

# 6. Canola and Mustard

## CANOLA AND MUSTARD INSECTS

**Table 6-1.** Control Options for Insects in Canola and Mustard — Flea Beetles

<b>LEGEND:</b> PHI = Pre-Harvest Interval (in days)      — = no information on label      N/A = not applicable					
<b>Integrated Pest Management Options</b>	<b>Active Ingredient</b>	<b>Trade Name</b>	<b>Rate</b>	<b>PHI</b>	<b>Comments (label precautions, restricted entry intervals, etc.)</b>
<b>FLEA BEETLES (<i>Phyllotreta cruciferae</i> and <i>Phyllotreta striolata</i>)</b>					
<b>Seed Treatment</b>					
<p>Hot, dry weather favours this pest. Once the crop reaches the 3–4-leaf stage, the plants are generally established and can compensate for the feeding damage.</p> <p>Canola seedlings can withstand up to 25% defoliation in the cotyledon stage under good growing conditions without a significant reduction in yield. No thresholds are available for late-season pod feeding by the second generation of adults. Only when adult populations are extreme, and dry conditions are hindering the crop from compensating for the pod damage, is a spray recommended.</p> <p>Honeybees and other pollinators regularly visit canola and mustard flowers. Keep insecticide application to a minimum while the crop is in bloom to avoid bee-kills. Advise local beekeepers before you apply a pesticide, so that they may take precautions to protect their bees. For more information on preventing bee poisonings, see <i>Bee Poisoning</i>, on page 199.</p>	clothianidin + carbathiin + thiram + metalaxyl	Prosper FL	1.25 L/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Not for use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment application. 30-day plant-back on cereal grains, grasses, non-grass animal feeds, and soybean and dried beans is required. 1-yr plant-back interval is required for leafy, root and tuber vegetables. Can be tank-mixed with Poncho 600 FS for longer season control of flea beetles. Follow resistance management Instructions as stated on label.
	clothianidin + metalaxyl + metconazole	NipsIt SUITE Canola Seed Protection	1.43 L/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with NipsIt SUITE.
	cyantraniliprole	Fortenza	1,333 mL/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Apply Fortenza as a water-based slurry utilizing standard slurry seed treatment equipment that provides uniform seed coverage. This product contains no colourant. An appropriate colourant must be added when this product is applied. Follow resistance management instructions as stated on label.
		Lumiderm	960–1,600 mL/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Use high rates in areas where extended pest control is required. Do not apply a subsequent application of a Group 28 insecticide (anthranilic diamide) in a crop with Lumiderm seed treatment. See label for tank-mix options.
	imidacloprid	Gaicho 480 FL	820–1,640 mL/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Not for use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment application. Do not graze livestock on treated areas for 4 weeks after planting. Do not use mustard greens that have had Gaicho 480 FL seed treatment for human consumption. Use higher rate if flea beetle populations are high.
		Sombrero 600 FS	670–1,330 mL/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Dilute with 63–133 mL/100 kg water. A colourant MUST be added to this product to colour seed in accordance with the <i>PCP Act</i> and the <i>Seeds Act</i> regulations. A blue colourant must be added when this product is applied to oilseed.
	imidacloprid + carbathiin + thiram	Gaicho CS FL	1.4 L/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Not for use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment application. Do not graze livestock on treated areas for 4 weeks after planting. Do not use mustard greens that have had Gaicho CS FL seed treatment for human consumption. Follow resistance management instructions as stated on label.

