

# 2004 Supplement

## *Nursery & Landscape Pest Management and Production Guide* (2002 Edition)

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This supplement contains revisions to the 2002 Edition of the *Nursery & Landscape Pest Management & Production Guide*. Cut & paste the changes onto the page specified of the guide.

### Chapter 1 – Exotic Pest Alert

⇒ change the caption to “Adult *Anthocoris* (right) and adult *Deraeocoris brevis* (left) Photo: ICMF” in the colour photographs of *Beneficial Insects and Mites* section.

### Chapter 2 – Plant Movement Regulations

**Federal Plant Quarantine Regulations** (insert on page 8)

2. Grapevines (D-94-34): Must be from an approved virus certification program to be eligible for entry to Canada. Only grapevines that have been fully tested in Canada (includes woody indexing) are approved for import. All rooted plants from any source (including other provinces) must be treated to control Grape Phylloxera and virus-vectoring nematodes. The approved treatments are described in D-94-34.
11. *Quercus*, *Castanea*, *Castanopsis* (Chinquapin) and *Lithocarpus* (Tanbark Oak) (D-99-03): Require a Permit to Import and a phytosanitary certificate in order to enter Canada when originating from states in the continental US that are regulated for Oak Wilt Disease (*Ceratocystis fagacearum*). The certificate must state “the material was produced in a nursery declared to be free of oak wilt disease (*Ceratocystis fagacearum*) on the basis of inspection during the previous growing season”.
18. *Ribes* (D-94-18): To prevent the importation of Black Currant Reversion Disease, all propagative material of *Ribes* spp. (currants and gooseberries) from Europe is prohibited entry into Canada. This includes both fruit-producing and ornamental varieties. Commercial importation of propagative material from other off-continent sources will require prior approval.
24. *Abies*, *Acer*, *Aesculus*, *Arbutus*, *Arctostaphylos*, *Calluna*, *Camellia*, *Castanea*, *Clintonia*, *Corylus*, *Drimys*, *Dryopteris*, *Fagus*, *Hamamelis*, *Heteromeles*, *Kalmia*, *Laurus*, *Leucothoe*, *Lithocarpus*, *Lonicera*, *Pieris*, *Pittosporum*, *Pseudotsuga*, *Pyracantha*, *Quercus*, *Rhamnus*, *Rhododendron*, *Rhus*, *Rosa*, *Rubus*, *Salix*, *Sequoia*, *Smilacina*, *Syringa*, *Taxus*, *Trientalis*, *Umbellularia*, *Vaccinium* and *Viburnum* (D-01-01): Importation of propagative and non-propagative material of the 39 host genera are prohibited from areas regulated for Sudden Oak Death (*Phytophthora ramorum*). Thirteen counties in California (e.g. Alameda, Contra Costa, Humboldt, Lake, Marin, Mendocino, Monterey, Napa, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma), Curry County in Oregon and all countries of the European Union are regulated areas. The directive prohibits the importation of propagative material (e.g. nursery stock) and non-propagative plant parts of the host plants, and soil alone or in association with plant material from the regulated areas. Seeds and fruit are exempt. Import permits will not be granted for host plants that originate from a regulated area, unless the material is produced in a CFIA approved certification program. Apart from the US, only the Netherlands has an accepted pest free certification program.

25. Soil importation is prohibited from all countries except the continental US (D-95-26). A permit is required to import soil without plants from the US. The definition of soil includes sand, earth, clay, compost, humus, unprocessed manure, mulch, peat, plant litter or related debris. Artificial media in which plants are growing is also defined as soil. Import requirements are in place for soil individually or in association with plants, plant material and other things such as vehicles, equipment, seed, hay and containers. Soil from golden nematode control areas of Central Saanich must not be moved out of the quarantine zone. Soil from areas of PEI quarantined for potato wart cannot be moved to other areas of PEI and other provinces. Growers in Central Saanich should contact the CFIA office in Victoria for more information on the Golden Nematode Control areas.
27. *Acer* (D-03-04), *Fraxinus* (D-03-03) and *Quercus* (D-03-05): Effective July 2003, the import into Canada of propagative material (excluding seed) of *Acer*, *Fraxinus* and *Quercus* will require a pest risk assessment (PRA) to identify all regulated pests potentially associated with the species. The eligibility and/or conditions for entry into Canada will be determined following the completion of the PRA. The assessment will consider the plant health risk posed by the commodity as a weed or invasive species plant, as well as by any pests and diseases potentially associated with the commodity. This action applies to all new sources from any area of the world except the continental US. Importation of *Acer*, *Fraxinus* and *Quercus* material will continue to be allowed from traditional off-continent sources provided the material is free of quarantine pests and signs of living quarantine pests; and free and clean of debris and soil. Rooted plants must be bare-root or potted in approved growing media. An import permit and a phytosanitary certificate are necessary.
30. *Fraxinus* (D-03-08): Effective June 2003, importing nursery stock from areas regulated for the emerald ash borer (*Agrilus planipennis*) is prohibited. The regulated areas include: China, Mongolia, Japan, Russia, Korea, Taiwan and counties in five US states (Indiana, Maryland, Michigan, Ohio and Virginia), and parts of Ontario. Seeds and foliage are exempt. An import permit and a phytosanitary certificate are required to import *Fraxinus* from a non-regulated county in a regulated state. The certificate must declare that the material was produced in a county where the emerald ash borer does not occur, based on official surveys.
31. *Pelargonium* spp. and *Solanum* spp. (non-tuber-bearing) (D-03-09): Effective September 2003, propagative material can only be imported into Canada from a country known to be free of *Ralstonia solanacearum*, Race 3 (Biovar 2), or from a facility that has been sampled and tested by the NPPO and found free of *R. solanacearum*, Race 3 (Biovar 2). Seeds and fruit of all hosts are exempt. An import permit is required from all countries other than the continental US. A phytosanitary certificate is required for all regulated commodities imported to Canada. In lieu of a phytosanitary certificate, regulated plant material originating from a designated facility in the continental US may enter Canada if produced in compliance with the Greenhouse Certification Program.
32. *Chaenomeles*, *Malus*, *Prunus* (producing stone fruits, e.g. cherry), *Pyrus* and *Salix* (D-03-10): Effective September 2003, decorative branches of *Chaenomeles*, *Malus*, *Prunus* and *Pyrus* from all countries require a phytosanitary certificate and an import permit for entry into Canada. Fruit tree material must originate from sources approved under the CFIA's Virus Certification Program and the shipment must be free of soil and debris. Importation of *Prunus* decorative branches is prohibited from countries in which plum pox virus is present.

