

# SHELTERBELTS, TREES AND SHRUBS

Amber Fiset

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Tree and shrub shelterbelts are frequently situated adjacent to fruit and vegetable gardens, field crops, pastures, and open water. Therefore, care must be exercised when spraying with all chemical insecticides to reduce or prevent contamination by spray drift.

The following recommendations with designated dosages are given as *active ingredient* and using high-pressure spray equipment unless otherwise specified. Follow label instructions explicitly for correct dosage, coverage, timing of spray, and to avoid phytotoxic effects.

<b>APHIDS</b>
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Aphids (General, open-feeding)

Boxelder aphid - see page 135.

Caragana aphid - see page 137.

Cooley spruce gall aphid - see page 137.

Elm leaf aphids - see page 138.

Poplar aphids - see page 144.

**Non-Chemical Control -**

Ingredient	Rate
Insecticidal Soap	Follow label directions

**Chemical Control -**

Active Ingredient	Rate (AI)
acephate	64 g/100 L
acetamiprid	Follow label directions
bendiocarb	Follow label directions
carbaryl	120 g/100 L
chlorpyrifos	18 g/100 L
cyhalothrin-Lambda	1.2g/100 L
deltamethrin	0.25g/100 L
diazinon	62.5 g/100 L
dimethoate	Follow label directions

endosulfan	4g/100 L
fenthion	187 g/100 L
imidacloprid	2.4g/100 L
kinoprene	Follow label directions
malathion	50 g/100 L
methomyl	2.15g/100 L
permethrin	8.75 g/100 L
pirimicarb	25 g/100 L
Polysulphid	Follow label directions
Pymetrozine	Follow label directions

**Restrictions -**

- dimethoate: May be toxic to *Amelanchier*, *Prunus*, and *Ulmus* spp.
- malathion: Do not apply at air temperatures below 20°C.

**ASH BORER**

**Cultural Control -**

Damaged areas may be wrapped with burlap to prevent emergence of adults.

**Chemical Control -**

Active Ingredient	Rate (AI)
chlorpyrifos	24 g/100 L
endosulfan	78 g/100 L

**ASH PLANT BUG**

**Chemical Control -**

Active Ingredient	Rate (AI)
carbaryl	120 g/100 L

**BIRCH LEAFMINERS**

Birch leaf-mining species

Other leafminers - see page 141.

**Chemical Control -**

Active Ingredient	Rate (AI)
carbaryl	120 g/100 L
diazinon	50 - 62.5 g/100 L
dimethoate	Follow label directions
disulfoton	Follow label directions
malathion	120 g/100 L
phosmet	62.5 g/ 100 L

**Restrictions -**

malathion: Do not apply at air temperatures below 20°C.

**BLISTER BEETLES**

Blister beetles - Nuttall blister beetle, ash-gray blister beetle and ash blister beetle

**Chemical Control -**

Active Ingredient	Rate (AI)
carbaryl	120 g/100 L
deltamethrin	1.5 g/100 L

**Restrictions -**

deltamethrin: For use in the Prairie Provinces and Peace River District of B.C . Do not make more than one application per year.

**BOXELDER APHID**

Boxelder aphid

Aphids (general) - see page 132.

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
acephate	64 g/100 L
chlorpyrifos	18 g/100 L

**BOXELDER BUG**

Boxelder bug

**Non-Chemical Control -**

<b>Ingredient</b>	<b>Rate (Bulk)</b>
Liquid detergent soap	3 ml/500 ml
Safer's Insecticidal Soap	10 ml/500 ml

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
carbaryl	120 g/100 L
trichlorfon	125 g/100 L

**BRONZE BIRCH BORER**

Bronze birch borer

**Cultural Control -**

Maintain birch in a healthy state by proper watering, fertilizing, and control insects such as birch leafminers. Infested trees showing advanced top and branch kill should be removed and destroyed during late fall to spring. On trees showing early signs of die-back and decline, prune 30-50 cm below all dead branches and tops in late fall and destroy.

<b>CANKERWORMS</b>
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Cankerworms: Fall cankerworm and spring cankerworm

**Economic Threshold -**

Control on first evidence of small "shot-holes" appearing on one or more leaves.

**Cultural Control -**

Construct Tanglefoot tree bands around trunk before April 1 for spring cankerworms and before September 25 for fall cankerworms to prevent wingless females from ascending the tree to lay eggs.