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Table 6–1. Control Options for Insects in Canola and Mustard — Flea Beetles

LEGEND: PHI = Pre-Harvest Interval (in days)      — = no information on label      N/A = not applicable						
Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)	
<b>FLEA BEETLES (<i>Phyllotreta cruciferae</i> and <i>Phyllotreta striolata</i>) (continued)</b>						
<b>Seed Treatment (continued)</b>						
(continued)	thiamethoxam + difenoconazole + metalaxyl-m + fludioxonil + sedaxane	Helix Vibrance	1.5 L/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Apply Helix Vibrance using standard commercial seed treatment equipment that provides uniform seed coverage. Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with Helix Vibrance.	
<b>Foliar Treatment</b>						
Honeybees and other pollinators regularly visit canola and mustard flowers. Keep insecticide application to a minimum while the crop is in bloom, to avoid bee-kills. Advise local beekeepers before you apply a pesticide, so that they may take precautions to protect their bees. For more information on preventing bee poisonings, see <i>Bee Poisoning</i> , on page 199.	carbaryl	Sevin XLR Plus	500 mL/ha (200 mL/acre)	60	<b>Ground application only.</b> Seedling stage only (up to 4 weeks after plant emergence). This product is highly toxic to honeybees exposed to direct treatment on blooming crops or weeds. Apply Sevin XLR Plus from late evening to early morning or when bees are not foraging.	
	cypermethrin	Mako	50 mL/ha (20 mL/acre)	30	<b>For use in canola only.</b> Ground application only. Apply when signs of insect damage appear. Repeat treatment if necessary. Use minimum 110 L/ha of water. Toxic to bees and other beneficial insects. Avoid spraying when bees are foraging.	
	deltamethrin	Decis 5 EC	100–150 mL/ha (40–60 mL/acre)	14	Ground and aerial application. Use a minimum of 100 L/ha of water for ground application. Use a minimum of 11–22 L/ha of water for aerial application. 12-hr restricted entry interval.  Toxic to bees for 1 day after application. DO NOT apply when crop or weeds are in bloom.	
	lambda-cyhalothrin	Matador 120 EC	Silencer 120 EC	83 mL/ha (33 mL/acre)	7	Ground and aerial application. Maximum 3 applications/yr. Maximum 1 aerial application. 24-hr restricted entry interval.
		This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.				
	lambda-cyhalothrin + chlorantraniliprole	Voliam Xpress	225 mL/ha (91 mL/ha)	7	To prevent migration of overwintering beetles, ground spray a 15-m strip around the field at the first sign of flea beetle feeding. Maximum of 3 applications/yr by ground, 1 application/yr by air. Apply in a minimum of 100–200 L of water/ha for ground applications, 40 L of water/ha for aerial applications. Do not apply Voliam Xpress following a Group 28 insecticide (e.g., Lumiderm) seed treatment.  This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.	
permethrin	Ambush 500EC	70–140 mL/ha (28–57 mL/acre)	—	Ground and aerial application. Use higher rate when infestations are severe. Restricted entry interval as soon as spray has dried. Maximum applications: 2 (ground), 1 (aerial) per season.  Toxic to bees. Avoid spraying when bees are foraging. Spray deposit should be dry before bees commence foraging in treated crop.		

## CANOLA AND MUSTARD INSECTS

**Table 6–2.** Control Options for Insects in Canola and Mustard — Cutworm, Swede Midge, Cabbage Seedpod Weevil, Tarnished Plant Bug

