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Chemical Control of Common Forest and Shade Tree Pests

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CHEMICAL CONTROL OF COMMON FOREST & SHADE TREE PESTS

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Nebraska Forest Service / University of Nebraska Lincoln
March 2008

This information is intended as a guide to the chemical control of common insect pests and diseases of forest and shade trees. This is not a complete list of all pesticides available. Other methods of control that do not involve the use of pesticides may be effective against certain pests and should be considered before a pesticide is used. Trade names have been used for convenience. No endorsement is implied, and no discrimination against similar products not listed is intended. No guarantee of effectiveness is made. **Some pesticides may not be appropriate for certain trees or pests or under certain conditions. Always read and follow the instructions and precautions on the pesticide container.**

CONIFER INSECTS

Insect	Tree	Application Number and Date	Pesticide
Aphids	Pine	1	Throughout the growing season as they appear (May to September). Horticultural oil / Growing season oil Insecticidal soap brands: Safer, Concern Imidacloprid Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP* Acephate Orthene Bonide Systemic Insect Control Permethrin Eight Astro* Licensed applicators only Deltamethrin DeltaGard T&O* Commercial use only
		1	Soil treatment: Use prior to infestation if a serious problem is expected. Has a 60-day translocation delay. Imidacloprid Bayer Advanced Tree & Shrub Insect Control Earl May Tree & Shrub Insect Control Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP*
Bagworms	Juniper	1	After eggs hatch and small bags appear (late May to June). Can also hand pick bags before eggs hatch. Bt <i>Bacillus thuringiensis</i> Dipel Thuricide Tebufenozide Mimic 2LV* Spinosad Ferti-lome Borer, Bagworm, Leafminer & Tent Caterpillar Spray Monterey Garden Insect Spray Conserve* Permethrin Eight Hi-Yield 38 Plus Astro* Licensed applicators only PermethrinPro* Licensed applicators only Deltamethrin DeltaGard T&O* Commercial use only Carbaryl Sevin Acephate Orthene Bonide Systemic Insect Control Malathion

* Pesticides marked with an asterisk (*) generally must be ordered from a chemical distributor or agricultural coop.

CONIFER INSECTS (CONT.)

Insect	Tree	Application Number and Date	Pesticide
Ips bark beetles	Pine	1	Apply in April prior to earliest beetle attack or when recently cut pine logs are brought near living pines.
			<p>Carbaryl Sevin XLR Plus, SL* Carbaryl 4L*</p> <p>Permethrin Hi-Yield 38 Plus Astro* Licensed applicators only PermethrinPro* Licensed applicators only Perm-Up* Restricted Use</p> <p>Bifenthrin Onyx*</p>
Pales weevil	Scotch & White pines	1	Apply as a drench on cut stumps and surrounding soil in spring (April).
			<p>Chlorpyrifos (Restricted Use) Chlorpyrifos Pro 2* For nurseries, industrial sites and road medians Dursban 50W* For nurseries</p>
Pine bark adelgid	Pine	1	In dormant season just before bud break (April).
		1+	Throughout the growing season as they appear (May to September).
		1	Soil treatment: Use prior to infestation if a serious problem is expected. Has a 60-day translocation delay.
			<p>Dormant oil Horticultural oil / Growing season oil</p> <hr/> <p>Horticultural oil / Growing season oil Insecticidal soap brands: Safer, Concern</p> <p>Imidacloprid Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP*</p> <p>Deltamethrin DeltaGard T&O* Commercial use only</p> <hr/> <p>Imidacloprid Bayer Advanced Tree & Shrub Insect Control Earl May Tree & Shrub Insect Control Merit 2F, 75WSP, 75WP*</p>
Pine needle scale	Pine Spruce	2-3	When eggs hatch and red crawlers appear (late May or early June). Repeat once or twice at 7 to 10-day intervals (Unless prohibited by the label, e.g. oil). Also when eggs hatch in July.
Pine tip moth	Pine	2-4	Third week of May and first week of July. Better control if also second week of June and third week of July.
			<p>Acephate Orthene Bonide Systemic Insect Control</p> <p>Dimethoate* Commercial sites only</p> <p>Carbaryl Sevin</p> <p>Permethrin Hi-Yield 38 Plus Astro* Licensed applicators only</p> <p>Deltamethrin DeltaGard T&O* Commercial use only</p> <p>Tebufenozide Mimic 2LV*</p>

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CONIFER INSECTS (CONT.)