**Biological Control -**

<b>Active Ingredient</b>	<b>Rate</b>
<i>Bacillus thuringiensis</i> var. <i>kurstaki</i>	Follow label directions

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
acephate	64 g/100 L
carbaryl	120 g/100 L
phosmet	63 g/100 L

<b>CARAGANA APHID</b>
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Caragana aphid

Aphids (general) - see page 132.

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
deltamethrin	4.5 g/100 L

**Restrictions -**

deltamethrin: For use in the Prairie Provinces and Peace River District of B.C . Do not make more than one application per year.

**CARPENTER WORMS**

Carpenter worms

**Cultural Control -**

Damaged areas may be wrapped with burlap to prevent emergence of adults.

**COOLEY SPRUCE GALL APHID**

Cooley Spruce Gall Aphid

Aphids (general) - see page 132.

**Economic Threshold -**

Control required on spruce less than 3 m tall, when 10 brown galls were formed the previous year, or 2 or more branches bear numerous visible white cottony specks on the needles in the spring.

**Cultural Control -**

Remove the galls by hand as they are forming.

**Non-Chemical Control -**

<b>Ingredient</b>	<b>Rate (Bulk)</b>
Dormant oil	2.5 L/100 L

**Restrictions -**

Dormant oil: Do not use on Colorado blue spruce.

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
carbaryl	120 g/100 L
endosulfan	50 g/100 L
lime sulphur	575 - 690 g/100 L

**ELM LEAF APHIDS**

Woolly elm aphid and woolly apple aphid on elm

Aphids (general) - see page 132.

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
carbaryl	120 g/100 L

**Notes -** Apply at elm bud break, repeat in 7 to 10 days.

<b>FOREST TENT CATERPILLAR</b>
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Forest tent caterpillar

**Economic Threshold -**

On trees up to 3 m tall, one egg band per tree (each band may contain 150-250 eggs), or following egg hatch, one larval colony per tree. On trees of 7 cm or more stem diameter, 7 or more egg bands per tree.

**Cultural Control -**

On ornamentals, remove egg bands during late to early spring, or remove young larval colonies after hatch.

**Biological Control -**

Active Ingredient	Rate
<i>Bacillus thuringiensis</i> var. <i>kurstaki</i>	Follow label directions

**Chemical Control -**

Active Ingredient	Rate (AI)
chlorpyrifos	24 g/100 L
deltamethrin	4.5 g/100 L
permethrin	8.75 g/100 L
trichlorfon	28.5 g/ha

**Restrictions -**

deltamethrin: Do not apply more than two times per year.



## LEAF BEETLES

Various leaf beetles on trees and shrubs

### Chemical Control -

Active Ingredient	Rate (AI)
carbaryl	120 g/100 L
deltamethrin	0.5g/100 L
endosulfan	50 g/100 L
naled	8.64g/100 L
spinosad	12 g/ha

## LEAFHOPPERS

Various leafhoppers on trees and shrubs

### Chemical Control -

Active Ingredient	Rate (AI)
carbaryl	120 g/100 L
chlorpyrifos	48 g/100 L
malathion	50 - 75 g/100 L
methoxychlor	100 g/100 L
permethrin	0.125g/100 L

### Restrictions -

malathion: Do not apply at air temperatures below 20°C.

<b>LEAFMINERS</b>
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Various leafminers on trees and shrubs

Birch leafminer - see page 134.

**Chemical Control -**

Active Ingredient	Rate (AI)
carbaryl	120 g/100 L
deltamethrin	0.5g/100 L
diazinon	50 - 62.5 g/100 L
dimethoate	Follow label directions
malathion	Follow label directions

**Restrictions -**

dimethoate: May be toxic to *Amelanchier*, *Prunus*, and *Ulmus* spp.

malathion: Do not apply at air temperatures below 20°C.

<b>MOUNTAIN PINE BEETLE</b>
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Mountain pine beetle

**Chemical Control -**

Active Ingredient	Rate (AI)
carbaryl	2%
chlorpyrifos	2%

## NATIVE ELM BARK BEETLES

Native elm bark beetle

Control of Dutch elm disease (DED) and the native elm bark beetle vector is achieved by an integration of several control methods:

### **Cultural Control -**

**Sanitation:** Remove and destroy (by chipping, burning, or burying in mineral soil) diseased, dying or recently killed elm trees, broken and dead branches and stumps with bark present to ground level. Trees salvaged for lumber or other wood products should not be stored with bark on or between April 1 and December 1. Avoid transport of infected material for firewood. Keep elms healthy by maintaining proper watering, fertilizing, insect control and pruning.