**Table 2.1. Index to plants subject to importation prohibitions or restrictions** (insert on page 7).

Botanical Name	Common Name	Comment #	Botanical Name	Common Name	Comment #
<i>Abies</i>	True Firs	8, 24	<i>Mahonia</i>	Oregon Grape	3
<i>Aesculus</i>	Horsechestnut	24	<i>Mahoberberis</i>	Mahoberberis	3
<i>Acer</i>	Maple	24, 27	<i>Malus</i>	Crabapple, Apple	1, 4, 5, 6, 32
<i>Alnus</i>	Alder	22	<i>Myriophyllum</i>	Milfoil	21
<i>Arbutus</i>	Madrone	24	<i>Pelargonium</i>	Geranium	31
<i>Arctostaphylos</i>	Kinnikinnick	24	<i>Pieris</i>	Andromeda	24
<i>Berberis</i>	Barberry	3	<i>Pinus</i>	Pine	13, 19
<i>Calluna</i>	Heather	24	<i>Pittosporum</i>	Victorian Box	24
<i>Camellia</i>	Camellia	24	<i>Populus</i>	Poplar	15
<i>Castanea</i>	Chestnut	11, 24	<i>Prunus</i>	Plum, Cherry, etc.	1, 4, 23, 32
<i>Castanopsis</i>	Chinquapin	11	<i>Pseudotsuga</i>	Douglas Fir	24
<i>Chaenomeles</i>	Quince	1, 4, 32	<i>Pyracantha</i>	Firethorn	24
<i>Chrysanthemum</i>	Chrysanthemum	8	<i>Pyrus</i>	Pear	p. 1, 1, 4, 32
<i>Clintonia</i>	Bluebead Lily	24	<i>Quercus</i>	Oak	11, 24, 27
<i>Corylus</i>	Hazelnut, Filbert	9, 24	<i>Rhamnus</i>	Buckthorn	7, 24
<i>Crataegus</i>	Hawthorn	4, 5	<i>Rhododendron</i>	Rhododendron	24
<i>Cydonia</i>	Quince	1, 4	<i>Rhus</i>	Poison Oak, Sumac	24
<i>Drimys</i>	Winter's Bark	24	<i>Ribes</i>	Currant	18
<i>Dryopteris</i>	Wood Fern	24	<i>Rosa</i>	Rose	24
<i>Elodea densa</i>	Waterweed	21	<i>Rubus</i>	Brambles	24
<i>Fagus</i>	Beech	24	<i>Salix</i>	Willow	12, 24
<i>Fragaria</i>	Strawberry	16	<i>Sequoia</i>	Coast Redwood	24
<i>Fraxinus</i>	Ash	27, 30	<i>Smilacina</i>	Starflower	24
<i>Gaylussacia</i>	Huckleberry	17	<i>Solanum</i>	Nightshade	31
<i>Grossularia</i>		18	<i>Syringa</i>	Lilac	24
<i>Hamamelis</i>	Witch Hazel	24	<i>Taxus</i>	Yew	24
<i>Heteromeles</i>	Toyon	24	<i>Trapa</i>	Water-Caltrop	21
<i>Hydrilla verticillata</i>	Elodea	21	<i>Trientalis</i>	Western Starflower	24
<i>Juniperus</i>	Juniper	p.1	<i>Ulmus</i>	Elm	10
<i>Kalmia</i>	Mountain Laurel	24	<i>Umbellularia</i>	Oregon Myrtle	24
<i>Larix</i>	Larch	14	<i>Vaccinium</i>	Blueberry	17, 24
<i>Laurus</i>	Laurel	24	<i>Viburnum</i>	Arrow Wood	24
<i>Leucothoe</i>	Leucothoe	24	<i>Vitis</i>	Grape	2
<i>Lithocarpus</i>	Tanbark Oak	11, 24	<i>Zelkova</i>	Zelkova	10
<i>Lonicera</i>	Honeysuckle	24			

## Chapter 7 – Herbicides

⇒ the revisions to Table 7.1 reflect the expanded crop list for **Devrinol** and the registered crops for **Dacthal**. Insert with pages 68 to 72.

<b>Table 7.1a – Selective herbicide options for broadleaf evergreens</b> (insert on page 68)		<b>Devrinol 2G &amp; 10G</b>	<b>Devrinol 50DF</b>	<b>Dacthal G5 &amp; W75</b>
<i>Abelia</i>	Abelia	CFL	C	FL
<i>Acer</i>	Maple	FL	FL	
<i>Aucuba</i>	Aucuba	FL	FL	
<i>Berberis</i>	Barberry			FL
<i>Buxus</i>	Boxwood	FL	FL	
<i>Callistemon</i>	Bottlebrush	CFL	CFL	
<i>Calluna (Erica)</i>	Heather	C	C	
<i>Camellia</i>	Camellia	CFL	CFL	
<i>Cotoneaster</i>	Cotoneaster	CFL	CFL	
<i>Euonymus</i>	Euonymus	CFL	CFL	FL
<i>Gardenia</i>	Gardenia	C	C	
<i>Ilex</i>	Holly	CFL	CFL	FL
<i>Leucothoe</i>	Leucothoe	CFL	CFL	
<i>Ligustrum</i>	Privet	CFL	CFL	
<i>Nandina</i>	Heavenly Bamboo	CFL	CFL	
<i>Photinia</i>	Photinia	CFL	CFL	
<i>Pittosporum</i>	Pittosporum	FL	FL	
<i>Pyracantha</i>	Firethorn	CFL	CFL	
<i>Raphiolepis</i>	Indian Hawthorn	CFL	C	
<i>Rhododendron</i>	Rhododendron, Azalea	CFL	CFL	

