

2. Soybeans

Bee kill incidences in Ontario have been found to be associated with the planting of corn and soybean seed treated with neonicotinoid. Growers are encouraged to follow best management practices to protect pollinators at planting. See Health Canada's pollinator protection web page: www.healthcanada.gc.ca/pollinators and Chapter 10 as well as ontario.ca/neonics for the latest information. Consult your seed company and the Ontario Soybean and Canola Committee (OSACC) at www.gosoy.ca for variety information.

SOYBEAN INSECTS

Table 2–1. Chemical Control Options for Insects in Soybeans — Seedcorn Maggot

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, re-entry periods, etc.)
SEEDCORN MAGGOT (<i>Delia platura</i>)				
Seed Treatment — For all seed treatments, use full rate and ensure good coverage of seed.				
<p>In Ontario, the use of neonicotinoid seed treatments on corn and soybean seed is restricted. See Chapter 10 for further information on the requirements to use these products.</p> <p>Factors that increase the risk of seedcorn maggot are early-planted fields where large amounts of manure, green manure or residue have been recently incorporated or when cool conditions unfavourable for emergence are expected.</p> <p>NOTE: The planting of neonicotinoid-treated corn and soybean seed can pose a risk to pollinators. This includes all clothianidin, imidacloprid and thiamethoxam products. The contaminated insecticide dust emitted from pneumatic planters can drift onto flower and water sources and expose bees to these insecticides. Growers are encouraged to follow best management practices (BMPs) to protect pollinators at planting. To help minimize the dust generated during planting, refer to <i>Pollinator Protection and Responsible Use of Treated Seed — Best Management Practices</i> on the Health Canada website at www.healthcanada.gc.ca/pollinators.</p>	thiamethoxam (See NOTE.)	Cruiser 5 FS	50–83 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Use higher rate when insect populations are expected to be high. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil (See NOTE.)	Cruiser Maxx Beans	195 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil + sedaxane (See NOTE.)	Cruiser Maxx Beans + Vibrance 500 FS (sold as a co-pack: Cruiser Maxx Vibrance Beans)	195 mL + 5–10 mL/ 100 kg seed (2.5–5 g ai/ 100 kg seed)	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	imidacloprid (See NOTE.)	Stress Shield 600	104–208 mL/ 100 kg seed (62.5–125 g ai/ 100 kg seed)	For use in commercial seed treatment facilities only. For control of certain seed and soil-borne pathogens in legume seeds and seedlings, Stress Shield 600 may be mixed with the following seed treatment fungicides: Trilex AL, Trilex AL Concentrate, Trilex FS, Allegiance, EverGol Energy, Apron Max RFC and Apron Max RTA. Follow all appropriate directions and precautions as specified on the fungicide labels. Make sure that the specific legume crop to be treated is registered on the fungicide partner as well. Do not apply any subsequent application of a Group 4 insecticide (neonicotinoids) (e.g., in-furrow or foliar application following treatment) with Stress Shield 600. Use high rate for early seeding, when insect populations are expected to be high or extended control period for aphids is needed. This product contains no colourant. Seed treated with this product must be conspicuously coloured. Do not graze or feed livestock on treated areas for 4 weeks after planting.
		Sombrero 600 FS	104–208 mL/ 100 kg seed	For use in commercial and on-farm seed treatment. Apply through slurry applicator seed treaters, which provide uniform seed coverage. Maintain constant agitation of the slurry during application. Do not apply any subsequent application of a Group 4 insecticide (e.g., in-furrow, soil or foliar application) following a soil, in-furrow or seed treatment with Sombrero.
		Alias 240 SC	260–520 mL/ 100 kg seed	Do not use in commercial seed treatment facilities. Apply through slurry applicator seed treaters, which provide uniform seed coverage. Maintain constant agitation of the slurry during application. Do not apply any subsequent application of a Group 4 insecticide (e.g., in-furrow, soil or foliar application) following a soil, in-furrow or seed treatment with ALIAS 240 SC.

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Table 2–2. Chemical Control Options for Insects in Soybeans — Soybean Aphid