<b>LEGEND:</b> PHI = Pre-Harvest Interval (in days)      N/A = not applicable					
<b>Integrated Pest Management Options</b>	<b>Active Ingredient</b>	<b>Trade Name</b>	<b>Rate</b>	<b>PHI</b>	<b>Comments (label precautions, restricted entry intervals, etc.)</b>
<b>CUTWORM (Various species)</b>					
<b>Seed Treatment</b>					
Redbacked cutworms are most commonly found in Northern Ontario. Larvae hatch in the spring and feed on the seedling crop before pupating mid-summer. Adult moths emerge and lay eggs late in the summer or early fall near weedy plants within the field. Practise good weed management to reduce attractiveness of adult moths during egg laying (typically August).	cyantraniliprole	Fortenza	500 mL/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Apply Fortenza as a water-based slurry utilizing standard slurry seed treatment equipment that provides uniform seed coverage. This product contains no colourant. An appropriate colourant must be added when this product is applied. Follow resistance management instructions as stated on label.
		Lumiderm	480–960 mL/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Do not make a subsequent foliar application of any Group 28 insecticide (e.g., Coragen and Voliam Xpress) for a minimum of 60 days after planting seed treated with Lumiderm. See label for tank-mix options.  This product contains no colourant. An appropriate colourant must be added when this product is applied.
<b>SWEDE MIDGE (<i>Contarinia nasturtii</i>)</b>					
Swede midge is a serious pest of spring canola, though winter canola can experience damage. Under heavy midge infestations, later-planted spring canola plants may experience stunting and malformed growth, with extremely reduced flower and pod formation. Fields planted later than the first week of June are at significantly increased risk of swede midge damage.  Go to <a href="http://www.ontariocanola growers.ca">www.ontariocanola growers.ca</a> for up-to-date management recommendations. Timing of insecticides is critical and is based on pheromone trapping results.	chlorantraniliprole	Coragen	250–375 mL/ha (101–151 mL/acre)	1	<b>Ground application only.</b> Do not apply this product for a minimum of 60 days following a seed treatment of a Group 28 insecticide (e.g., Fortenza and Lumiderm) within that season. For ground application, use a minimum water volume of 100 L/ha. Use high rate of Coragen under heavy pest pressure. Minimum of 3 days between applications. Maximum 3 applications/yr. 12-hr restricted entry interval.
		lambda-cyhalothrin	Matador 120 EC	83 mL/ha (34 mL/acre)	7
Silencer 120 EC	83 mL/ha (34 mL/acre)				

## CANOLA AND MUSTARD INSECTS

**Table 6–2.** Control Options for Insects in Canola and Mustard — Cutworm, Swede Midge, Cabbage Seedpod Weevil, Tarnished Plant Bug

<b>LEGEND:</b> PHI = Pre-Harvest Interval (in days)      N/A = not applicable					
<b>Integrated Pest Management Options</b>	<b>Active Ingredient</b>	<b>Trade Name</b>	<b>Rate</b>	<b>PHI</b>	<b>Comments (label precautions, restricted entry intervals, etc.)</b>
<b>CABBAGE SEEDPOD WEEVIL (<i>Ceutorhynchus obstrictus</i>)</b>					
<p>This is a serious pest in winter canola, though it can also impact early-planted spring canola. Adult weevils lay eggs directly into the seedpod. Pod feeding by the larvae can cause up to 35% yield loss. Apply insecticide to adults prior to egg-laying, as foliar insecticide will not control larvae within the canola pod.</p> <p>See the OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>, for further information on pest biology and management options.</p> <p>Honeybees and other pollinators regularly visit canola and mustard flowers. Keep insecticide application to a minimum while the crop is in bloom to avoid bee-kills. Advise local beekeepers before you apply a pesticide, so that they may take precautions to protect their bees. For more information on preventing bee poisonings, see <i>Bee Poisoning</i>, on page 199.</p>	lambda-cyhalothrin	Matador 120 EC	83 mL/ha (33 mL/acre)	7	<p>Ground and aerial application. For adult control only. Apply at bud-to-early-flowering stage. Maximum 1 application/yr. 24-hr restricted entry interval.</p> <p>This product is toxic to bees when exposed to direct treatment, drift, or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.</p>
	Silencer 120 EC				
	lambda-cyhalothrin + chlorantraniliprole	Voliam Xpress	225 mL/ha (91 mL/ha)	7	<p>Apply at the bud-to-early-flowering stage. Make only 1 application per season by either ground or aerial. Apply in a minimum of 100–200 L of water/ha for ground applications, 40 L of water/ha for aerial applications.</p> <p>This product is toxic to bees when exposed to direct treatment, drift, or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.</p>
<b>TARNISHED PLANT BUG (<i>Lygus lineolaris</i>)</b>					
<b>Foliar Treatment</b>					
<p>Tarnished plant bugs sting plant tissue, including pods and flowers. This causes scarring, malformation and dimpling or pitting on pods. They can also drill into the seed. If flowers are still present, they can prick the flower and cause it to abort. Spraying is warranted when 2 bugs per sweep are found after petal fall, prior to pod maturity.</p> <p>Honeybees and other pollinators regularly visit canola and mustard flowers. Keep insecticide application to a minimum while the crop is in bloom to avoid bee-kills. Advise local beekeepers before you apply a pesticide, so that they may take precautions to protect their bees. For more information on preventing bee poisonings, see <i>Bee Poisoning</i>, on page 199.</p>	lambda-cyhalothrin	Matador 120 EC	83 mL/ha (33 mL/acre)	7	<p>Ground and aerial application. Maximum 3 applications/yr. Maximum 1 aerial application. 24-hr restricted entry interval.</p> <p>This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.</p>
	Silencer 120 EC				
	lambda-cyhalothrin + chlorantraniliprole	Voliam Xpress	225 mL/ha (91 mL/ha)	7	<p>Apply at the bud-to-early-flowering stage. Make only 1 application per season by either ground or aerial. Apply in a minimum of 100–200 L of water/ha for ground applications, 40 L of water/ha for aerial applications.</p> <p>This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.</p>