<b>Table 7.1b - Selective herbicide options for conifers</b> (insert on page 69)		<b>Devrinol 2G &amp; 10G</b>	<b>Devrinol 50DF</b>	<b>Dacthal G5 &amp; W75</b>
<i>Abies</i>	True Fir	CFL	CFL	
<i>Cedrus</i>	True Cedar	CFL	CFL	
<i>Chamaecyparis</i>	False Cypress	CFL	CFL	
<i>Juniperus</i>	Juniper	CFL	CFL	FL
<i>Larix kaempferi</i>	Japanese Larch	FL	FL	
<i>Picea</i>	Spruce	FL	FL	
<i>Pinus</i>	Pine	CFL	CFL	
<i>Podocarpus</i>	Podocarpus	CFL	CFL	
<i>Pseudotsuga</i>	Douglas Fir	CFL	CFL	
<i>Taxus</i>	Yew	FL	FL	FL
<i>Thuja</i>	Arborvitae	CFL	CFL	
<i>Tsuga</i>	Hemlock	FL	FL	

<b>Table 7.1c - Selective herbicide options for deciduous shrubs (insert on page 70)</b>		<b>Devrinol 2G &amp; 10G</b>	<b>Devrinol 50DF</b>	<b>Dacthal G5 &amp; W75</b>
<i>Abelia</i>	Abelia	FL	FL	FL
<i>Cornus</i>	Dogwood	CFL	CFL	
<i>Cotoneaster</i>	Cotoneaster	CFL	CFL	
<i>Deutzia</i>	Deutzia			FL
<i>Euonymus</i>	Euonymus	CFL	CFL	FL
<i>Forsythia</i>	Forsythia	CFL	CFL	FL
<i>Hibiscus</i>	Hibiscus	CFL	CFL	
<i>Hypericum</i>	St. John's Wort	FL	FL	
<i>Jasminum</i>	Jasmine	CFL	C	
<i>Lagerstroemia</i>	Crape Myrtle	CFL	CFL	
<i>Rhododendron</i>	Azalea	CFL	CFL	
<i>Rosa</i>	Rose	CFL	CFL	
<i>Spiraea</i>	Spirea			FL
<i>Viburnum</i>	Viburnum	FL	FL	
<i>Weigela</i>	Weigela			FL


<b>Table 7.1d - Selective herbicide options for deciduous trees (insert on page 71)</b>		<b>Devrinol 2G &amp; 10G</b>	<b>Devrinol 50DF</b>	<b>Dacthal G5 &amp; W75</b>
<i>Acer</i>	Maple			FL
<i>Betula</i>	Birch	FL	FL	
<i>Cornus</i>	Dogwood	FL	FL	
<i>Corylus</i>	Hazelnut	FL	FL	
<i>Crataegus</i>	Hawthorn	FL	FL	
<i>Fraxinus</i>	Ash	FL	FL	
<i>Gleditsia</i>	Honeylocust	FL	FL	
<i>Juglans</i>	Walnut	FL	FL	FL
<i>Laburnum</i>	Chain Tree	FL	FL	
<i>Liriodendron</i>	Tulip Tree			FL
<i>Malus</i>	Apple, Crabapple	FL	FL	
<i>Platanus</i>	Sycamore, Plane Tree			FL
<i>Populus</i>	Poplar	FL	FL	
<i>Prunus</i>	Cherry, Peach, Plum	FL	FL	
<i>Pyrus</i>	Pear	FL	FL	
<i>Quercus</i>	Oak			FL
<i>Quercus palustris</i>	Pin Oak	FL	FL	
<i>Robinia</i>	Locust			FL
<i>Salix</i>	Willow			FL




<b>Table 7.1e - Selective herbicide options for annuals, perennials, bulbs, ground covers and vines (insert on page 72)</b>		<b>Devrinol 2G &amp; 10G</b>	<b>Devrinol 50DF</b>	<b>Dacthal G5 &amp; W75</b>
<i>Agapanthus</i>	African Lily	C	C	
<i>Ageratum</i>		C	C	
<i>Ajuga</i>	Bugleweed	FL	FL	
<i>Alyssum</i>	Madwort			FL
<i>Aster</i>	Aster	FL	FL	
<i>Dahlia</i>	Dahlia	FL	FL	
<i>Gazania</i>	Gazania	FL	FL	
<i>Gladiolus</i>	Gladiolus			FL
<i>Gypsophila</i>	Baby's Breath			FL
<i>Hedera</i>	Ivy	CFL	CFL	FL
<i>Hosta</i>	Plantain Lily	FL	FL	
<i>Hypericum</i>	St. John's Wort	FL	FL	
<i>Iberis</i>	Candytuft			FL
<i>Lantana</i>	Lantana	FL	FL	
<i>Liriope</i>	Lily Turf	CFL	CFL	
<i>Lonicera</i>	Honeysuckle	FL	FL	
<i>Narcissus</i>	Daffodil	FL	FL	
<i>Osteospermum</i>	African Daisy	FL		
<i>Pachysandra</i>	Japanese Spurge	CFL	CFL	
<i>Pelargonium</i>	Geranium	CFL	CFL	
<i>Paeonia</i>	Peony			FL
<i>Petunia</i>	Petunia	FL	FL	FL
<i>Salvia</i>	Sage			FL
<i>Sedum</i>	Stonecrop	CFL	CFL	
<i>Tagetes</i>	Marigold			FL
<i>Vinca</i>	Vinca	CFL	CFL	
<i>Vitis</i>	Grape	FL	FL	

Please make the following additional changes to the herbicides section of the guide:

- ⇒ **EcoClear** is not registered for use in greenhouses. It is recommended for the control of herbaceous broadleaf and grassy weeds on non-crop land areas, such as around greenhouses and in plant nurseries. Please note this change on page 75.
- ⇒ **Chloro IPC** is no longer registered. Please note this product removal on pages: 68, 69, 70, 71, 72, 73, 74, 84 and 260.
- ⇒ insert new Table 7.16 (below) on page 86.