LEGEND: PHI = Pre-Harvest Interval (in days)		N/A = not applicable			
Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
SOYBEAN APHID (<i>Aphis glycines</i>)					
Seed Treatment					
<p>Foliar treatment at threshold is the recommended method of control.</p> <p>In Ontario, the use of neonicotinoid seed treatments on corn and soybean seed is restricted. See Chapter 10 for further information on the requirements to use these products.</p> <p>Clothianidin, thiamethoxam and imidacloprid may not be used as soybean seed treatment solely for protection from soybean aphid. However, seed treatments for the control of other soil insect pests may provide early-season protection (up to 40 days after planting) from early infestations of soybean aphids. These early-season infestations are more likely to occur in Eastern Ontario.</p> <p>NOTE: The planting of neonicotinoid-treated corn and soybean seed can pose a risk to pollinators. This includes all clothianidin, imidacloprid and thiamethoxam products. The contaminated insecticide dust emitted from pneumatic planters can drift onto flower and water sources and expose bees to these insecticides. Growers are encouraged to follow best management practices (BMPs) to protect pollinators at planting. To help minimize the dust generated during planting, refer to <i>Pollinator Protection and Responsible Use of Treated Seed — Best Management Practices</i> on the Health Canada website at www.healthcanada.gc.ca/pollinators.</p>	thiamethoxam (See NOTE.)	Cruiser 5 FS	83 mL/ 100 kg seed	N/A	For soybeans grown under contract for seed production only. The use of neonicotinoid seed treatments solely for protection against soybean aphids is not permitted on commercial soybeans. For use in commercial seed treatment facilities only. Provides only early-season protection against soybean aphids and will not protect crop against typical mid-to-late-season aphid infestations.
	thiamethoxam + metalaxyl-M + fludioxonil (See NOTE.)	Cruiser Maxx Beans	195 mL/ 100 kg seed	N/A	For soybeans grown under contract for seed production only. The use of neonicotinoid seed treatments solely for protection against soybean aphids is not permitted on commercial soybeans. For use in commercial seed treatment facilities only. Provides early-season protection. Will not protect crop against typical mid-to-late-season aphid infestations. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil + sedaxane (See NOTE.)	Cruiser Maxx Beans + Vibrance 500 FS (sold as a co-pack: Cruiser Maxx Vibrance Beans)	195 mL + 5–10 mL/ 100 kg seed (2.5–5 g ai/ 100 kg seed)	N/A	For soybeans grown under contract for seed production only. The use of neonicotinoid seed treatments solely for protection against soybean aphids is not permitted on commercial soybeans. For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.

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Table 2-2. Chemical Control Options for Insects in Soybeans — Soybean Aphid

Integrated Pest Management Options		Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
LEGEND: PHI = Pre-Harvest Interval (in days) N/A = not applicable						
SOYBEAN APHID (<i>Aphis glycines</i>) (cont'd)						
Seed Treatment (cont'd)						
(cont'd)	imidacloprid (See NOTE.)	Stress Shield 600	104–208 mL/ 100 kg seed (62.5–125 g ai/ 100 kg seed)	N/A	<p>For soybeans grown under contract for seed production only. The use of neonicotinoid seed treatments solely for protection against soybean aphids is not permitted on commercial soybeans. For use in commercial seed treatment facilities only. For control of certain seed and soil-borne pathogens in legume seeds and seedlings, Stress Shield 600 may be mixed with the following seed treatment fungicides: Trilex AL, Trilex AL Concentrate, Trilex FS, Allegiance, EverGol Energy, Apron Max RFC and Apron Max RTA. Follow all appropriate directions and precautions as specified on the fungicide labels. Make sure that the specific legume crop to be treated is registered on the fungicide partner as well.</p> <p>Do not apply any subsequent application of a Group 4 insecticide (neonicotinoids) (e.g., in-furrow or foliar application following treatment) with Stress Shield 600.</p> <p>Use high rate for early seeding, when insect populations are expected to be high or extended control period for aphids is needed. This product contains no colourant. Seed treated with this product must be conspicuously coloured. Do not graze or feed livestock on treated areas for 4 weeks after planting.</p>	
		Sombrero 600 FS	104–208 mL/ 100 kg seed	N/A	<p>For use in commercial and on-farm seed treatment equipment.</p> <p>For soybeans grown under contract for seed production only. The use of neonicotinoid seed treatments solely for protection against soybean aphids is not permitted on commercial soybeans. Apply through slurry applicator seed treaters that provide uniform seed coverage. Maintain constant agitation of the slurry during application. Do not apply any subsequent application of a Group 4 insecticide (e.g., in-furrow, soil or foliar application) following a soil, in-furrow or seed treatment with Sombrero.</p>	
		Alias 240 SC	260–520 mL/ 100 kg seed	N/A	<p>For soybeans grown under contract for seed production only. The use of neonicotinoid seed treatments solely for protection against soybean aphids is not permitted on commercial soybeans. Do not use in commercial seed treatment facilities. Apply through slurry applicator seed treaters that provide uniform seed coverage. Maintain constant agitation of the slurry during application. Do not apply any subsequent application of a Group 4 insecticide (e.g., in-furrow, soil or foliar application) following a soil, in-furrow or seed treatment with Alias 240 SC.</p>	

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Table 2–2. Chemical Control Options for Insects in Soybeans — Soybean Aphid

