

Insecticides and Miticides for PA Christmas Tree Pests

Prepared by PA Dept Agriculture

*** Call 1-800-PENN IPM for Christmas tree pest scouting report (April through June) ***

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

To view chemical labels go to <http://www.cdms.net/manuf/manuf.asp>

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Aphids (balsam twig, *Cinara* sp., spotted pine, and white pine aphids): Control over-wintering forms with Damoil or Ultra-fine Spray Oil^k. When aphids are active and before populations build to damaging levels, apply Areca; Ardent 0.15 EC; Avid 0.15EC; Attain Nursery; *BifenthrinPro; Celero 16 WSG; *Chlorpyrifos Pro 2 or Pro 4 and 4E AG; Damoil^k; Decathlon 20; *DeltaGard GC; *Diazinon AG500 or 50W; Dibrom 8E; Dimethoate 4EC; Discus; Distance; Dormant Oil^k; *Dursban 50W *DuraGuard ME; Endeavor; Flagship 25WG; Imida E Pro 2F or AG 1.6F; Lorsban *4E, 50W and 75WG; Majesty; Malathion 5EC, 50% E, or 5lb Spray; Marathon II; *Mesuro 75% WP; *MSR Spray Concentrate; Naturalis-L; Omni Oil 6E; OnyxPro; Orthene TT&O Spray 97; Pasada 1.6F; Provado 1.6F¹; Pyrethrum TR; Pyrenone Crop Spray; Pyreth-it or formula 2; Pyromyl Crop Spray; Safari 20SG; *Scimitar; SunSpray 6E; *Talstar Nursery Flowable; Triact 70, TriStar 70 WSP; Ultra-fine Spray Oil; *Whirlwind or Wisdom Flowable. For **balsam twig aphid**, in addition to the above, use *Adjourn; *Asana XL¹; Carbaryl 80S or 4L¹ Dimethoate 4EC; *Lambda-T; Sevin¹ 4F, 80S, 80WSP, RP4, SL or XLR Plus; *Silencer or *Warrior. Products specifically labeled for **Balsam Woolly Adelgid**, *Adjourn; *Lambda-T; *Silencer; or *Warrior.

Bagworm: When practical, hand pick overwintering bags before June. If chemical control is necessary, spray with;; Attain Nursery; Azatin XL; *Bifenthrin Pro; Biobit HP; Carbaryl¹ 4L or 80S^c; *Chlorpyrifos Pro 2 or Pro 4; Conserve SC; Crymax; Decathlon 20;*DeltaGard GC; *Diazinon AG500 or 50W; Dimethoate 4EC; *Dimilin 4L or 25W; Dipel ES, DF or Pro DF; Discus; *Dursban 50W; Entrust; Foray 76B; Javelin WG; *Lambda-T; Lepinox WDG; Malathion 5EC, 50% E, or 5lb Spray; Mimic 2LV; OnyxPro; Orthene TT&O Spray 97; Ornazine 3%EC; *Permethrin 3.2AG; Pounce *25WP; Pyrenone Crop Spray; Pyreth-it formula 2; Pyromyl Crop Spray; *Scimitar; Sevin¹ 4F, 80S, 80WSP, RP4, SL or XLR Plus; *Silencer; Spintor 2SC; *Talstar Nursery Flowable; *Warrior; Wisdom Flowable or XenTari when bags are small (early to mid-June).

Bark beetles: Carbaryl¹ 4L or 80S; *Dursban 50W; OnyxPro; Ornazine 3%EC; and Sevin¹ 4F, 80S, 80WSP, RP4, SL or XLR Plus are labeled for various species of bark beetles on Christmas trees. Applications should be made to the trunk, when adult activity is noted. Most bark beetles are secondary, attacking only dead and dying trees; sanitation is important in reducing the effect of these pests. *Scimitar GC and *Talstar Nursery Flowable can be used for pine shoot beetle.