**Table 7.16.** Ornamental uses and application rates for Devrinol 2-G (2%), 10-G (10%) and 50-DF (50%).

**Note:**  denotes pesticides recommended for use on conifer seedlings.

	<b>Devrinol 2-G</b>	<b>Devrinol 10-G</b>	<b>Devrinol 50-DF</b>
 <b>Container and Field-grown</b>	225 kg/ha	45 kg/ha	9 kg in 470 L of
 <b>Ornamentals and</b>	or 22.5 g/m <sup>2</sup>	or 4.5 g/m <sup>2</sup>	water/ha
 <b>Foundation Plants</b>			

⇒ **Expedite** is no longer registered. Please note this product removal on pages: 256 and 260.

⇒ **Gallery** is registered for use on *Picea* and *Pinus* species of nursery stock grown for silviculture purposes. It is no longer necessary to be a member of the Canadian Forest Nursery Weed Management Association to use this product. Please note this change on page 85.

⇒ add **SAFER'S TOPGUN** to *Nonselective, Postemergence Herbicides* (page 78).

**SAFER'S TOPGUN (FATTY ACIDS/SOAP)** is a fast-acting, non-selective herbicide made from naturally occurring fatty acids for use around bark mulch and trees; on sidewalks, driveways, around buildings; and prior to planting grass, shrubs and flowers. Safer's TopGun is available as a ready to use spray or a liquid concentrate. It kills on contact and results may be visible within hours of application. Treated areas can be seeded or planted after 3 days. It leaves no soil residue. Controls a broad spectrum of weeds including redroot pigweed, lamb's quarters, corn spurry, mustards, spotted cat's-ear, chickweed and round-leaved mallow. Also provides suppression or top-kill of some perennials including plantain. It may cause a white residue on brick and some types of concrete; residue will wear off after several weeks.

**Registrant:** Safer Ltd., Box 186, Scarborough, Ont. M1R 5B5

**Application rate:** For the concentrate formula, add 170 mL of Safer's TopGun concentrate to 1 L of water and mix thoroughly. 100 mL of this mixture or of the ready to use spray will cover approximately 1 m<sup>2</sup>.

**Spraying tips:** Apply in spring/summer to young, actively growing weeds less than 13 cm (5 inches) high. Spray weeds thoroughly until foliage is wet without run-off. Browning of foliage will usually occur rapidly in 1 to 2 days. Repeat treatment as required every 14 to 21 days to control weeds growing from seed or for re-growth of perennial or large annual weeds.

**Precautions:** May cause eye and skin irritation. Product may be mildly sensitizing. It has a low mammalian acute toxicity (LD<sub>50</sub>: oral >5,000; dermal >2,000). It is slightly toxic to fish and not toxic to bees.

⇒ add **DACTHAL** to *Selective, Preemergence Herbicides* (page 84).

**DACTHAL (CHLORTHAL)** is a selective, non-systemic, preemergence herbicide that kills germinating weed seeds. It controls annual bluegrass, barnyard grass, crabgrass, green and yellow foxtail, witchgrass, chickweed, lamb's-quarters, redroot pigweed and purslane on mineral soils in ornamentals, nursery stock and turf. Refer to the label for a list of crops that should not be treated with Dacthal.

**Registrant:** AMVAC Chemical Corporation 4100 E. Washington Boulevard, Los Angeles, CA 90023 USA

**When used:** Application should be made to soil recently cultivated to a uniform texture. With established plantings, application should be made following proper cultivation to remove existing weeds. Where possible, this should be done early in the spring. Late summer applications should be beneficial for control of fall germinating weeds, if made following cultivation. Weed control up to four months or more may be expected following proper application.

**Incorporation:** Do not incorporate deeper than 5 cm. Shallow soil incorporation, when recommended, often gives more consistent results. Depending on crop and time of application, several incorporation methods may be used. See the product label to confirm which method to use for each crop.

- **Pre-plant** often provides better weed control on irrigated land, and on non-irrigated land if dry weather is anticipated following planting. When recommended, Dacthal can be sprayed on the soil surface and then incorporated using a disc harrow or related tilling equipment. To ensure complete incorporation, double disc in two directions. Incorporate banded treatments with a hooded rotary tiller or ground tiller.
- **Delayed preemergent** is appropriate for crops where pre-plant incorporation can be used. Incorporation at this time should be done when adequate rainfall or irrigation is not available within 3 to 5 days after planting. Lightly incorporate (1.5 to 2.5 cm deep) with drag harrow, rotary hoe or other suitable tillage equipment.
- **Lay by** is done just prior to the stage when plant growth would prevent further cultivation. Cultivate soil to remove established weeds, then apply Dacthal and lightly incorporate with suitable equipment.

**Application rate:** Early spring applications at the rate of 275 kg/ha (2.75 kg/100 m<sup>2</sup>) or fall applications at 325 kg/ha (3.25 kg/100 m<sup>2</sup>). Dacthal G-5 can also be applied by the shaker method; measure off the area into small plots and evenly spread Dacthal granules over this area. 300 grams treats 10 m<sup>2</sup>.

**Spraying tips:** Apply to soil surface that is uniformly weed-free 2 to 3 days after cultivation. Disturbing the soil surface following application will reduce effectiveness. Rates of application can be reduced by banding. A minimum of 1 cm of water is necessary to activate Dacthal; if there is no rainfall within 3 to 4 days after application, sprinkler irrigation should be used. If rainfall does not occur and irrigation cannot be made, shallow incorporation, when recommended, will aid in weed control.