Integrated Pest Management Options		Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
LEGEND: PHI = Pre-Harvest Interval (in days) N/A = not applicable						
SOYBEAN APHID (<i>Aphis glycines</i>) (cont'd)						
Foliar Treatment						
<p>Foliar treatment is the recommended method of control for soybean aphids. Aphid infestations are more likely to cause yield reduction if the plants are already suffering from drought conditions or another stress factor.</p> <p>Scout fields frequently. Apply foliar insecticide when threshold of “250 aphids per plant with increasing populations” has been reached in the R1–R5 stage of soybeans. If aphid populations do not appear to be on the increase above 250 per plant, do not apply insecticide, as it will kill off the beneficial insects that are keeping the aphid population in check. Aphids are then likely to increase quickly in the absence of their predators and could easily reach threshold.</p> <p>For further information on scouting techniques, thresholds and management options, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	lambda-cyhalothrin	Matador 120 E	83–233 mL/ha (34–94 mL/acre)	21	<p>Ground and aerial application. For best results, apply during the early morning, before temperatures rise, or during the evening. Use higher rate when conditions favour rapidly increasing populations or when crop canopies are dense, resulting in poor spray coverage. Select nozzle size, type and pressure to produce a medium spray. Use 100–200 L water/ha for ground application, 10–40 L water/ha for aerial application. Maximum 3 applications/yr. 24-hr re-entry period.</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	83–233 mL/ha (34–94 mL/acre)	21	<p>Ground application only. For best results, apply during the early morning, before temperatures rise, and during the evening. Maximum 3 applications/yr. 24-hr re-entry period.</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>	
	dimethoate	Cygon 480 EC	1 L/ha (400 mL/acre)	30	<p>Ground and aerial application. Use high volume, high pressure and ensure good coverage. Maximum 3 applications/yr.</p> <p>This product is toxic to bees. Restrict application to the period after dark when bees are inside their hives, or in the early morning before the bees are foraging in the fields. Do not apply to such crops as alfalfa when in full bloom.</p>	
		Lagon 480 EC				
imidacloprid + deltamethrin		Concept	325–650 mL/ha (131–263 mL/acre)	20	<p>Do not apply this product if following a seed treatment or soil application of a Group 4 insecticide (neonicotinoids) within that season. Ground or aerial application. Use high rate for fastest knockdown and best residual control. Minimum of 5 days between applications. Maximum 3 applications/yr. 24-hr re-entry period.</p> <p>This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.</p>	

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Table 2-2. Chemical Control Options for Insects in Soybeans — Soybean Aphid

Integrated Pest Management Options		Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
SOYBEAN APHID (<i>Aphis glycines</i>) (cont'd)						
Foliar Treatment (cont'd)						
(cont'd)	thiamethoxam + lambda-cyhalothrin	Endigo	180 mL/ha (73 mL/acre)	30	<p>Base the need and timing of application on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring. Allow at least 7 days between treatments. Do not graze or harvest treated forage, straw or hay for livestock feed. Do not apply this product within 45 days of planting if seeds were treated with a neonicotinoid product. Do not exceed a total of 540 mL/ha of Endigo per season. Maximum of 3 applications/yr. Use a minimum of 100–200 L of water/ha for ground applications and 20 L of water/ha for aerial application.</p> <p>Toxic to bees. To minimize exposure to bees from foliar application, 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>	
	spirotetramat	Movento	185–275 mL/ha (75–111 mL/acre)	21	<p>Soybeans may be treated by ground or aerial application equipment. The minimum interval between applications is 7 days. A maximum of 730 mL/ha of Movento is allowed per crop season. Movento must be tank-mixed with a spray adjuvant/additive having spreading and penetrating properties to maximize leaf uptake and systemicity of the active ingredient within treated plants. Please see label for suggested adjuvants. The efficacy of Movento may not be apparent for 10–21 days.</p> <p>This product is toxic to bee brood. Bee brood may be exposed to residues in/on pollen and nectar brought back to the hive by bees foraging on flowering crops and weeds. DO NOT apply during crop flowering period or when flowering weeds are present in the treatment area.</p>	
	flupyradifurone	Sivanto Prime	500–750 mL/ha (202–303 mL/acre)	7	<p>The maximum amount of Sivanto Prime allowed per crop season is 2,000 mL/ha. Apply as a foliar application ensuring thorough coverage. Do not make any application of Sivanto Prime following soil, in-furrow or seed treatment applications of a Group 4D insecticide.</p> <p>Toxic to adult bees in laboratory studies via oral exposure, however, not toxic to bees through contact exposure, and field studies conducted with this product have shown no effects on honeybee colony development. Minimize spray drift to reduce exposure to bees in habitats close to the application site. Application during the crop blooming period and when flowering weeds are present may only be made in the early morning and the evening when most bees are not foraging.</p>	

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Table 2–2. Chemical Control Options for Insects in Soybeans — Soybean Aphid

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

N/A = not applicable

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
SOYBEAN APHID (<i>Aphis glycines</i>) (cont'd)					
Foliar Treatment (cont'd)					
(cont'd)	lambda-cyhalothrin + chlorantraniliprole	Voliam Xpress	500 mL/ha (200 mL/acre)	21	<p>DO NOT use more than 3 applications per season by ground application. DO NOT use more than 1 application per season by aerial application. Re-apply after 7 days, depending on the presence of significant populations as determined by local monitoring. Apply in a minimum of 100–200 L of water/ha for ground application. Apply in a minimum of 40 L of water/ha for aerial application.</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>

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Table 2-3. Chemical Control Options for Insects in Soybeans — Bean Leaf Beetle