### **Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
chlorpyrifos *	500 g/100 L
methoxychlor **	Dormant - 1920 g/100 L Summer - 960 g/100 L

\* To prevent adult beetles from overwintering and to reduce beetle populations, thoroughly spray the lower 2.5 m of the trunks of living elms until the bark is wet in late summer. Spray the entire crowns of high value elm trees in late-April to mid-May to give single season protection against branch feeding by adult beetles.

\*\* Dormant spray should be applied in late winter when the buds are dormant but the temperature is over 5°C. Summer spray should be applied in July.

## PEAR SLUG

Pear slug

### **Economic Threshold -**

Control when each of 5 leaves examined in late July contains one or more immature larvae.

### **Cultural Control -**

Larvae can be removed from leaves with a strong jet of water from a garden hose. Effective control is also achieved by rinsing with a soapy solution.

**Non-Chemical Control -**

<b>Ingredient</b>	<b>Rate</b>
Insecticidal Soap	Follow label directions

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
acephate	64 g/100 L

<b>PINE NEEDLE SCALE</b>
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Pine needle scale

Other scale insects - see page 145.

**Economic Thresholds -**

Pine Needle Scale: Control when 1 or more branches has noticeable white scales on needles (i.e. one or more scales per needle of spruce and pine)

**Non-Chemical Control -**

<b>Ingredient</b>	<b>Rate (Bulk)</b>
Superior 70 Oil	2 L/100 L

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
malathion	250 g/100 L

**Restrictions -**

<b>POPLAR APHIDS</b>
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malathion: Do not apply at air temperatures below 20°C.  
Apply when scale crawlers have settled on foliage.

Various aphids on poplar

Aphids (general) - see page 132.

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
deltamethrin	4.5 g/100 L

**Restrictions -**

deltamethrin: For use in the Prairie Provinces and Peace River District of B.C . Do not make more than one application per year.

<b>POPLAR BORER ON ASPEN</b>
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Poplar borer on aspen (*Saperda calcarata*)

Borer infestations tend to vary directly with stem diameter and inversely with stocking of aspen stands. Infestations may concentrate in "brood trees" as larval tunnels increase annually. These provide infection courts for disease-causing fungi, especially Hypoxylon canker, and ultimately enhance the risk of stem breakage by wind. The poplar borer may be associated with carpenter worms. No chemicals are currently registered.

**Cultural Control -**

In small aspen woodlots or shelterbelts, peripheral heavily infested "brood trees" may be removed and destroyed before mid June. Maintaining a heavy understory of other trees and shrubs appear to reduce risk of borer attacks. On trees with fresh sap exudate or boring frass, larvae in the wood can sometimes be killed by inserting a length of sharp flexible wire into the exit holes.

<b>POPLAR BUD-GALL MITE</b>
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Poplar bud-gall mite

**Cultural Control -**

Thorough annual pruning and destroying of galls helps reduce populations. Future plantings should favour the more resistant varieties such as; Assiniboine, Griffin, Manitou and Walker over the less resistant Brooks #5 and Northwest. Trees provided with adequate moisture, weed control, and fertilization can tolerate infestations of mites and gall development without major effects.

**Chemical Control -**

No chemicals registered.

<b>SAWFLIES</b>
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Sawflies (open-feeding defoliators)

**Economic Threshold -**

- Larch: Control when 5 or more of current year shoots are curled on 3-m tall trees. Shoots will bear eggs or newly hatched larvae.
- Pine: Control when 10 or more colonies of larvae are present on trees up to 3 m tall.
- Willow: Control when 10 or more colonies of larvae are present on shrubs up to 2 m tall.

**Chemical Control -**

Active Ingredient	Rate (AI)
acetamiprid	Follow Label Directions
carbaryl	120 g/100 L
chlorpyrifos	24 g/100 L
deltamethrin	0.9 g/100 L
diazinon	60 g/100 L
dimethoate	48 g/100 L
malathion	90 g/100 L
permethrin	6.25 g/100 L
rotenone	Follow label directions
spinosad	12 g/ha
trichlorfon	4.2g/100 L

**Restrictions -**

- deltamethrin: For use in the Prairie Provinces and Peace River District of B.C . Do not make more than one application per year.
- dimethoate: May be toxic to *Amelanchier*, *Prunus*, and *Ulmus* spp.
- malathion: Do not apply at air temperatures below 20°C.