**Conditions under which poor results may be seen:** Prior to making application, the soil should be cultivated to provide a weed-free and uniform surface. Dacthal is effective only when applied before weed seed germination. Do not use on muck soil.

**Precautions:** Dacthal has a low mammalian acute toxicity; (LD<sub>50</sub>: oral 1,250; dermal >2,000) and it is a slight eye irritant.

**Storage:** Do not store near food or feedstuff, seeds, fertilizers or other pesticides in order to prevent contamination. Store in a dry, well ventilated place.



## Chapter 9 - General Disease Management

Please make the following changes to your copy of the guide:

- ⇒ **Benomyl** (ie: Benlate) registration expired on December 31, 2003. Delete all recommendations for benomyl on pages 137 and 231.


**Table 9.5. Management and control of damping-off and cutting stem rot** (insert on page 132).

<b>Registered Pesticides</b>	
<b>metalaxyl-M and S-isomer</b>	
Subdue MAXX	<p><b>Soil Mix Rate:</b> thoroughly mix 5 mL with each m<sup>3</sup> of soil mixture.</p> <p><b>Crops:</b> container, bench, or bed-grown foliage and bedding plants (refer to label)</p> <hr/> <p><b>Drench Rate:</b> mix 24 mL in 1,000 L of water and apply 5 L of solution per m<sup>2</sup> at seeding or transplanting.</p> <p><b>Crops:</b> container, bench, or bed-grown bedding plants (refer to label)</p>
<b>trifloxystrobin</b>	
Compass 50 WG	<p><b>Rate:</b> 3.8 g/100 L water to control damping-off caused by <i>Rhizoctonia solani</i>. Apply as a drench to wet the upper half of the growing media at the time of seeding. Do not apply more than once before rotating with a fungicide with a different mode of action to prevent resistance. Do not exceed 4 applications per crop cycle or season.</p> <p><b>Crops:</b> seedlings grown in interiorscapes, field nursery plantings, residential and commercial landscapes, greenhouses, lath and shadehouses, containers, and other enclosed structures. Registered crops include: <i>Alyssum</i>, azalea, bamboo, begonia, <i>Brachycome</i>, catnip, <i>Celosia</i>, chrysanthemum, <i>Cosmos</i>, daisy, <i>Dianthus</i>, daylily, <i>Delphinium</i>, dusty miller, dwarf ivy, hawthorn (Indian), heather (Mexican), <i>Sempervivum</i>, <i>Hosta</i>, <i>Hypoestes</i>, <i>Impatiens</i>, <i>Jasminum</i>, <i>Iris</i> (African/Siberian), <i>Juniperus tortulosm</i>, <i>Lantana</i>, <i>Ligustrum</i>, lilac, <i>Liriope</i>, marigold, <i>Nandina</i>, pansy, peach (non-bearing), <i>Petunia</i>, <i>Phlox</i>, <i>Pittosporum</i>, <i>Rosa</i> and <i>Verbena</i>.</p>




**Table 9.10. Management and control of powdery mildew** (insert on page 139).

<b>Registered Pesticides</b>	
<b>trifloxystrobin</b>	
Compass 50 WG	<p><b>Rate:</b> 14 - 21 g/100 L water. Apply as a foliar spray to point of run-off before symptoms develop or when conditions are favorable for disease development. Continue at 7 to 10 day intervals until the threat of disease is over. Under lighter disease pressure, the application interval may be extended. Use the higher rate for severe disease threats.</p> <p>Do not apply more than once before rotating with a fungicide with a different mode of action to prevent resistance. Do not exceed 4 applications per crop cycle or season. Do not apply to trees that will bear harvestable fruit within 12 months.</p> <p><b>Crops:</b> non-bearing apple, crabapple, plum, nectarine and cherry trees grown in field nursery plantings, and residential and commercial landscapes</p>

**Table 9.12. Management and control of phytophthora and pythium root rots** (insert on page 142).

**Note:**  denotes pesticides recommended for use on conifer seedlings.

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<b>Registered Pesticides</b>	
<b>metalaxyl-M and S-isomer</b>	
 Subdue MAXX	<b>Soil Mix Rate:</b> Mix 5 ml with each m <sup>3</sup> of soil mixture. <b>Drench Rate:</b> Mix 24 mL with 1,000 L of water and apply 5 L of solution per m <sup>2</sup> at seeding or transplanting. Ensure the growing media is moist prior to applying the drench. <b>Crops:</b> container, bench, or bed-grown bedding plants (e.g. <i>Ageratum</i> , Algerian ivy, <i>Artemisia</i> , <i>Aster</i> , <i>Begonia</i> , <i>Caladium</i> , carnation, <i>Chrysanthemum</i> , <i>Coleus</i> , English ivy, daisy (Shasta), foxglove, <i>Gaillardia</i> , geranium, <i>Impatiens</i> , marigold, pansy, <i>Petunia</i> , <i>Phlox</i> , primrose, prostrate rosemary, <i>Salvia</i> , snapdragon, <i>Verbena</i> , <i>Vinca</i> and <i>Zinnia</i> ) in greenhouses or outdoor nurseries <b>Rate:</b> Apply 1.2 L in at least 200 L/ha in the spring. For small areas mix 12 mL product/100 L water and apply 100 L solution /100 m <sup>2</sup> . Irrigate after applying to soil surface to ensure the product reaches the root zone. For outdoor soil surface applications, irrigate with at least 1.5 cm of water if rainfall does not occur within 7 days. <b>Crops:</b> conifers in nurseries (e.g. seedbeds and plug-plantings, and 2-0 bare root transplants)
<hr/> <b><i>Trichoderma harzianum</i></b>	
 RootShield  Drench or Granules	<b>Drench Rate:</b> Apply 115-220 g/m <sup>3</sup> (loose) in 200 L of water. Agitate to maintain suspension and apply through low pressure watering system. <b>Incorporation Rate:</b> Thoroughly incorporate 600 g of granules into 1 m <sup>3</sup> of loose planting mix or soil. Rake or till into planting beds. <b>Bulb Dip:</b> 120 g/L; dip bulbs in suspension before planting. For best results treat several days before seeding or transplanting <b>Crops:</b> greenhouse ornamental crops. Test RootShield on a small lot of plants to check the response of the variety.