LEGEND: PHI = Pre-Harvest Interval (in days) N/A = not applicable					
Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
BEAN LEAF BEETLE (<i>Certoma trifurcata</i>)					
Seed Treatment					
<p>In Ontario, the use of neonicotinoid seed treatments on corn and soybean seed is restricted. See Chapter 10 for further information on the requirements to use these products. Seed treatments may provide early-season protection (up to 40 days after planting) from early infestations of bean leaf beetle. Fields with a history of early-season infestation from overwintering adults are at a higher risk and should be scouted regularly. Fields in southwestern counties of Ontario, in particular, tend to experience injury to the seedling crop from early infestations of beetles.</p> <p>NOTE: The planting of neonicotinoid-treated corn and soybean seed can pose a risk to pollinators. This includes all clothianidin, imidacloprid and thiamethoxam products. The contaminated insecticide dust emitted from pneumatic planters can drift onto flower and water sources and expose bees to these insecticides. Growers are encouraged to follow best management practices (BMPs) to protect pollinators at planting. To help minimize the dust generated during planting, refer to <i>Pollinator Protection and Responsible Use of Treated Seed — Best Management Practices</i> on the Health Canada website at www.healthcanada.gc.ca/pollinators.</p>	thiamethoxam (See NOTE.)	Cruiser 5 FS	83 mL/ 100 kg seed	N/A	For use in commercial seed treatment facilities only. To reduce early-season defoliation. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil (See NOTE.)	Cruiser Maxx Beans	195 mL/ 100 kg seed	N/A	For use in commercial seed treatment facilities only. To reduce early-season defoliation. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil + sedaxane (See NOTE.)	Cruiser Maxx Beans + Vibrance 500 FS (sold as a co-pack: Cruiser Maxx Vibrance Beans)	195 mL + 5–10 mL/ 100 kg seed (2.5–5 g ai/ 100 kg seed)	N/A	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	imidacloprid (See NOTE.)	Stress Shield 600	104–208 mL/ 100 kg seed (62.5–125 g ai/ 100 kg seed)	N/A	For use in commercial seed treatment facilities only. For control of certain seed and soil-borne pathogens in legume seeds and seedlings, Stress Shield 600 may be mixed with the following seed treatment fungicides: Trilex AL, Trilex AL Concentrate, Trilex FS, Allegiance, EverGol Energy, Apron Max RFC and Apron Max RTA. Follow all appropriate directions and precautions as specified on the fungicide labels. Make sure that the specific legume crop to be treated is registered on the fungicide partner as well. Do not apply any subsequent application of a Group 4 insecticide (neonicotinoids) (e.g., in-furrow or foliar application following treatment) with Stress Shield 600. Use high rate for early seeding, when insect populations are expected to be high or extended control period for aphids is needed. This product contains no colourant. Seed treated with this product must be conspicuously coloured. Do not graze or feed livestock on treated areas for 4 weeks after planting.
		Sombrero 600 FS	104–208 mL/ 100 kg seed	N/A	For use in commercial and on-farm seed treatment equipment. Apply through slurry applicator seed treaters, which provide uniform seed coverage. Maintain constant agitation of the slurry during application. Do not apply any subsequent application of a Group 4 insecticide (e.g., in-furrow, soil or foliar application) following a soil, in-furrow or seed treatment with Sombrero.
		Alias 240 SC	260–520 mL/ 100 kg seed	N/A	Do not use in commercial seed treatment facilities. Apply through slurry applicator seed treaters, which provide uniform seed coverage. Maintain constant agitation of the slurry during application. Do not apply any subsequent application of a Group 4 insecticide (e.g., in-furrow, soil or foliar application) following a soil, in-furrow or seed treatment with Alias 240 SC.

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Table 2–3. Chemical Control Options for Insects in Soybeans — Bean Leaf Beetle

Integrated Pest Management Options		Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
BEAN LEAF BEETLE (<i>Certoma trifurcata</i>) (cont'd)						
Foliar Treatment						
<p>For protection from overwintering adults, in areas with a history of injury, consider using insecticide seed treatment for early-planted soybeans.</p> <p>Bean leaf beetle populations rarely cause enough defoliation after the seedling stages to require a foliar insecticide application in Ontario. Defoliation thresholds are listed in the OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p> <p>Food-grade and seed soybeans may require protection, especially during the later R5 and R6 pod stages to reduce pod disease development caused by beetle feeding. If 10% of pods have feeding damage, insecticide may be necessary. Pay attention to pre-harvest intervals when spraying during the R6 stage of soybeans.</p>	lambda-cyhalothrin	Matador 120 E	83–233 mL/ha (34–94 mL/acre)	21	<p>Ground and aerial application. For best results, apply during the early morning, before temperatures rise, or during the evening. Use 100–200 L water/ha for ground application, 10–40 L water/ha for aerial application. Maximum 3 applications/yr. 24-hr re-entry period.</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	83–233 mL/ha (34–94 mL/acre)	21	<p>Ground application only. For best results, apply during the early morning, before temperatures rise, and during the evening. Maximum 3 applications/yr. 24-hr re-entry period.</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>	
	dimethoate	Cygon 480 EC	0.7–1 L/ha (280–400 mL/acre)	30	<p>Ground and aerial application. Use sufficient water volume to ensure good coverage. Maximum 3 applications/yr.</p> <p>This product is toxic to bees. Restrict application to the period after dark when bees are inside the hives, or in the early morning before the bees are foraging in the fields. DO NOT apply to such crops as alfalfa when in full bloom.</p>	
		Lagon 480 EC				
imidacloprid + deltamethrin		Concept	325–650 mL/ha (131–263 mL/acre)	20	<p>Suppression only. Do not apply this product if following a seed treatment or soil application of a Group 4 insecticide (neonicotinoid) within that season. Ground or aerial application. Use high rate for fastest knockdown and best residual control. Minimum of 5 days between applications. Maximum 3 applications/yr. 24-hr re-entry period.</p> <p>This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.</p>	