Insect	Tree	Application Number and Date	Pesticide
Sawflies	Pine	1 When larvae appear (mid-to late April).	<p>Permethrin Hi-Yield 38 Plus Astro* Licensed applicators only</p> <p>Deltamethrin DeltaGard T&O* Commercial use only</p> <p>Carbaryl Sevin</p> <p>Acephate Orthene Bonide Systemic Insect Control</p> <p>Imidacloprid Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP*</p>
Spruce needle miner	Spruce	1 When current-year damage is first observed (June).	<p>Carbaryl Sevin</p>
Spruce spider mite	Spruce Juniper Pine	1 In dormant season just before bud break (April).	<p>Dormant oil Horticultural oil / Growing season oil Oil will remove blue needle color</p>
		2 When mites are detected (April to May, and September to October). Make a second application 7 to 10 days later with a different or same product according to label directions. (A different product will reduce development of resistance.) A hard spray with water will help keep populations down.	<p>Horticultural oil / Growing season oil Oil will remove blue needle color.</p> <p>Insecticidal soap brands: Safer, Concern</p> <p>Bifenazate Floramite, Floramite sc*</p> <p>Hexythiazox Hexygon DF* Commercial use only</p> <p>Spiromesifen Forbid 4L*</p> <p>Etoxazole TetraSan 5WDG*</p> <p>Abamectin Avid 0.15EC*</p> <p>Acephate+fenbutatin-oxide Ortho Systemic Insect Killer</p>
Twospotted spider mite	Juniper Pine Spruce	2 When mites are detected (April through summer). Make a second application 7 to 10 days later with a different or same product according to label directions. (A different product will reduce development of resistance.) A hard spray with water will help keep populations down.	<p>Horticultural oil / Growing season oil Oil will remove blue needle color.</p> <p>Insecticidal soap brands: Safer, Concern</p> <p>Bifenazate Floramite, Floramite sc*</p> <p>Hexythiazox Hexygon DF* Commercial use only</p> <p>Spiromesifen Forbid 4L*</p> <p>Etoxazole TetraSan 5WDG*</p> <p>Abamectin Avid 0.15EC*</p> <p>Acephate+fenbutatin-oxide Ortho Systemic Insect Killer</p>

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CONIFER INSECTS (CONT.)

Insect	Tree	Application Number and Date	Pesticide
Zimmerman pine moths (<i>Dioryctria</i> species)	Pine	2 Second week of April and second week of August. Use rate for borers and apply to trunk and major branches.	Permethrin Hi-Yield 38 Plus Super Eight Astro* Licensed applicators only PermethrinPro* Licensed applicators only Perm-Up* Restricted Use Chlorpyrifos (Restricted Use) Chlorpyrifos Pro 2* For nurseries, industrial sites and road medians Dursban 50W* For nurseries
		Before the end of April if too late for the April spray above.	Dimethoate* Commercial sites only

* Pesticides marked with an asterisk (*) generally must be ordered from a chemical distributor or agricultural coop.