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## Chapter 10 – Bactericide and Fungicide Properties and LD<sub>50</sub> Values

### Page 149

**azoxystrobin** (Quadris) is a broad spectrum, systemic strobilurin fungicide with protectant and curative activity. It disrupts mitochondrial respiration and blocks the formation of energy storage molecules within the target fungi. It is also an inhibitor of fungal spore germination and mycelial growth. Do not store below 0°C. It has a low mammalian acute toxicity (LD<sub>50</sub>: oral >5,000; dermal >2,000). Causes slight eye and skin irritation. This product is toxic to fish and aquatic organisms. Keep it out of aquatic habitats and estuarine/marine habitats. Do not apply directly to water or contaminate water by cleaning of equipment, or disposal of wastes.

### Page 152

**metalaxyl-M and S-isomer** (Subdue MAXX) is a systemic fungicide with protective and curative action. It is absorbed through the leaves, stems and roots. The soil application formula controls soil-borne pathogens that cause root and lower stem rots caused by *Pythium* spp. on a variety of ornamental crops. It has a low mammalian acute toxicity (LD<sub>50</sub>: oral >2,000). Not a skin irritant or skin sensitizer. Not toxic to fish or bees.

### Page 153

**Trichoderma harzianum** (RootShield) is a mitosporic fungi used to control a range of soil and foliar pathogens. It inhibits the growth of pathogenic fungi by invading and parasitizing the fungal hyphae and it is effective in protecting roots from diseases caused by *Pythium*, *Rhizoctonia* and *Fusarium*. It also improves growth of the plant root system as it allows greater soil exploration and enhanced nutrient uptake. Not a skin irritant but may cause skin sensitization. Avoid contact with eyes and clothing and avoid inhalation. It has a slight to moderate acute mammalian toxicity (LD<sub>50</sub>: oral >500). Not toxic to bees.

### Page 153

**trifloxystrobin** (Compass) is a mesostematic broad spectrum fungicide with preventative and curative activity. It is rain-fast and penetrates the plant to control leaf spots, powdery mildew, rust, scab, downy mildew, *Botrytis*, *Myrothecium*, *Anthraco* and *Rhizoctonia*. It is for use on turf and ornamental crops in seedlings grown in interiorscapes, field nursery plantings, residential and commercial landscapes, greenhouses, lath and shadehouses, containers, and other enclosed structures. It may cause injury to petunias, violets and New Guinea impatiens. It has a low mammalian acute toxicity but is irritating to eyes and may cause skin sensitization (LD<sub>50</sub>: oral >5,000). It is highly toxic to fish and other aquatic organisms and practically non toxic to bees. Take precautions as it is harmful to beneficial predatory or parasitic arthropods.



## Chapter 11 - General Insect and Mite Management

Please make the following changes to your copy of the guide:

- ⇒ Products containing **azinphos-methyl** (ie: APM, Guthion and Sniper) intended for use on ornamental crops will not be available for purchase after August 31, 2004; and the registration for these products will expire December 31, 2005. For tree fruit and small fruit uses, azinphos-methyl products will not be available for purchase after August 31, 2006 and the registration for these products will expire December 31, 2006. Please make note of this on pages: 114, 157, 163, 168, 181, 185, 187, 256, 261, 264 and 266.
- ⇒ The registrant for **bendiocarb** (ie: Trumpet) has communicated to the PMRA that they do not support continued registration of this chemical. Products containing bendiocarb will be discontinued at the end of 2005 or 2006 depending on the product. While these products will still be registered, they will not be available for purchase. The registration of all bendiocarb products will expire on December 31, 2008 to allow consumers to use up existing product. Please make note of this on pages: 114, 167, 181, 185, 188 and 262.
- ⇒ **Conserve 480 SC** has been replaced (re-named) with **Success 480**. Rates and recommendations remain the same. Please note this replacement on pages: 164, 186, 192, 244, 245 and 261.
- ⇒ The registration of **disulfoton** (ie: Di-Syston 15 G) expires on July 1<sup>st</sup>, 2005. Please note pending change on pages: 158, 175 and 186.
- ⇒ **Dursban 2E** is no longer sold in Canada. While the product is under re-evaluation by the PMRA, the Canadian distributor will annually renew the registration. The registration for Dursban 2E currently expires on December 31, 2006. Please note this product is unavailable on pages: 157, 160, 164, 169, 174, 181, 182, 183, 184, 185, 188, 207, 218, 225, 229, 240 and 261.

- ⇒ **Impower 60 WP** has been replaced (re-named) with **Intercept 60 WP**. Rates and recommendations remain the same. Please note this replacement on pages: 114, 158, 190, 224, 225, 245 and 261.
- ⇒ **Metasystox** registration expired in December of 2003 and the product is no longer registered for use on ornamental crops. Please note this product removal on pages: 114, 159, 171, 176, 186, 191, 200 and 263.
- ⇒ The registrant of **methoxychlor** does not support continued registration of the chemical. The registration of methoxychlor products will expire on December 31, 2005. Once the registration expires the pesticides cannot be used. Please make note of this on pages: 161, 164, 169, 178, 183, 186, 191, 212, 214, 218, 223, 234, 240, 244, 245 and 262.
- ⇒ **Nemasys** (*Steinernema feltiae*) is now known as **Nemasys F** or **Exhibitline SF**. Please note this change on page 190.