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Table 2–3. Chemical Control Options for Insects in Soybeans — Bean Leaf Beetle

Integrated Pest Management Options		Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
BEAN LEAF BEETLE (<i>Certoma trifurcata</i>) (cont'd)						
Foliar Treatment (cont'd)						
(cont'd)	thiamethoxam + lambda-cyhalothrin	Endigo	180 mL/ha (73 mL/acre)	30	Base the need and timing of application on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring. Allow at least 7 days between treatments. Do not graze or harvest treated forage, straw or hay for livestock feed. Do not apply this product within 45 days of planting if seeds were treated with a neonicotinoid product. Do not exceed a total of 540 mL/ha of Endigo per season. Maximum of 3 applications/yr. Use a minimum of 100–200 L of water/ha for ground applications and 20 L of water/ha for aerial application. Toxic to bees. To minimize exposure to bees from foliar application, 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.	
	spirotetramat	Movento	185–275 mL/ha (75–111 mL/acre)	21	Soybeans may be treated by ground or aerial application equipment. The minimum interval between applications is 7 days. A maximum of 730 mL/ha of Movento is allowed per crop season. Movento must be tank-mixed with a spray adjuvant/additive having spreading and penetrating properties to maximize leaf uptake and systemicity of the active ingredient within treated plants. Please see label for suggested adjuvants. The efficacy of Movento may not be apparent for 10–21 days. This product is toxic to bee brood. Bee brood may be exposed to residues in/on pollen and nectar brought back to the hive by bees foraging on flowering crops and weeds. DO NOT apply during crop flowering period or when flowering weeds are present in the treatment area.	
	lambda-cyhalothrin + chlorantraniliprole	Voliam Xpress	500 mL/ha (200 mL/acre)	21	DO NOT use more than 3 applications per season by ground application. DO NOT use more than 1 application per season by aerial application. Re-apply after 7 days, depending on the presence of significant populations as determined by local monitoring. Apply in a minimum of 100–200 L of water/ha for ground application. Apply in a minimum of 40 L of water/ha for aerial application. 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.	

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Table 2–4. Chemical Control Options for Insects in Soybeans — Wireworm

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, re-entry periods, etc.)
WIREWORM (<i>Limonius</i> spp.)				
Seed Treatment				
<p>In Ontario, the use of neonicotinoid seed treatments on corn and soybean seed is restricted. See Chapter 10 for further information on the requirements to use these products.</p> <p>Factors that impact wireworm populations include early-planted fields where large amounts of manure, green manure or residue have been recently incorporated or when cool conditions unfavourable for emergence are expected.</p> <p>NOTE: The planting of neonicotinoid-treated corn and soybean seed can pose a risk to pollinators. This includes all clothianidin, imidacloprid and thiamethoxam products. The contaminated insecticide dust emitted from pneumatic planters can drift onto flower and water sources and expose bees to these insecticides. Growers are encouraged to follow best management practices (BMPs) to protect pollinators at planting. To help minimize the dust generated during planting, refer to <i>Pollinator Protection and Responsible Use of Treated Seed — Best Management Practices</i> on the Health Canada website at www.healthcanada.gc.ca/pollinators.</p>	thiamethoxam (See NOTE.)	Cruiser 5 FS	50–83 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Use higher rate when insect populations are expected to be high. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil (See NOTE.)	Cruiser Maxx Beans	195 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil + sedaxane (See NOTE.)	Cruiser Maxx Beans + Vibrance 500 FS (sold as a co-pack: Cruiser Maxx Vibrance Beans)	195 mL + 5–10 mL/ 100 kg seed (2.5–5 g ai/ 100 kg seed)	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	imidacloprid (See NOTE.)	Stress Shield 600	104–208 mL/ 100 kg seed (62.5–125 g ai/ 100 kg seed)	<p>For use in commercial seed treatment facilities only. For control of certain seed and soil-borne pathogens in legume seeds and seedlings, Stress Shield 600 may be mixed with the following seed treatment fungicides: Trilex AL, Trilex AL Concentrate, Trilex FS, Allegiance, EverGol Energy, Apron Max RFC and Apron Max RTA. Follow all appropriate directions and precautions as specified on the fungicide labels. Make sure that the specific legume crop to be treated is registered on the fungicide partner as well.</p> <p>Do not apply any subsequent application of a Group 4 insecticide (neonicotinoids) (e.g., in-furrow or foliar application following treatment) with Stress Shield 600.</p> <p>Use high rate for early seeding, when insect populations are expected to be high or extended control period for aphids is needed. This product contains no colourant. Seed treated with this product must be conspicuously coloured. Do not graze or feed livestock on treated areas for 4 weeks after planting.</p>
		Sombrero 600 FS	104–208 mL/ 100 kg seed	For use in commercial and on-farm seed treatment equipment. Apply through slurry applicator seed treaters, which provide uniform seed coverage. Maintain constant agitation of the slurry during application. Do not apply any subsequent application of a Group 4 insecticide (e.g., in-furrow, soil or foliar application) following a soil, in-furrow or seed treatment with Sombrero.
		Alias 240 SC	260–520 mL/ 100 kg seed	Do not use in commercial seed treatment facilities. Apply through slurry applicator seed treaters, which provide uniform seed coverage. Maintain constant agitation of the slurry during application. Do not apply any subsequent application of a Group 4 insecticide (e.g., in-furrow, soil or foliar application) following a soil, in-furrow or seed treatment with Alias 240 SC.