Gypsy moth: When larvae are still small (early to mid-May), apply Attain Nursery; *BifenthrinPro; Biobit HP; ,¹ 4L or 80S^c; *Chlorpyrifos Pro 2 or Pro 4 and 4E AG; Confirm 2F; Conserve SC; Crymax; Decathlon 20; *DeltaGard GC; *Dimilin 4L or 25W; Dipel ES, DF or Pro DF; Discus; *Dursban 50W; Entrust; Foray 76B; Imidan 70-W; Javelin WG; *Lambda-T; Lepinox WDG; Lorsban *4E, 50W, and 75WG; M-Pede; Mimic 2LV; *MSR Spray Consontrate; OnyxPro; Ornazine 3%EC; Orthene TT&O Spray 97; Pyrenone Crop Spray; Pyreth-it or Pyreth-it formula 2; Pyromyl Crop Spray; *Scimitar; Sevin¹ 4F, 80S, 80WSP, SL, RP4 or RP4; *Silencer; Spintor 2SC; *Talstar Nursery Flowable; TriStar 70 WSP; *Warrior or XenTari; or *Whirlwind.

Midges (Douglas fir needle midge, pine needle midge): Lorsban *4E, 50W and 75WG; Orthene TT&O Spray 97; and *Whirlwind are specifically labeled for Douglas fir needle midge and should be applied when adults are active. *Adjourn; *Asana XL¹; *Chlorpyrifos Pro 2 or 4E AG; *Dursban 50W;; Lorsban *4E and 75WG; and *Whirlwind are labeled for control of pine needle midge on Scotch pine. Applications for pine needle midge should be made to the top 1/3 of tree when needles are beginning to elongate. AZA-Direct; Ornazine 3%EC; Pyrenone Crop Spray; Pyreth-it formula 2; Pyromyl Crop Spray; and *Scimitar; are labeled for midges, in general.

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 spider mites and eriophyids on conifers are "cool season"

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mites, with peak populations in spring and fall. To avoid resistance, use a different class of miticide every third application.

Registered **general miticides** include Ardent 0.15 EC; Attain Nursery; Avid 0.15EC; AZA-Direct; *BifenthrinPro; *Chlorpyrifos Pro 2 or Pro 4 and 4E AG; Dimethoate 4EC; *DeltaGard GC; *Dursban 50W; Floramite SC; Judo; *Mesurol 75% WP; *MSR Spray Concentrate; Naturalis-L; OnyxPro; Ovation SC; Pyrethrum TR; Sulfur 6L; Sanmite 75WP; *Scimitar GC or Triact 70. Damoil and Ultra-fine Spray Oil^k can be used as a dormant spray for overwintering eggs. Additional compounds are labeled only for **spider mites**: Attain Nursery; *Chlorpyrifos 4E AG; Conserve SC; Damoil^k; *Diazinon AG500 or 50W; Dibrom 8E; *DuraGuard ME; Dormant Oil^k; Floramite SC; Hexygon DF; Lorsban *4E, 50W and 75WG; Malathion 5EC, 50% E, or 5lb Spray; M-Pede; Omni Oil 6E; Pyrethrum TR; Savey 50DF; Shuttle 15 SC; *Talstar Nursery Flowable; *Tame 2.4EC; TetraSan 5WDG; or *Whirlwind. **Eriophyid mites** are specified on Ardent 0.15 EC; Avid 0.15 EC; Carbarylⁱ 4L or 80S^c; Sevinⁱ 4F, 80S, 80WSP, RP4, SL and XLR Pro; Judo; Omni Oil 6E; SunSpray 6E and Ultra-fine Spray Oil.