**Table 11.1. Management and control of aphids** (insert on page 159).

Registered Pesticides	
<b>acetamiprid</b>	
 Tristar 70 WSP	<b>Rate:</b> 1-3 water soluble packs/1,000 L of water. 1 pack is generally sufficient for aphid control. Apply as a full coverage foliar spray. Do not apply more often than every 7 days. Maximum 5 applications per year. Apply maximum 55 water soluble packs/ha per year. Allow to dry at least 6 hours before wetting foliage. <b>Crops:</b> ornamental and flowering plants grown outdoors and in greenhouse, shadehouses and lath houses
<b>pymetrozine</b>	
 Endeavor 50 WG	<b>Rate:</b> 10-20 g/100 L water. Do not apply more than 20 g/100 L. Maximum 2 applications per season. Apply as a full coverage foliar spray, particularly to plant stems and leaf undersides, to point of run-off. <b>Crops:</b> ornamental plants in greenhouses and outdoors

**Table 11.13. Pesticides registered to control leafhoppers** (insert on page 169).


<b>acetamiprid</b>	
Tristar 70 WSP	<b>Rate:</b> 5 water soluble packs/1,000 L of water. Apply as a full coverage foliar spray. Do not apply more often than every 7 days. Maximum of 5 applications per year. Apply maximum 55 water soluble packs/ha per year. Allow to dry at least 6 hours before wetting foliage. <b>Crops:</b> ornamental and flowering plants grown outdoors and in greenhouse, shadehouses and lath houses

**Table 11.14. Pesticides registered to control leafminers and needle miners** (insert on page 171).

<b>acetamiprid</b>	
Tristar 70 WSP	<b>Rate:</b> 5 water soluble packs/1,000 L of water for <b>tentiform leafminers</b> . Apply as a full coverage foliar spray. Do not apply more often than every 7 days. Do not exceed 5 applications per year. Apply maximum 55 water soluble packs/ha per year. Foliage should dry 6 hours before wetting. <b>Crops:</b> ornamental and flowering plants grown outdoors and in greenhouse, shadehouses and lath houses

**Table 11.16. Pesticides registered to control lygus bugs** (insert on page 172).


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<b>cypermethrin</b>	
 Ripcord 400 EC	<b>Rate:</b> 172 ml per ha. Apply in sufficient water for good coverage. Maximum of 3 applications per growing season. Do <b>not</b> use in greenhouses. <b>Crops:</b> conifer seedlings (nursery)

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**Table 11.19. Management and control of root weevils** (insert on page 178).

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<b><i>Steinernema kraussei</i></b>	
 Nemasys L	<b>Drench:</b> 1 tray/200 L of water for open soil or 1 tray/400 L water for pots or containers and apply 4 L/m <sup>2</sup> . <b>Spray Rate:</b> 1 tray in 50 L water for open soil or 1 tray in 100 L water for pots or containers and apply 1 L/m <sup>2</sup> . Apply directly to the soil around the roots when black vine weevil larvae are present in spring or fall. Soil temperature should be between 5 to 30°C for at least 2 weeks after application. Moisten soil before applying. Use solution immediately after mixing.

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**Table 11.25. Pesticides registered to control sawfly larvae** (insert on page 183).

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<b>acetamiprid</b>	
Tristar 70 WSP	<b>Rate:</b> 1-3 water soluble packs/1,000 L of water for <b>European pine sawfly larvae</b> . Apply as a full coverage foliar spray. Do not apply more often than every 7 days. Maximum 5 applications per year. Apply maximum 55 water soluble packs/ha per year. Allow to dry at least 6 hours before wetting foliage. <b>Crops:</b> ornamental and flowering plants grown outdoors and in greenhouse, shadehouses and lath houses

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**Table 11.29. Registered pesticides to control whiteflies** (insert new section on page 186).

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<b>acetamiprid</b>	
Tristar 70 WSP	<b>Rate:</b> 5-10 water soluble packs/1,000 L of water. Apply as a full coverage foliar spray. Do not apply more often than every 7 days. Maximum 5 applications per year. Apply maximum 55 water soluble packs/ha per year. Allow to dry at least 6 hours before wetting foliage. <b>Crops:</b> ornamental and flowering plants grown outdoors and in greenhouse, shadehouses and lathhouses
<b>pymetrozine</b>	
Endeavor 50 WG	<b>Rate:</b> 10-20 g/100 L water for reduction of whiteflies. Maximum 2 applications per season. Apply as a full coverage foliar spray, particularly to plant stems and leaf undersides, to point of run-off. <b>Crops:</b> ornamental plants in greenhouses and outdoors

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## Chapter 12 – Insecticide and Miticide Properties and LD<sub>50</sub> Values

### Page 187

**acetamiprid** (Tristar) is a systemic insecticide that is effective through contact and ingestion. It provides ovicidal activity to give control throughout the entire pest life cycle. It is used as a foliar spray to provide control of aphids, citrus thrips, European pine sawfly, leafhoppers (including glassy wing sharp shooter), mealybug, tentiform leaf miner and whiteflies on a wide range of ornamental crops. It has a low to moderate mammalian acute toxicity and is irritating to skin, eyes and through inhalation (LD<sub>50</sub>: oral = 147-217; dermal >2,000). It is practically not toxic to fish.

### Page 190

**imidacloprid** (Intercept) change the dermal LD<sub>50</sub> to >5,000.

### Page 191

**pymetrozine** (Endeavor) is a foliar insecticide that penetrates leaf and stem tissues and provides control of aphids and whitefly populations by stopping their feeding activity. It works initially through contact, and residually through feeding inhibition. It is not toxic to fish or bees and has a low mammalian toxicity (LD<sub>50</sub>: oral = 5,820; dermal >2,000) and it is a potential skin sensitizer.

### Page 192

***Steinernema kraussei*** (Nemasys L) is a nematode used to control vine weevil larvae. The nematodes live in moisture surrounding the soil particles and seek out vine weevil larvae and enter them through body openings. Once inside the larvae, the nematodes release bacteria that kill it within 48 hours. The nematodes then reproduce inside the cadaver and are released back into the soil to infect more vine weevil larvae. If there are no larvae present in the soil the nematodes will die out after a few weeks. This nematode is effective at a lower temperature than the previous Nemasys, (to 5 ° C, 41° F).