SOYBEAN INSECTS

Table 2-5. Chemical Control Options for Insects in Soybeans — Grubs, Marmorated Stink Bug

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, re-entry periods, etc.)
GRUBS — EUROPEAN CHAFER (<i>Rhizotrogus majalis</i>) and JAPANESE BEETLE (<i>Popillia japonica</i>)				
Seed Treatment				
<p>In Ontario, the use of neonicotinoid seed treatments on corn and soybean seed is restricted. See Chapter 10 for further information on the requirements to use these products.</p> <p>NOTE: The planting of neonicotinoid-treated corn and soybean seed can pose a risk to pollinators. This includes all clothianidin, imidacloprid and thiamethoxam products. The contaminated insecticide dust emitted from pneumatic planters can drift onto flower and water sources and expose bees to these insecticides. Growers are encouraged to follow best management practices (BMPs) to protect pollinators at planting. To help minimize the dust generated during planting, refer to <i>Pollinator Protection and Responsible Use of Treated Seed — Best Management Practices</i> on the Health Canada website at www.healthcanada.gc.ca/pollinators.</p>	thiamethoxam (See NOTE.)	Cruiser 5 FS	83 mL/ 100 kg seed	For European chafer only. For use in commercial seed treatment facilities only. Use higher rate when insect populations are expected to be high. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil (See NOTE.)	Cruiser Maxx Beans	195 mL/ 100 kg seed	For European chafer only. For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	imidacloprid (See NOTE.)	Stress Shield 600	104–208 mL/ 100 kg seed (62.5–125 g ai/ 100 kg seed)	<p>For European chafer and Japanese beetle grubs. For use in commercial seed treatment facilities only. For control of certain seed- and soil-borne pathogens in legume seeds and seedlings, Stress Shield 600 may be mixed with the following seed treatment fungicides: Trilex AL, Trilex AL Concentrate, Trilex FS, Allegiance, EverGol Energy, Apron Max RFC and Apron Max RTA. Follow all appropriate directions and precautions as specified on the fungicide labels. Make sure that the specific legume crop to be treated is registered on the fungicide partner as well.</p> <p>Do not apply any subsequent application of a Group 4 insecticide (neonicotinoids) (e.g., in-furrow or foliar application following treatment) with Stress Shield 600.</p> <p>This product contains no colourant. Seed treated with this product must be conspicuously coloured. Do not graze or feed livestock on treated areas for 4 weeks after planting.</p>
BROWN MARMORATED STINK BUG (<i>Halyomorpha halys</i>)				
<p>This is a new invasive species in Ontario and is established in many urban areas of Ontario, though infestations have not been detected in crops in Ontario as of 2015. BMSBs are most likely to enter corn and soybean fields once the crop has an ear developing or a pod forming.</p> <p>Scout fields once a week, inspecting five areas within the first 12 m of the field's edge. No thresholds have been established for corn or soybeans in Ontario yet, though it has been found to cause serious injury to host crops in the mid-Atlantic U.S. If this pest is found in corn or soybeans, contact the OMAFRA Agricultural Information Contact Centre at 1-877-424-1300 or ag.info.omafra@ontario.ca. Management strategies are under development. Up-to-date information is available at ontario.ca/stinkbug.</p>				No products currently registered for BMSB on soybeans.