Northern (Eastern) pine weevil: Can be controlled by eliminating suitable breeding material, including slash piles and stumps. *Adjourn (kerosene); *Asana XLⁱ, in kerosene, chlorpyrifos Pro 2 or Pro 4 and *Dursban 50W in water, can be used in early spring as a cut stump spray. Only stumps from previous season harvest need to be treated. If excessive adult feeding damage is occurring, AZA-Direct; *Bifenthrin Pro; Dibrom 8E; *Dimilin 4L^b or 25W^b; *Lambda-T; OnyxPro; Pyrenone Crop Spray; Pyromyl Crop Spray; *Silencer; *Talstar Nursery Flowable or Wisdom Flowable can be used as foliar sprays to protect valuable trees. Spraying with *Dursban 50W immediately after planting can protect pine seedlings.

Pales weevil: This weevil breeds in fresh stumps, dying trees, and slash piles of conifers, particularly Scotch pine. *Adjourn (kerosene); *Asana XLⁱ (kerosene); *Chlorpyrifos Pro 2 or Pro 4 and 4E AG (water); *Dursban 50W (water); Lorsban *4E, 50W and 75WG (water); or *Whirlwind(water) should be applied to stumps from the previous season harvest in early spring. Pre-plant dipping in *Furadan 4F (roots), or Imidan 70-W (tops) will protect seedlings. If adults are causing damage to valuable trees, Attain Nursery; AZA-Direct; *Bifenthrin Pro; *Chlorpyrifos Pro 2 or Pro 4 and 4E AG; Dibrom 8E; *Dursban 50W; Imidan 70-W; *Lambda-T; Lorsban *4E, 50W and 75WG; OnyxPro; Pyrenone Crop Spray; Pyromyl Crop Spray; *Silencer; *Talstar Nursery Flowable; *Warrior; *Whirlwind or Wisdom Flowable can be used as a foliar spray in spring or fall.

Pine bark adelgid: Apply Areca; *Chlorpyrifos Pro 2 or Pro 4; Damoil^k; Discus; Dormant^k Oil^k; *Dursban 50W; Imida E Pro 2F or AG 1.6F; Majesty; Marathon II; MSR Spray Concentrate; M-Pede; Provado 1.6Fⁱ; Omni Oil 6E; OnyxPro; SunSpray 6E; TriStar 70 WSP and Ultra-fine Spray Oil from late April through May, when adelgids are active. To control overwintering forms, apply Damoil or Dormant oil^k before new growth starts.

Pine root collar weevil: Attain Nursery; AZA-Direct; *Bifenthrin Pro; BotaniGard 22WP or ES; *DuraGuard ME; Imidan 70-W; *Lambda-T; Mycotrol O; Naturalis-L; OnyxPro; Orthene TT&O Spray 97; Pyrenone Crop Spray; *Scimitar GC; *Silencer; *Talstar Nursery Flowable or Wisdom Flowable are labeled for adult weevils.

Sawflies, general: *Adjourn; Areca; Azatin XL; Carbarylⁱ 4L, 80S; *Chlorpyrifos Pro 2 or Pro 4; Conserve SC; Damoil^k; Decathlon 20; *DeltaGard GC; *Dimilin 4L or 25W; Discus; Dormant Oil^k; *Dursban 50W; Entrust; Flagship 25 WG; Imida E Pro 2F or AG 1.6F; Imidan 70-W; *Lambda-T; Majesty; Marathon II; M-Pede; Omni Oil 6E; OnyxPro; Orthene TT&O Spray 97; Pasada 1.6F; Provado 1.6Fⁱ; *Scimitar; Sevinⁱ 4F, 80S, 80WSP, RP4, SL or XLR Plus; *Silencer; Spintor 2SC; SunSpray 6E; TriStar 70 WSP; Ultra-fine Spray Oil and *Warrior are labeled for sawfly control. In addition to these, *Adjourn; *Asana XLⁱ; *Chlorpyrifos 4E AG; *DeltaGard GC; Lorsban *4E, 50W and 75WG; Ornazine 3%EC; and *Whirlwind are labeled for **European pine sawfly**.