## CANOLA AND MUSTARD DISEASES

**Table 6-3.** Control Options for Seedling Diseases in Canola and Mustard — Seed Rot and Seedling Blight, Pythium Damping-Off

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
<b>SEED ROT and SEEDLING BLIGHT (<i>Alternaria</i>, <i>Fusarium</i> and <i>Rhizoctonia</i> spp.)</b>				
<b>Seed Treatment</b>				
Plant good-quality seed under conditions that promote rapid germination (warm temperatures). Using a fungicide seed treatment will increase stand establishment. Maintain a good fertility balance and avoid excess fertilizer, which promotes disease and phytotoxicity. Avoid deep planting of seed.	carbathiin + thiram	Vitavax RS	833 mL/ 100 kg seed	Do not graze or feed livestock on seed area for 4 weeks after planting.
	imidacloprid + carbathiin + thiram	Gaucho CS FL	1.4 L/ 100 kg seed	<b>For use in commercial seed treatment facilities only.</b> Not for use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment application. Do not graze livestock on treated areas for 4 weeks after planting. Do not use mustard greens that have had Gaucho CS FL seed treatment for human consumption. Follow resistance management instructions as stated on label.
	mandestrobin	S-2200 3.2FS	26 mL/ 100 kg seed	For commercial and on-farm treating. Regulations under the <i>Seeds Act</i> require that an appropriate colourant be added when this product is applied to seed. Ensure uniform seed coverage and do not apply this product in a hopper-box or planter-box at planting time. For resistance management, please note that S-2200 3.2 FS fungicide is a Group 11 fungicide. Any fungal population may contain individuals naturally resistant to S-2200 3.2 FS fungicide and other Group 11 fungicides.
	thiamethoxam + difenoconazole + metalaxyl-m + fludioxonil + sedaxane	Helix Vibrance	1.5 L/ 100 kg seed	<b>For use in commercial seed treatment facilities only.</b> Apply Helix Vibrance using standard commercial seed treatment equipment that provides uniform seed coverage. Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with Helix Vibrance.
<b>PYTHIUM DAMPING-OFF (<i>Pythium</i> spp.)</b>				
Plant good-quality seed under conditions that promote rapid germination (warm temperatures). Using metalaxyl or metalaxyl-M seed treatment will increase stand establishment. Maintain a good fertility balance and avoid excess fertilizer, which promotes disease and phytotoxicity. Avoid deep planting of seed.	ethaboxam	INTEGO Solo	13–19.6 mL/ 100 kg seed (5–7.5 g ai/ 100 kg seed)	For commercial and on-farm treating. Regulations under the <i>Seeds Act</i> require that an appropriate colourant must be added when this product is applied to seed. A baby blue colourant must be added when this product is applied to canola/rapeseed.  For best results, use INTEGO Solo fungicide combined with other oomycete-active seed treatment fungicides, such as metalaxyl, to broaden the spectrum of activity. INTEGO Solo fungicide can also be used in combination with a broad-spectrum registered seed treatment fungicide having activity against <i>Rhizoctonia solani</i> and other fungal pathogens inciting seed and seedling disease.
	metalaxyl	Apron FL	32–110 mL/ 100 kg seed	<b>For use in canola only.</b> Do not graze or feed livestock on seeded area for 4 weeks after planting.
	metalaxyl-M	Apron XL LS	20–40 mL/ 100 kg seed	<b>For use in canola only. For use in commercial seed treatment facilities only.</b> Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Read label for information regarding resistant strains of fungus.
	thiamethoxam + difenoconazole + metalaxyl-m + fludioxonil + sedaxane	Helix Vibrance	1.5 L/ 100 kg seed	<b>For use in commercial seed treatment facilities only.</b> Apply Helix Vibrance using standard commercial seed treatment equipment that provides uniform seed coverage. Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with Helix Vibrance.