SOYBEAN INSECTS

Table 2–6. Chemical Control Options for Insects in Soybeans — Two-Spotted Spidermites, Japanese Beetle, Potato Leafhopper, Slugs**LEGEND:** PHI = Pre-Harvest Interval (in days)

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
TWO-SPOTTED SPIDERMITES (<i>Tetranychus uricae</i>)					
Foliar application					
Scout fields in the first week of July. Infestations usually move in from edge of field as hot spots. Spot spray when populations average 4 mites per leaf. Do not use a pyrethroid insecticide (e.g., Matador) for the control of spidermites, as it will kill the beneficial mites and cause the spidermite populations to increase.	dimethoate	Cygon 480 EC	1 L/ha (400 mL/acre)	30	Ground and aerial application. Use sufficient water volume to ensure good coverage. Maximum 2 applications/yr. Toxic to adult bees in laboratory studies via oral exposure, however, not toxic to bees through contact exposure, and field studies conducted with this product have shown no effects on honeybee colony development. Minimize spray drift to reduce exposure to bees in habitats close to the application site. Application during the crop blooming period, and when flowering weeds are present, may only be made in the early morning and the evening when most bees are not foraging. This product is toxic to bees. Restrict application to the period after dark when bees are inside the hives, or in the early morning before the bees are foraging in the fields. Do not apply to such crops as alfalfa when in full bloom.
		Lagon 480 EC			
JAPANESE BEETLE ADULTS (<i>Popillia japonica</i>)					
Foliar application					
This pest is most commonly found in the Niagara/Hamilton region, though it is known to be present across Ontario. If the defoliation by adults exceeds the thresholds, insecticide applications may be necessary. Defoliation thresholds for soybeans are available in OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	imidacloprid + deltamethrin	Concept	325–650 mL/ha (131–263 mL/acre)	20	Ground or aerial application. Use high rate for fastest knockdown and best residual control. Do not apply this product if following a seed treatment or soil application of a Group 4 insecticide (neonicotinoid) within that season. Minimum of 5 days between applications. Maximum 3 applications/yr. 24-hr re-entry period. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.
POTATO LEAFHOPPER (<i>Empoasca fabae</i>)					
Foliar application					
Potato leafhoppers are controlled in soybeans by plant resistance through leaf pubescence. Problems are rare in soybeans in Ontario. Food grade soybeans may need protection.	dimethoate	Cygon 480 EC Lagon 480 EC	0.7–1 L/ha (280–400 mL/acre)	30	Ground and aerial application. Use sufficient water volume to ensure good coverage. Maximum 3 applications/yr. This product is toxic to bees. Restrict application to the period after dark when bees are inside the hives, or in the early morning before the bees are foraging in the fields. Do not apply to such crops as alfalfa when in full bloom.
SLUGS (Various species)					
No chemical control available. Slugs often avoid contact by feeding below ground, and dew and rainfall easily wash any product used away from the slugs and leaves. Ensure seed slots are closed during planting. Growers with fields with a history of significant slug damage should consider using some form of tillage to eliminate significant residue, exposing the slugs to dehydration and predation. Zone tillage or row sweepers can help speed up the drying of the row area, thus deterring slug feeding. Moving trash away from seedlings may also help reduce damage. See OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> , for rotation and tillage recommendations.					

SOYBEAN DISEASES

Table 2–7. Chemical Control Options for Diseases in Soybeans — Soybean Cyst Nematode, Phytophthora Root Rot

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, re-entry periods, etc.)
SOYBEAN CYST NEMATODE (<i>Heterodera glycines</i>)				
Seed Treatment				
<p>Soybean cyst nematode (SCN) is often confused with other common problems such as nutrient deficiencies, herbicide injury, soil compaction, drought, flooding or root rots. By the time above-ground symptoms from SCN feeding become noticeable, most fields have lost 25%–30% yield potential to the nematode. Early detection through scouting and soil testing is critical. If you suspect SCN, plants should be carefully dug (not pulled) and soil gently removed from the roots. Cysts are white to yellow and about the size of a pinhead. Rotating non-host crops such as corn, wheat, alfalfa or vegetable crops such as tomatoes, with resistant varieties, will lower SCN populations and improve yields on SCN-infested fields. In addition, rotation of SCN-resistant varieties is recommended to reduce shifts in the nematode population.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	<p><i>Pasteuria nishizawae</i></p>	<p>CLARIVA pn</p>	<p>10 million spores per seed (100 kg seed)</p>	<p>For commercial seed treatment facilities only.</p> <p>To determine the amount (mL) of CLARIVA pn required to treat 100 kg of seed, use the following formula:</p> <p>Rate per 100 kg seed (mL/100 kg seed) = 10,000,000 spores per seed ÷ product guarantee (spores/mL) x seed size (seeds/kg) x 100 kg seed</p> <p>This product does not contain a colourant. A suitable colourant must be added to the slurry prior to application to the seed. Dilute in sufficient water to achieve thorough and even coverage to the seed.</p>

SOYBEAN DISEASES

Table 2–7. Chemical Control Options for Diseases in Soybeans — Soybean Cyst Nematode, Phytophthora Root Rot