## SCALE INSECTS

Various scale insects on trees and shrubs:

Pine needle scale - see page 143.

### Economic Thresholds -

European Fruit Lecanium: Control when 25 or more scale insects attached/15 cm length of shoots.

### Non-Chemical Control -

Ingredient	Rate
Insecticidal Soap	Follow label directions
Dormant Oil	Follow label directions

### Chemical Control -

Active Ingredient	Rate (AI)
carbaryl	120 g/100 L
chlorpyrifos	96 g/100 L
diazinon	77 g/100 L
dimethoate	48 - 96 g/100 L
lime sulphur	Follow label directions
malathion	50 g/100 L

### Restrictions -

dimethoate: May be toxic to *Amelanchier*, *Prunus*, and *Ulmus* spp.

malathion: Do not apply at air temperatures below 20°C.

## SPRUCE BUDWORM

Spruce budworm

### Economic Threshold -

On a 45-cm branch tip from mid-crown level of spruce, 6-10 spring emerged larvae are sufficient to cause potential damage to 25-50% of openly exposed new shoots. Damage caused by fewer larvae would be negligible because of natural larval mortality factors.

**Biological Control -**

<b>Active Ingredient</b>	<b>Rate</b>
<i>Bacillus thuringiensis</i> var. <i>kurstaki</i>	Follow label directions

Apply *B. t.* after most of new shoots have flushed or lost their bud caps and larval development has reached peak third and fourth instars.

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
carbaryl	Follow label directions
dichlorvos	Follow label directions
malathion	Follow label directions
methomyl	2.15g/100 L
permethrin	6.25 g/100 L
tebufenozide	2.4g/100 L
trichlorfon	100 g/100 L

**Restrictions -**

malathion: Do not apply at air temperatures below 20°C.

**SPRUCE SPIDER MITE**

Spruce spider mite

**Economic Threshold -**

Control when foliage near the stem and in lower third of crown has yellow-brown coloration and silken webbing plainly visible at close examination. Mite adults of green to brown coloration and 0.5 mm long should be visible to naked eye, especially against a white background.

**Cultural Control -**

Effective control can be achieved by flushing the affected foliage with a strong stream of cold water every 14 days throughout the summer; this removes dead needles, webbing, dust and mite populations. Trimming



the lower branches to increase light and air circulation will help to decrease mite buildup.

**Non-Chemical Control -**

<b>Ingredient</b>	<b>Rate (Bulk)</b>
Superior 70 Oil	2 L/100 L

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
abamectin	0.19g/100 L
chlorpyrifos	18 - 24 g/100 L
dicofol	26 - 35 g/100 L
malathion	75 g/100 L

Apply at nozzle pressure of 1000 kPa or greater to penetrate webbing. Usually 2 sprays required in a season; the first application during third week of May, the second in late June or July. Control may be enhanced by using a different insecticide for second application.

**Restrictions -**

malathion: Do not apply at air temperatures below 20°C.

<b>TENT CATERPILLARS</b>
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Eastern tent caterpillar, fall webworm, prairie tent caterpillar and ugly-nest caterpillar

**Cultural Control -**

On ornamentals, remove young larval colonies after hatch.

**Biological Control -**

<b>Active Ingredient</b>	<b>Rate</b>
<i>Bacillus thuringiensis</i> var. <i>kurstaki</i>	Follow label directions

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
carbaryl	120 g/100 L
chlorpyrifos	24 g/100 L
deltamethrin	4.5 g/100 L
malathion	Follow label directions
permethrin	8.75 g/100 L
spinosad	4.8g/100 L
trichlorfon	4.2g/100 L

**Restrictions -**

deltamethrin: For use in the Prairie Provinces and Peace River District of B.C . Do not make more than one application per year.

malathion: Do not apply at air temperatures below 20°C.

<b>YELLOW-HEADED SPRUCE SAWFLY</b>
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Yellow-headed spruce sawfly

Sawflies (open feeding) - see page 145.

**Economic Threshold -**

Spruce: Control when colonies of larvae are present on upper whorls of branches of trees, mostly less than 4 m tall.

**Chemical Control -**

<b>Active Ingredient</b>	<b>Rate (AI)</b>
permethrin	6.25 g/100 L