phosmet	Organophosphates	1B	Imidan 70-W (Gowan Co)
potassium salts of fatty acids	Insecticidal Soaps		M-Pede (Dow AgroSciences LLC); Insecticidal Soap 40% (Value Garden Supply)
pymetrozine	Pyridine Azomethine	9B	Endeavor (Syngenta Crop Protection Inc)
pyrethrins	Synthetic Pyrethroids	3	Pyrenone Crop Spray (Bayer Environmental Science); Pyronyl Crop Spray (Prentiss Inc); Pyreth-It Formula 2 (Whitmire Micro-Gen Research Laboratories Inc)
pyriproxyfen	Insect Growth Regulators	7C	Distance (Valent USA Corp)
refined petroleum distillate	Horticultural Oils		
sorbitol octanoate	Synthetic Sucrose Esters		SorbiShield 90 (Natural Forces LLC)
spinosad	Spinosyn	5	Conserve SC, Entrust, SpinTor 2SC (Dow AgroSciences LLC)
spirodiclofen	Tetronic Acid	23	^L Envidor 2 SC (Bayer CropScience LP)
spiromesifen	Tetronic Acid	23	Judo (OHP Inc)
sucrose octanoate esters	Synthetic Sucrose Esters		SucraShield (Natural Forces LLC)
tebufenozide	Insect Growth Regulator	18A	Confirm 2F & Mimic 2LV (Dow AgroSciences LLC)
thiamethoxam	Nicotinoid	4A	Flagship 25WG (Syngenta Crop Protection Inc)