Scales (cryptomeria, elongate hemlock, pine needle, pine tortoise, striped pine, and spruce bud scales): Scale control is generally directed toward the crawler stage and at least two applications, 7 days apart, are recommended when crawlers are present. These materials are labeled for general scale control: Attain Nursery; Carbarylⁱ 4L, 80S; *Chlorpyrifos Pro 2, or Pro 4, and 4E AG; Decathlon 20; *DeltaGard GC; Dimethoate 4E; Discus; Dormant Oil^{ck}; *DuraGuard ME; *Lambda-T; Lorsban *4E, 50W and 75WG; Majesty; Marathon II; M-Pede; Omni Oil 6E; OnyxPro; Orthene TT&O Spray 97; Safari 20SG; Pyrethrum TR; *Scimitar GC; Sevinⁱ 4F, 80S, 80WSP, RP4, SL or XLR Plus; *Supracide 2E or 25W^f; SunSpray 6E; Talus; Triact 70; Ultra-fine Spray Oil; and *Whirlwind. Damoil may be used in dormant season. **Pine needle scale** can be controlled by using one of the above materials or *BifenthrinPro; *Diazinon AG500 or 50W; *Dursban 50W; *Lambda-T; Lime Sulfur Solution; Malathion 5 EC, 50% E, or 5lb Spray; *MSR Spray Concentrate; *Talstar

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Nursery Flowable; TriStar 70 WSP; *Warrior. or Wisdom Flowable when crawlers are present, generally late April or early May. Second generation crawlers will emerge in mid- to late July.

Striped pine and pine tortoise scales can be controlled by a dormant spray of Ultra-fine Spray Oil^k or a crawler spray during late May through June. Use one of the materials from the general list above to control these soft scale pests of Scotch pine. These scales tend to be spotty and removal of a few infested trees prior to crawler emergence is effective in limiting spread.

Shoot and tip boring moths: Numerous compounds are specifically labeled for **eastern pine shoot borer**, **European pine shoot moth**, and **Nantucket pine tip moth**. Of these, and Imidan 70-W are 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 pine tip 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. Additional compounds labeled for both **European pine shoot moth** and **Nantucket pine tip moth** include: Azatin XL; Carbarylⁱ 4L, 80S; Confirm 2F; Decathlon 20; Dimethoate 4EC; *Dimilin 4L or 25W; Discus; *Dursban 50W; Mimic 2LV; Pyrenone Crop Spray; Pyromyl Crop Spray; and Sevinⁱ 4F, 80S, 80WSP, RP4, SL or XLR Plus. Additional materials labeled for **European pine shoot moth** only include *Chlorpyrifos 4E AG; *Diazinon AG500 or 50W; Lorsban *4E, 50W and 75WG; Malathion 5EC, 50%E, or 5lb Spray; Pyreth-it formula 2 and *Whirlwind. Materials only for use against **Nantucket pine tip moth** include *Adjourn; *Ambush 25W; *Asana XLⁱ; *BifenthrinPro; *Chlorpyrifos Pro 2, and Pro 4; Conserve SC; *DeltaGard GC; Entrust; *Lambda-T; OnyxPro; Ornazine 3%EC; Orthene TT&O Spray 97; *Permethrin 3.2EC; Pounce *25WP; Majesty; Marathon II; *Scimitar; Spintor 2SC; *Silencer; *Talstar Nursery Flowable; or *Warrior.

Spittlebugs: Adult spittlebugs should be controlled when 90% of the spittle masses are empty, usually in July. *Adjourn; *Asana XLⁱ; *Chlorpyrifos Pro 2, Pro 4, or 4E AG; Decathlon 20; *DeltaGard GC; Dibrom 8E; Discus; *Dursban 50W; *Lambda-T; Lorsban *4E, 50W and 75WG; OnyxPro; Ornazine 3%EC; Pyrenone Crop Spray; Pyromyl Crop Spray; *Scimitar; *Silencer; *Warrior; or *Whirlwind may be used for **pine spittlebug** and **Saratoga spittlebug**. Carbarylⁱ 4L or 80S and Sevinⁱ 4F, 80S, 80WSP, RP4, SL or XLR Plus are only labeled for **pine spittlebug**.