## Chapter 12 – Pests of Specific Crops

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### CORYLUS – HAZELNUT (insert on page 211)

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Pest Description	Chemical Control
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**Diseases:**

**Eastern Filbert Blight**

(*Anisogramma anomala*):

**ADD:**

‘GUARDSMAN’ COPPER 50 WP or COPPER SPRAY (fixed copper fungicide) 50%: 3-9 kg of product per hectare. Maximum of three applications per year and repeat at 10-14 day intervals. Use low rate on small trees, and high rate on large trees. Apply product in 1,000 L water/ha. Application is needed only from bud swell to bud break (approximately mid-March to mid-May) which is the time that the tissue is susceptible to infection.

QUADRIS FLOWABLE: 900 mL product/ha. Apply in 1,000 L of water per hectare. Do not exceed four applications per year. Make two sequential applications of Quadris followed by two or more applications of fungicides with a different mode of action. Apply at a 7-10 day interval. Apply at bud swell to bud break (approximately mid-March to mid-May), when tissues are susceptible.

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**MALUS – APPLE AND CRABAPPLE** (insert on page 222)

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<b>Pest Description</b>	<b>Chemical Control</b>
<b>Diseases:</b>	
<b>Rust</b> (Quince Rust, <i>Gymnosporangium clavipes</i> ):	<b>ADD:</b> THIRAM 75 WP: Apply 1.5 to 2.25 kg /1,000 L of water. Apply in tight cluster through first cover spray. If recommended by local authorities, apply a special bloom spray at 750 grams/1,000 L. Keep foliage and fruit covered during infestation periods. Do not apply within 1 day of harvest. ZINEB CLEAN CROP 80 W: Follow directions for application for <b>Scab</b> (below).
<b>Scab</b> ( <i>Venturia inaequalis</i> ):	<b>ADD:</b> THIRAM 75 WP: Apply 1.5 to 2.25 kg/1,000 L of water. Apply in a regular protective schedule from green tip up to and including second cover spray. After the second cover spray, reduce rate to 1.0 to 1.5 kg/1,000 L if scab is at a low level. Do not apply within 1 day of harvest. ZINEB CLEAN CROP 80 W: Apply 1-1.25 kg/1,000 L of water. Apply in the 5 <sup>th</sup> and 6 <sup>th</sup> cover sprays, apply again 2 weeks after the 6 <sup>th</sup> cover spray. COMPASS 50 WG: For non-bearing apple trees. Apply 14-17.5 g/100 L of water. Apply before symptoms develop or when conditions are favorable for disease development. Apply as a foliar spray to run-off. Continue at 7 - 10 day intervals until the threat of disease is over. Under lighter disease pressure, the application interval may be extended. Use the higher rate for severe disease threats. Registered for outdoor ornamental trees grown in field nursery plantings, and residential and commercial landscapes.

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**PRUNUS spp. (all)** (insert on page 233)

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<b>Pest Description</b>	<b>Chemical Control</b>
<b>Insects:</b>	
<b>Peach Tree Borer</b> ( <i>Synanthedon excitiosa</i> ): This pest affects apricots, cherries, chokecherries, nectarines, peaches, plums and prunes. Females lay eggs near the soil line on tree trunks where, after hatching, the larvae tunnel under the bark. Larvae are cream colored with brown heads and reach up to 30 mm long. Adults are clear-winged moths around 25 mm long with yellow banded abdomens. Can girdle and kill young trees. Older trees are weakened and become susceptible to other pests.	<b>ADD:</b> ISOMATE-P PHEROMONE: 250 to 625 dispensers/ha for peaches, nectarines and apricots. One dispenser per tree attached to a branch around mid-point of tree. Apply in the spring prior to moth emergence, one application can provide season-long control. ENDOSULFAN 400E, THIODAN 4EC: 1.75 L/1,000 L of water THIODAN 50WP: 1.5 kg/1,000 L of water  <b>Cultural Management:</b> Install a metal cone-shaped collar around the base of the tree before eggs are laid to prevent larvae from boring into the base of the tree. Kill larvae in tunnels by probing with a wire or by opening the tunnels to find and destroy them.

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**PRUNUS – FLOWERING CHERRY, PLUMS, etc.** (insert on page 230)

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<b>Pest Description</b>	<b>Chemical Control</b>
<b>Diseases:</b>	
<b>Brown Rot</b> ( <i>Monilinia</i> spp.):	<b>ADD:</b> THIRAM 75 WP: (peaches) 1.5 to 2.25 kg per 1,000 L water. For blossom blight apply at 3 to 4 day intervals timed to keep newly opened blossoms covered. For fruit rot, apply at petal fall and again 2 weeks later. Do not apply within 7 days to harvest.

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## Appendix 11 – Publications and Contacts

### BC Ministry of Agriculture, Food and Fisheries Contacts (insert on page 312)

<b>Contact</b>	<b>Ornamental Specialization</b>	<b>Phone</b>	<b>Fax</b>
Dave Trotter <sup>1</sup>	Agroforestry	604-556-3148	604-556-3099
Siva Sabaratnam <sup>1</sup>	Disease Management	604-556-3029	604-556-3117
Bob Costello <sup>1</sup>	Insect and Mite Management	604-556-3031	604-556-3030
Tracy Hueppelsheuser <sup>1</sup>	Minor Use Pesticide Coordinator	604-556-3028	604-556-3117
Dave Woodske <sup>1</sup>	Industry Specialist, Ornamentals	604-556-3044	604-556-3080
Madeline Waring <sup>1</sup>	Pesticides	604-556-3027	604-556-3030
Vippen Joshi <sup>1</sup>	Plant Diagnostic Laboratory	604-556-3128	604-556-3154
	Resource Management Branch	604-556-3100	604-556-3099
Micheal Betts <sup>2</sup>	Weed Management	250-356-1533	
Yadvinder Dhillon <sup>1</sup>	Crop Insurance Representative	604-556-3070	604-556-3030
Jim Matheson <sup>1</sup>	Crop Insurance Representative	604-556-3069	604-556-3030

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