## CANOLA AND MUSTARD DISEASES

**Table 6–4.** Control Options for Seedling Diseases in Canola and Mustard — Blackleg

<b>Integrated Pest Management Options</b>		<b>Active Ingredient</b>	<b>Trade Name</b>	<b>Rate</b>	<b>PHI</b>	<b>Comments (label precautions, restricted entry intervals, etc.)</b>
<b>LEGEND:</b> PHI = Pre-Harvest Interval (in days) N/A = not applicable						
<b>BLACKLEG (<i>Leptosphaeria maculans</i>)</b>						
<b>Seed Treatment</b>						
<p>There are differences in susceptibility to blackleg between cultivars. Consult with your seed company for variety information.</p> <p>Maintain at least 3 yr between canola crops. Fungicide seed treatments will reduce seed-borne infection.</p>	carbathiin + thiram	Vitavax RS	833 mL/ 100 kg seed	N/A	Do not graze or feed livestock on seed area for 4 weeks after planting.	
	imidacloprid + carbathiin + thiram	GaUCHO CS FL	1.4 L/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Not for use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment application. Do not graze livestock on treated areas for 4 weeks after planting. Do not use mustard greens that have had GaUCHO CS FL seed treatment for human consumption. Follow resistance management instructions as stated on label.	
	thiamethoxam + difenoconazole + metalaxyl-m + fludioxonil + sedaxane	Helix Vibrance	1.5 L/ 100 kg seed	N/A	<b>For use in commercial seed treatment facilities only.</b> Apply Helix Vibrance using standard commercial seed treatment equipment that provides uniform seed coverage. Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with Helix Vibrance.	
<b>Foliar Treatment</b>						
<p>A foliar fungicide may be warranted if blackleg symptoms occur at the seedling and rosette stages or if a susceptible variety is being grown. Consult with your seed company for variety information.</p>	azoxystrobin	Quadris	500 mL/ha (200 mL/acre)	30	<b>For use in canola only.</b> Apply at 2–6-leaf stage. See label for information regarding resistant strains of fungus. Plant-back interval of 30 days for broadleaf and root crops and 45 days for cereals required.	
	azoxystrobin + propiconazole	Quilt	1.0 L/ha (404 mL/acre)	30	Ground and aerial application. Apply during the rosette stage between 2nd true leaf and bolting. Maximum 1 application/yr. 12-hr restricted entry interval. Apply a minimum of 100 L of water/ha for ground application and 45 L of water/ha for aerial application.	
	propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	60	For use in canola only. Ground and aerial application. Apply at rosette stage, between 2nd true leaf and bolting.	
		Nufarm Propiconazole				
		Tilt 250 E	500 mL/ha (200 mL/acre)			
	pyraclostrobin	Headline EC	300–400 mL/ha (120–160 mL/acre)	21	Apply at the 2–6-leaf stage for black leg and <b>20%–50% bloom-(suppression only)</b> -to-early-pod stage (90% bloom) in canola for alternaria black spot. Use the higher rate when conditions are conducive to heavy disease development. Use a minimum of 100 L/ha of water for ground application and 50 L/ha of water for aerial application. Maximum 2 applications/yr. 12-hr restricted entry interval.	
pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	21	Ground and aerial application. Apply at the 2–6-leaf (rosette) stage. Use the higher rate under high disease pressure. Maximum 2 applications/yr. 12-hr restricted entry interval.		