CONIFER DISEASES

Disease	Tree	Application Number and Date	Pesticide
Brown spot	Scotch & White pines	1-2 When new needles are nearly half grown (mid-June). Repeat 3 to 4 weeks later if frequent rains occur.	Chlorothalonil Fung-onil Daconil Weather Stik* Bravo Weather Stik* Bordeaux mixture Mancozeb Dithane 75DF, F45* Fore 80WP* Protect T/O, DF*
Cercospora blight	Juniper Redcedar	2+ Mid-June and late July. Additional sprays at monthly intervals may be necessary if frequent rains occur in August and September. Use of a spreader-sticker may increase effectiveness.	Copper salts of fatty and rosin acids Camelot* Bordeaux mixture See note next page‡ Mancozeb Dithane 75DF* Fore 80WP* Pentathlon LF, DF* Protect T/O, DF*
Cyclaneusma needlecast	Pine (mostly Scotch)	4+ Before bud break (April). Repeat at 6 to 8-week intervals until fall or monthly during periods of frequent rainfall.	Chlorothalonil Daconil Weather Stik* Bravo Weather Stik* Mancozeb Dithane 75DF* Fore 80WP* Protect T/O, DF*
Dothistroma needle blight	Austrian pine	2 As needles are emerging (mid-May) and after new growth has occurred (mid- to late June).	Copper salts of fatty and rosin acids Camelot* Bordeaux mixture
Phomopsis blight	Juniper Redcedar	2+ Every 7 to 10 days during wet periods in spring and summer (usually May to June).	Thiophanate-methyl Bonomyl 3336 F, WP* Fungo Flo, 50WSB* OHP 6672 50W* Not for homeowner use Mancozeb Dithane 75DF* Fore 80WP* Pentathlon LF, DF* Protect T/O, DF* Propiconazole Banner-MAXX*
Pine wilt	Scotch pine	1 Trunk inject once before symptoms appear.	Abamectin Greyhound* For professional use only
Rhizosphaera needlecast	Spruce (mostly Colo. blue)	2+ When shoots are 1/2 to 2 inches in length (May) and 3 to 4 weeks later. If frequent rains occur, spray every 10-14 days through early July.	Chlorothalonil Fung-onil Daconil Weather Stik* Bravo Weather Stik* Bordeaux mixture
Sirococcus shoot blight	Spruce (Colo. blue, Norway)	2 When shoots are 1/2 to 2 inches in length (May) and 3 to 4 weeks later.	Chlorothalonil Daconil Weather Stik* Bravo Weather Stik*

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CONIFER DISEASES (CONT.)

Disease	Tree	Application Number and Date	Pesticide
Sphaeropsis (Diplodia) blight	Pine	3	First at bud break (April), second just before needles emerge, third 10 days later.
		2	During third week of April and 10 to 14 days later.

Thiophanate-methyl
Bonomyl
3336 F, WP*
Fungo Flo, 50WSB*
OHP 6672 50W* **Not for homeowner use**

Propiconazole
Banner-MAXX*

Bordeaux mixture
Copper salts of fatty and rosin acids
Camelot*

‡ **Note:** The label for Bordeaux mixture does not state that the product will control *Cercospora* blight. Although research conducted in Nebraska has shown this product can be effective in controlling this disease, no guarantee of effectiveness is made.

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BROADLEAF INSECTS

Insect	Tree	Application Number and Date	Pesticide
Aphids	Many trees	1+ Throughout the growing season as they appear (May to September).	Insecticidal soap brands: Safer, Concern Horticultural oil / Growing season oil Imidacloprid Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP* Acephate Orthene Bonide Systemic Insect Control Malathion Permethrin Eight Astro* Licensed applicators only Deltamethrin DeltaGard T&O* Commercial use only
Ash leaf-curling aphid	Ash	1 Just as leaves begin to curl (May).	Imidacloprid Merit 2F, 75 WSP, 75WP* Xytect 2F, 75WSP* Acephate Orthene Bonide Systemic Insect Control
		1 Soil treatment: Apply in March to be effective in May. Has a 60-day translocation delay.	Imidacloprid Bayer Advanced Tree & Shrub Insect Control Earl May Tree & Shrub Insect Control Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP*
Ash sawfly	Ash	1 When larvae appear (mid-to late April).	Insecticidal soap brands: Safer, Concern Carbaryl Sevin Acephate Orthene Bonide Systemic Insect Control Deltamethrin DeltaGard T&O* Commercial use only Imidacloprid Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP*

* Pesticides marked with an asterisk (*) generally must be ordered from a chemical distributor or agricultural coop.

BROADLEAF INSECTS (CONT.)