Spruce gall adelgids: Cooley gall adelgids on Douglas fir and Colorado spruce, and **Eastern spruce gall adelgid** on Norway spruce are best controlled in the overwintering stage. Thorough coverage, including inner branches, is essential. Spray from mid-September through early October, or just before bud break in spring, when temperatures are above 60° F.

Registered materials include Areca; Carbarylⁱ 4L or 80S; *Chlorpyrifos Pro 4, Pro 2 or 4E AG; Damoil^k; *DeltaGard GC; Discus; Dormant Oil^k; *Dursban 50W; Lorsban *4E, 50W and 75WG; Majesty; Marathon II; *MSR Spray Concentrate; M-Pede; Provado 1.6Fⁱ; Omni Oil 6E; OnyxPro; Pasada 1.6F; Sevinⁱ 4F, 80S, 80WSP, RP4, SL or XLR Plus; SunSpray 6E; TriStar 70 WSP; Ultra-fine Spray Oil^k; and *Whirlwind. After budbreak, chemical controls are not effective. If only a few galls are present, pruning and destroying unopened green galls before mid-July is recommended.

White pine weevil: Attain Nursery; Avaunt; AZA-Direct; *Bifenthrin Pro; Dibrom 8E; *Dimilin 4L^b or 25W^b; *Lambda-T; *MSR Spray Concentrate; OnyxPro; Pyrenone Crop Spray; Pyromyl Crop Spray; *Silencer; *Talstar Nursery Flowable; *Warrior or Wisdom Flowable may be used to control adult weevils by application to the top 1/3 of the tree in early spring, when adult weevils are active. Pruning and destroying infested terminals before adults emerge in mid-July will give some control.

Zimmerman pine moth: Apply Dibrom 8E; Dimethoate 4EC; *Dimilin 4L or 25W; *Dursban 50W; Endosulfan 3EC; Mimic 2LV; OnyxPro; or Thionex 3EC from early April through early May to control overwintering larvae before they enter stem.