## CANOLA AND MUSTARD DISEASES

**Table 6–5.** Control Options for Seedling Diseases in Canola and Mustard — Sclerotinia Stem Rot**LEGEND:** PHI = Pre-Harvest Interval (in days)

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
<b>SCLEROTINIA STEM ROT (WHITE MOULD) (<i>Sclerotinia sclerotiorum</i>)</b>					
<b>Foliar Treatment</b>					
This disease is often a problem when canola follows canola, dry edible beans, soybeans or sunflowers. Use clean seed and a 4–5-yr rotation with non-host crops such as corn, wheat, barley or oats. At present, no resistant varieties exist. Keep fields clean of broad-leaved weeds, since many are alternate hosts. The disease is very destructive during periods of prolonged, wet weather. Losses of up to 50% can occur under conditions ideal for the disease.	azoxystrobin	Quadris	700–1,000 mL/ha (283–405 mL/acre)	30	<b>For use in canola only.</b> Apply at early bloom (prior to 30% bloom). Use the higher rate if there is a history of infection in the area and when environmental conditions favour disease development. See label for information regarding resistant strains of fungus. Plant-back interval of 30 days for broadleaf and root crops and 45 days for cereals required.
	<i>Bacillus subtilis</i> QST 713 strain	Serenade OPTI	0.3–0.9 kg/ha (0.12–0.36 kg/acre)	0	<b>Provides suppression only.</b> Ground and aerial application. Begin application at 20%–30% bloom. A second application may be made 7–10 days later, at approximately 50% bloom and prior to significant petal fall, if conditions for disease development remain favourable. Use higher rates in fields with a history of heavy disease pressure.  Aerial spray volume: minimum 50 L/ha.
	boscalid	Lance	350 g/ha (142 g/acre)	21	Ground and aerial application. Apply at 20%–50% flowering. Apply a second time, 7–10 days later, up to 50% flowering, if disease persists or weather conditions are favourable for disease development. Do not tank-mix with insecticide, as this fungicide could affect insecticide efficacy. 4-hr restricted entry interval.
	boscalid + prothioconazole	Cotegra	0.7 L/ha (280 mL/acre)	21	<b>Provides suppression only.</b> Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100–200 L/ha for ground application. Ensure thorough coverage of foliage. Apply a second time 7–14 days later if disease persists, or weather conditions are favourable for disease development. Use shorter interval when disease pressure is high. Maximum 2 applications/yr.
	<i>Coniothyrium minitans</i>	Contans WG	0.5–4 kg/ha (0.20–1.6 kg/acre)	0	<b>Provides suppression only.</b> Ground application only. This product should be applied at least 3 months prior to anticipated outbreak (e.g., prior to planting). Product should be incorporated as thoroughly as possible to a depth of 5–20 cm. Rate should be increased to 2–4 kg/ha (0.8–1.6 kg/acre) if incorporated to a depth greater than 5 cm. A post-harvest application may be applied in the fall to treat the soil prior to spring planting of a susceptible crop. Treated soils in the fall should not be disturbed to avoid bringing untreated sclerotia from lower soil layers to the top soil layer. Maximum 2 applications/yr.
	cyprodinil + fludioxonil	Astound	775–975 g/ha (314–395 g/acre)	35	Ground and aerial application. Apply 1 application at 20%–30% bloom stage. Use a minimum of 200 L/ha of water for ground application. Use a minimum of 45 L/ha of water for aerial application. Apply the higher rate under conditions of high disease pressures. Maximum 1 application/yr. 12-hr restricted entry interval.