Insect	Tree	Application Number and Date	Pesticide
Bronze birch borer	Birch	2	Spray trunk and branches throughout the tree in late May. Repeat in 3 weeks.
			<p>Permethrin Hi-Yield 38 Plus Astro* Licensed applicators only PermethrinPro* Licensed applicators only Perm-Up* Restricted Use Chlorpyrifos (Restricted Use) Chlorpyrifos Pro 2* For nurseries, industrial sites and road medians Dursban 50W* For nurseries</p> <p>Bifenthrin Onyx*</p>
		1	Soil treatment: Apply in March to be effective in May. Has a 60-day translocation delay.
		1	Trunk inject once if too late to spray.
Elm leaf beetle	Elm	1	When larvae appear (May).
			<p>Imidacloprid Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP*</p> <p>Spinosad Ferti-lome Borer, Bagworm, Leafminer & Tent Caterpillar Spray Monterey Garden Insect Spray Conserve*</p> <p>Permethrin Eight Astro* Licensed applicators only</p> <p>Deltamethrin DeltaGard T&O* Commercial use only</p> <p>Carbaryl Sevin</p> <p>Acephate (NOT for American elm) Orthene Bonide Systemic Insect Control</p>

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1	Soil treatment: Apply in March or previous fall to be effective in May. Has a 60-day translocation delay.	Imidacloprid Bayer Advanced Tree & Shrub Insect Control Earl May Tree & Shrub Insect Control Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP*
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BROADLEAF INSECTS (CONT.)

Insect	Tree	Application Number and Date	Pesticide	
<p><i>As of the date of this publication emerald ash borer is not known to occur in Nebraska.</i></p> <p><i>If you think you have found emerald ash borer please contact:</i></p> <p>Nebr Dept of Ag: 402-471-2394 or Nebr Forest Service: 402-472-2944</p>	Ash	1	Soil treatment: Apply in March or previous fall to be effective in May. Has a 60-day translocation delay.	Imidacloprid Bayer Advanced Tree & Shrub Insect Control Earl May Tree & Shrub Insect Control Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP*
		1	Trunk inject once in late May.	Imidacloprid Pointer* For professional use only Imicide Hp*
		2+	Spray entire canopy, trunk and branches in late May. Repeat one or more times at 3-4 week intervals.	Bifenthrin Onyx* Cyfluthrin Tempo SC Ultra, UltraUP, UltraWSP* Carbaryl Sevin 80WSP, SL*
Fall webworm	Cottonwood	1	When caterpillars and their webs appear (July).	Bt <i>Bacillus thuringiensis</i> Dipel Thuricide Tebufenozide Mimic 2LV* Spinosad Ferti-lome Borer, Bagworm, Leafminer & Tent Caterpillar Spray Monterey Garden Insect Spray Conserve* Permethrin Hi-Yield 38 Plus Astro* Licensed applicators only Deltamethrin DeltaGard T&O* Commercial use only Carbaryl Sevin

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Greenstriped mapleworm	Maple	1	When larvae appear (June). Repeat for second generation if needed.	Bt <i>Bacillus thuringiensis</i> Dipel Spinosad Ferti-lome Borer, Bagworm, Leafminer & Tent Caterpillar Spray Monterey Garden Insect Spray Conserve* Permethrin Hi-Yield 38 Plus Astro* Licensed applicators only Deltamethrin DeltaGard T&O* Commercial use only Carbaryl Sevin
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Honeylocust plant bug	Honeylocust	1	When leaves fail to appear after budbreak (May) and small green bugs are present.	Insecticidal soap brands: Safer, Concern Horticultural oil / Growing season oil
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BROADLEAF INSECTS (CONT.)

Insect	Tree	Application Number and Date	Pesticide
Lace bugs	Sycamore Hackberry Oak Linden	1	When feeding damage (small yellow spots) and insects appear (June). Insecticidal soap brands: Safer, Concern Horticultural oil / Growing season oil Permethrin Hi-Yield 38 Plus Astro* Licensed applicators only Deltamethrin DeltaGard T&O* Commercial use only Imidacloprid Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP* Acephate Orthene Bonide Systemic Insect Control Malathion
		1	Soil treatment: Apply in April to be effective in June. Has a 60-day translocation delay. Imidacloprid Bayer Advanced Tree & Shrub Insect Control Earl May Tree & Shrub Insect Control Merit 2F, 75WSP, 75WP* Xytect 2F, 75WSP*
Lilac (ash) borer	Ash	2	Spray trunk and large branches around May 10. Repeat in 3 weeks. Permethrin Hi-Yield 38 Plus Super Eight Astro* Licensed applicators only PermethrinPro* Licensed applicators only Perm-Up* Restricted Use Chlorpyrifos (Restricted Use) Chlorpyrifos Pro 2* For nurseries, industrial sites and road medians Dursban 50W* For nurseries Bifenthrin Onyx*

* Pesticides marked with an asterisk (*) generally must be ordered from a chemical distributor or agricultural coop.