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<u>Class of Chemical</u>	<u>Active ingredient</u>	<u>Products (Manufacturers)</u> Areca
Acequinocyl	acequinocyl	Shuttle 15 SC (Arysta LifeScience)
Biological/ Botanical	azadirachtin pyrethrin	AZA-Direct (Gowan); Azatin XL (OPH); Triact 70 (OHP) Pyreth-it or Pyreth-it Formula 2 (Whitmire); Pyrenone Crop Spray (BayerEnviro Sci/Aventis Enviro Sci.); Pyrethrum TR (Whitmire micro-gen); Pyromyl Crop Spray(Prentis);
Carbamates	carbaryl	Carbaryl ⁱ 4L or 80S (Drexel); Sevin ⁱ Brand 4F, 80S, 80WSP, RP4, and XLR Plus (Bayer Crop Science); Chipco Sevin ⁱ SL, and 80WSP (Bayer/Aventis Enviro Sci)
	carbofuran	*Furadan 4F (FMC)
	hexythiazox methiocarb	Hexygon DF (Gowan); Savey 50DF (Gowan) *Mesurool 75% WP(Gowan)
Carbazate	bifenazate	Floramite SC (Crompton); Attain Nursery (Whitmire micro-gen)
Hydrocarbon	endosulfan	Endosulfan 3EC (Drexel); Thionex 3EC (Makhteshim)
Insect Growth Regulator	diflubenzuron	*Dimilin 4L and 25W (Chemtura)
	pyriproxyfen	Distance (Valent U.S.A.)
	Tebufenozide	Confirm 2F and Mimic 2LV (Dow Agriscience)
Macrocyclic lactone	abamectin	Avid 0.15EC and Ardent 0.15 EC (Syngenta)
Microbials	<i>Bacillus</i> <i>thuringiensis</i> <i>Beauveria bassiana</i>	Biobit HP (Valent Biosci); Crymax (Certis); Dipel ES, DF or Pro DF and Foray 76B (Valent Bioscience); Javelin WG (Certis); Lepinox WDG (Certis); XenTari (Valent BioSci.) Naturalis-L (Troy Bioscience); BotaniGard ES and 22WP; Mycotrol O (Eernald BioAgriculture)
Nicotinoid	dinotefuran	Safari 20 SG (Valent USA)
	imidacloprid	Provado 1.6 Flowable (Bayer Crop Science); Majesty, Areca, and Marathon II (OHP); Pasada 1.6 (Makhteshim); Imida E AG 1.6F or ImidaE Pro 2 F (Etigra).
	thiamethoxam	Flagship 25WG (Syngenta)
	Acetamiprid Clothianidin	TriStar 70WSP(Cleary and Nippon Soda Co.) Celerio 16 WSG (Arysta LifeScience)
Organophosphates	acephate	Orthene TT&O Spray 97 (Valent U.S.A.)
	chlorpyrifos	*Chlorpyrifos Pro 2, Pro 4 (Micro Flo); *Chlorpyrifos 4E AG (Drexel, *Makhteshim, and Micro Flo); *DuraGuard ME (Whitmire Research Lab); *Dursban 50W and *Lorsban-4E, 75WG and 50W (Dow AgroSciences); Lorsban 75WG (Gowan); *Whirlwind (Helena).
	Diazinon	*Diazinon 50W and AG500 (Makhteshim)
	dimethoate	Dimethoate 4EC (Micro Flo)
	malathion	Malathion 5EC (Micro Flo and Drexel Chemical); 5lb. or 50% Malathion Spray (Prentiss);
	methidathion	*Supracide 25W ^f and 2E (Gowan)
naled	Dibrom 8E (AMVAC)	
oxydemeton-methyl	*MSR Spray Concentrate (Gowan)	
phosmet	Imidan 70-W (Gowan)	
Oxadiazine	Indoxacarb	Avaunt (DuPont)
Petroleum oils	horticultural oil	Damoiil ^h (Drexel); SunSpray 6E, and Ultra-FineSpray Oil (Sun Co.); Ultra-fine Oil (Whitmire Research Lab.); Omni Oil 6E (Helena);
Potassium salt of fatty acid	insecticidal soap	M-Pede (Dow AgroSciences)
Pyridine azomethine	pymetrozine	Endeavor (Syngenta)
Pyridazinone	pyridaben	Sanmite 75WP (BASF)
Spinosyn	spinosad	Conserve SC, Entrust and Spintor 2SC (Dow AgroSciences)
	calcium polysulfide sulfur	Lime Sulfur Solution (Miller) Sulfur 6L (Micro Flo)
Tetrazine	clofentezine	Ovation SC (Scotts-Sierra)
Tetronic Acid	Spiromesifen	Judo (OHP)
Synthetic pyrethroids	bifenthrin	*BifenthrinPro (BASF); *Talstar Nursery Flowable (FMC); Wisdom Flowable (AMVAC); OnyxPro (FMC); Floramite SC (Chemtura).
	Cyfluthrin	Decathlon 20 WP and Discus (OHP)
	deltamethrin	*DeltaGard GC (Bayer Enviro Sci/Aventis Enviro Sci)
	fenvalerate	*Asana XL (Dupont)
	fenpropathrin	*Tame 2.4EC (Valent U.S.A.)
	lambda-cyhalothrin	*Lambda-T (Helena); *Scimitar GC and *Silencer (Makhteshim); *Warrior (Syngenta);
	permethrin esfenvalerate	*Ambush 25W (AmVac); Permethrin 3.2AG (MicroFlo, or Helena); *Pounce 25WP (FMC) * Adjourn (Makhteshim)
Oxazolone	etoxazole	TetraSan 5WDG (Valent USA)

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