## CANOLA AND MUSTARD DISEASES

**Table 6–5.** Control Options for Seedling Diseases in Canola and Mustard — Sclerotinia Stem Rot**LEGEND:** PHI = Pre-Harvest Interval (in days)

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
<b>SCLEROTINIA STEM ROT (WHITE MOULD) (<i>Sclerotinia sclerotiorum</i>) (continued)</b>					
<b>Foliar Treatment (continued)</b>					
(continued)	iprodione	Overall 240 SC	2.1–3.1 L/ha (850–1,255 mL/acre)	14	<b>For use in canola only.</b> Ground and aerial application. Use a minimum of 100 L/ha of water for ground application. Use a minimum of 45 L/ha of water for aerial application. Apply at 20%–30% bloom. Maximum 2 applications/yr. 12-hr restricted entry interval.
		Rovral WP	1.0–1.5 kg/ha (0.4–0.6 kg/acre)	14	<b>For use in canola only.</b> Ground and aerial application. Use a minimum of 45 L/ha of water for aerial application. Apply at 20%–30% bloom. 12-hr restricted entry interval.
	mandestrobin	S-2200 4SC	439–877 mL/ha (178–355 mL/acre)	12 hr	Make application between 20% and 50% bloom. Do not use within 35 days of harvest. Under high pressure, use 877 mL/ha. Do not apply more than 1 application/yr. Do not apply more than 877 mL/ha/yr.
	metconazole	Quash	280 g/ha (113.3 g/acre)	45	Ground and aerial application. Apply prior to disease development. Make first application at 20%–50% bloom stage, before disease symptoms are visible. Make a second application at full bloom (minimum 7-day interval). Do not make more than 2 applications or apply more than 560 g/ha per season.
	penthiopyrad	Vertisan	1.25–1.5 L/ha (0.5–0.6 L/acre)	21	Ground and aerial application. Begin applications at 20%–25% bloom prior to disease development. Under high disease pressure, make a 2nd application 7–14 days later. Use higher rate and shorter interval when disease pressure is high. Do not apply more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 3 L/ha/yr. 12-hr restricted entry interval.
	picoxystrobin	Acapela	0.80–1.2 L/ha (320–490 mL/acre)	28	Ground and aerial application. Apply at 20%–50% bloom prior to disease development to control white mould. Use the higher rate or shorter interval when disease pressure is high. Under high disease pressure, make a second application of another fungicide, from a different fungicide group, 7–14 days later. A second application of Acapela fungicide can only be carried out if both applications are at the lowest rate and if sprays are not sequential. Use the high rate under heavy pest pressure. Maximum seasonal use rate is 1.75 L/ha. Maximum 2 applications/yr. 12-hr restricted entry interval.
	prothioconazole	Proline	315–368 mL/ha (128–149 mL/acre)	36	Ground and aerial application. Apply when the crop is in the 20%–50% bloom stage. Best protection will be achieved when applied prior to petals beginning to fall. Higher rate is recommended for fields with a history of heavy disease pressure or for dense plant stands. Good spray coverage is essential. The lowest label rate of a non-ionic surfactant, AgSurf or Agral 90, may be tank-mixed. Maximum 1 application/yr. 24-hr restricted entry interval.
	pyraclostrobin + fluxapyroxad	Priaxor	0.45 L/ha (180 mL/acre)	21	<b>Provides suppression only.</b> Ground and aerial application. Apply at 20%–50% flower. Maximum 2 applications/yr. 12-hr restricted entry interval.



## CANOLA AND MUSTARD DISEASES

**Table 6-6.** Control Options for Seedling Diseases in Canola and Mustard — Alternaria Black Spot

**LEGEND:** PHI = Pre-Harvest Interval (in days)

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
<b>ALTERNARIA BLACK SPOT (<i>Alternaria brassicae</i> and <i>A. raphani</i>)</b>					
<b>Foliar Treatment</b>					
The disease is more prominent in other canola areas of Canada and is sporadic in Ontario. The fungus produces black lesions that can infect all parts of the plant but is especially problematic when it causes pod shatter. Crop rotation, tillage of residues, use of less susceptible variety and timely harvest can reduce impact. Fungicides are very effective.	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	21	Ground and aerial application. Use the high rate under high disease pressure. Applications at 20%–50% bloom will provide suppression of alternaria black spot, whereas applications at early pod stage will control alternaria black spot. Maximum 2 applications/yr. 12-hr restricted entry interval.