Mimosa webworm	Honeylocust	1	When webs first appear (early June). Repeat for second generation in August if needed.	Bt <i>Bacillus thuringiensis</i> Dipel Spinosad Ferti-lome Borer, Bagworm, Leafminer & Tent Caterpillar Spray Monterey Garden Insect Spray Conserve* Deltamethrin DeltaGard T&O* Commercial use only Acephate Orthene Bonide Systemic Insect Control
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Oystershell scale	Ash Maple	2	When eggs hatch and light-yellow crawlers appear (late May). Repeat in 7 to 10 days (Unless prohibited by the label, e.g. oil). Repeat at August egg hatch if needed.	Horticultural oil / Growing season oil Oil may damage some maples Insecticidal soap (NOT for some maples) brands: Safer, Concern Acephate (NOT for some maples) Orthene Bonide Systemic Insect Control Malathion
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BROADLEAF INSECTS (CONT.)

Insect	Tree	Application Number and Date	Pesticide
Peach tree borer	Peach Cherry Plum	3 Some chemicals cannot be used on trees grown for fruit production/consumption.	Permethrin Super Eight Eight Astro* Licensed applicators only Perm-Up* Restricted Use
Spider mites	Many trees	2 When mites are present (as early as April, but mostly June through August). Make a second application 7 to 10 days later with a different or same product according to label directions. (A different product will reduce development of resistance.)	Horticultural oil / Growing season oil Insecticidal soap brands: Safer, Concern Bifentazate Floramite, Floramite sc* Hexythiazox Hexygon DF* Commercial use only Spiromesifen Forbid 4L* Etoxazole TetraSan 5WDG* Abamectin Avid 0.15EC* Acephate+fenbutatin-oxide Ortho Systemic Insect Killer

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Tent caterpillars	Plum Cherry Apple Crabapple	1	When caterpillars and their webs appear (April). Some chemicals cannot be used on trees grown for fruit production/consumption.	Bt <i>Bacillus thuringiensis</i> Dipel Thuricide Tebufenozide Mimic 2LV* Spinosad Ferti-lome Borer, Bagworm, Leafminer & Tent Caterpillar Spray Monterey Garden Insect Spray Conserve* Permethrin Eight Hi-Yield 38 Plus Astro* Licensed applicators only Deltamethrin DeltaGard T&O* Commercial use only Carbaryl Sevin Acephate (NOT for crabapple) Orthene Bonide Systemic Insect Control Malathion
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BROADLEAF INSECTS (CONT.)

Insect	Tree	Application Number and Date	Pesticide
Walnut caterpillar	Walnut	1	When caterpillars appear (June). Bt <i>Bacillus thuringiensis</i> Dipel Spinosad Ferti-lome Borer, Bagworm, Leafminer & Tent Caterpillar Spray Monterey Garden Insect Spray Conserve* Permethrin Hi-Yield 38 Plus Astro* Licensed applicators only Deltamethrin DeltaGard T&O* Commercial use only Carbaryl Sevin

* Pesticides marked with an asterisk (*) generally must be ordered from a chemical distributor or agricultural coop.

BROADLEAF DISEASES

Disease	Tree	Application Number and Date	Pesticide
Anthracnose	Sycamore	3-4 At budbreak (mid-April) and repeat 2 or 3 times at 7 to 14-day intervals.	Chlorothalonil Fung-onil Daconil Weather Stik* Thiophanate-methyl Bonomyl 3336 F, WP* Fungo Flo, 50WSB* OHP 6672 50W* Not for homeowner use Copper salts of fatty and rosin acids Camelot* Bordeaux mixture
	Ash Maple Oak Walnut	3-4 At budbreak (mid-April) and repeat 2 or 3 times at 7 to 14-day intervals. Damage is seldom serious enough to justify a treatment.	Thiophanate-methyl ash, maple, oak, walnut Bonomyl 3336 F, WP* Fungo Flo, 50WSB* OHP 6672 50W* Not for homeowner use Chlorothalonil ash, maple, walnut Daconil Weather Stik* Copper salts of fatty and rosin acids maple, oak Camelot* Bordeaux mixture ash, maple, oak, walnut Propiconazole walnut Infuse Ferti-lome Liquid Systemic Fungicide Banner-MAXX* Mancozeb Dithane 75DF* white ash, walnut Fore 80WP* white ash, walnut Pentathlon LF, DF* ash, oak, walnut Protect T/O, DF* ash, maple, oak, walnut
Apple scab	Crabapple	5+ At 7 to 14-day intervals from prebloom (April) through rainy periods of growing season. Some chemicals cannot be used on trees grown for fruit production/consumption.	Chlorothalonil Fung-onil Daconil Weather Stik* Thiophanate-methyl Bonomyl 3336 F, WP* Fungo Flo, 50WSB* OHP 6672 50W* Not for homeowner use Myclobutanil Immunox Systhane WSP* Eagle 20EW, 40WP* Mancozeb Dithane 75DF, F45* Fore 80WP* Pentathlon LF, DF* Protect T/O, DF* Propiconazole Infuse Ferti-lome Liquid Systemic Fungicide Banner-MAXX*

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BROADLEAF DISEASES (CONT.)

Disease	Tree	Application Number and Date	Pesticide
Ash rust	Ash	3-4 At budbreak (mid-April) and repeat 2 or 3 times at 10 to 14 day intervals.	Myclobutanil Immunox Systhane WSP* Eagle 20EW, 40WP*
Cedar-apple rust	Crabapple Hawthorn	5+ As flower buds break (mid-April), at petal drop, and 3 or 4 additional sprays at 7 to 10-day intervals. Some chemicals cannot be used on trees grown for fruit production/consumption.	Chlorothalonil Fung-onil Daconil Weather Stik* Thiophanate-methyl Bonomyl 3336 F, WP* Fungo Flo, 50WSB* OHP 6672 50W* Not for homeowner use Propiconazole Infuse (crab only) Ferti-lome Liquid Systemic Fungicide (crab only) Banner-MAXX* Myclobutanil Immunox Systhane WSP* Eagle 20EW, 40WP* Mancozeb Dithane 75DF, F45* Fore 80WP* Pentathlon LF, DF* Protect T/O, DF*
Cherry leaf spot	Cherry	4+ At petal fall (May) and every 10 to 14 days as fruit matures. Some chemicals cannot be used on trees grown for fruit production/consumption.	Chlorothalonil Fung-onil Daconil Weather Stik* Bravo Weather Stik* Myclobutanil Immunox Systhane WSP* Eagle 20EW, 40WP* Propiconazole Infuse Ferti-lome Liquid Systemic Fungicide Banner-MAXX*
Dutch elm disease	American elm	1 Preventive treatment: Trunk inject when leaves approach full size (late May). Therapeutic treatment: Trunk inject as soon as current year infections are seen (5% or less of crown infected; late June through August).	Thiabendazole Arbotect 20S*
		1 Trunk inject as soon as symptoms begin appearing or before. High volume injection (macro-injection) more effective than small volume injection (micro-injection).	Propiconazole Alamo*

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BROADLEAF DISEASES (CONT.)

Disease	Tree	Application Number and Date	Pesticide
Fire blight	Apple Pear	3-4	At pink stage (3 to 4 days before blossoms open, mid-April) and every 5 to 7 days until petal drop.
Oak wilt	Oak	1	Trunk inject as soon as symptoms begin appearing or before. High volume injection (macro-injection) more effective than small volume injection (micro-injection).
Tubakia leaf spot	Bur oak	3	At budbreak (April) and repeat 2 times at 10 to 14-day intervals.

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