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, re-entry periods, etc.)
PHYTOPHTHORA ROOT ROT (<i>Phytophthora sojae</i>) — Suppression only				
Seed Treatment				
<p>Select soybean varieties that have both specific resistance (Rps genes such as 1K and 1C) and good partial resistance (tolerance) to all races of <i>Phytophthora</i>. Consult with your seed company and the Ontario Soybean and Canola Committee (OSACC) Variety Trial Results at www.gosoy.ca for variety profiles. This disease is primarily controlled through resistant varieties. Crop losses are greatest in cold, wet, clay soils. Try to minimize soil compaction and remove excess moisture through improved drainage. A small amount of tillage will help warm the soil and improve surface drainage. Rotate soybeans with corn and wheat. Plant seed when soil temperatures are above 13°C.</p>	fludioxonil + metalaxyl-M	Apron Maxx RTA	325 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treatment using standard gravity- or mist-type seed treatment equipment. Provides early-season protection for tolerant varieties. If target fields have a history of high <i>Phytophthora</i> pressure, or if susceptible varieties are to be treated, tank-mix with 31 mL/100 kg seed of Apron XL LS. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers prior to use. Ensure uniform coverage.
		Apron Maxx RFC	100 mL + 230 mL of water/ 100 kg seed	For commercial and on-farm treating. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting. Provides early-season protection against phytophthora root rot for tolerant varieties of soybeans. If target fields have a history of high pressure or if susceptible varieties are to be treated, tank-mix with 31 mL of Apron XL LS/100 kg seed.
	thiamethoxam + metalaxyl-M + fludioxonil	Cruiser Maxx Beans	195 mL/ 100 kg seed	For use in commercial treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting. Provides early-season protection against phytophthora root rot for tolerant varieties of soybeans. If target fields have a history of high pressure or if susceptible varieties are to be treated, tank-mix with 31 mL of Apron XL LS/100 kg of seed.
	thiamethoxam + metalaxyl-M + fludioxonil + sedaxane	Cruiser Maxx Beans + Vibrance 500 FS (sold as a co-pack: Cruiser Maxx Vibrance Beans)	195 mL + 5–10 mL/ 100 kg seed (2.5–5 g ai/ 100 kg seed)	For use in commercial treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting. Provides early-season protection against phytophthora root rot for tolerant varieties of soybeans. If target fields have a history of high pressure or if susceptible varieties are to be treated, tank-mix with 31 mL of Apron XL LS/100 kg of seed.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	5 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions. For control of early-season phytophthora in soybean, product may be tank-mixed with metalaxyl and metalaxyl-M but see tank-mix partner label.
	metalaxyl-M	Apron XL-LS	40 mL/ 100 kg seed	For use in commercial seed treating only. Do not graze or feed livestock on seeded area for 4 weeks after planting.
	metalaxyl	Allegiance FL Apron FL	46–93 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on seeded area for 4 weeks after planting.
	ethaboxam	Intego Solo Fungicide	19.6 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. 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.

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Table 2–8. Chemical Control Options for Diseases in Soybeans — Phomopsis Seed Mould

Integrated Pest Management Options		Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)	
PHOMOPSIS SEED MOULD (<i>Phomopsis longicolla</i>)							
Seed Treatment							
This disease is most severe when cool, wet conditions delay harvest. Some varieties are more susceptible than others. Consult with your seed company for variety profiles. Fungicide seed treatments will improve the germination of low to moderately infected seed. Do not plant severely infected seed. Plant good-quality seed with a germination rate of at least 80%–90%. Rotate with non-host crops such as corn and wheat, remove excess surface residue and harvest as early as possible.	carbathiin + thiram	Anchor		600 mL/ 100 kg seed	N/A	For drill box application. Ensure uniform coverage on seed. Do not apply Anchor through commercial seed-treating equipment or through an auger, as excessive seed wetness may result. Do not graze or feed livestock on treated areas for 4 weeks after planting.	
		Vitaflo 280		260 mL/ 100 kg seed	N/A	For use in commercial seed treatment facilities only. Do not store treated soybean seed. May be applied through commercial seed treatment equipment or auger. Ensure uniform coverage.	
		captan	Agrox FL		280 mL/ 100 kg seed	N/A	For commercial seed treatment facilities only. Mix with the amount of water required for the slurry treater equipment to be used.
		fludioxonil	Maxim 480 FS		5.2–10.4 mL/ 100 kg seed	N/A	For use in commercial seed treatment facilities only. Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications or immediately before planting. Do not graze treated crops or cut for forage within 30 days of planting.
		fludioxonil + metalaxyl-M	Apron Maxx RTA		325 mL/ 100 kg seed	N/A	For both commercial seed treatment plants and on-farm treatment using standard gravity- or mist-type seed treatment equipment. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers prior to use. Ensure uniform coverage.
			Apron Maxx RFC		100 mL + 230 mL of water/ 100 kg seed	N/A	For commercial and on-farm treating. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
		thiamethoxam + metalaxyl-M + fludioxonil	Cruiser Maxx Beans		195 mL/ 100 kg seed	N/A	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
		thiamethoxam + metalaxyl-M + fludioxonil + sedaxane	Cruiser Maxx Beans + Vibrance 500 FS (sold as a co-pack: Cruiser Maxx Vibrance Beans)		195 mL + 5–10 mL/ 100 kg seed (2.5–5 g ai/ 100 kg seed)	N/A	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Use the low rate of Vibrance 500 FS (2.5 g ai/100 kg) for control of pre-emergent damping-off, seed decay or seedling blight. For extended control of post-emergent damping-off and seedling blight or high disease pressure, use the high rate (5 g ai/100 kg). Follow resistance management instructions on the label.
		trifloxystrobin	Trilex FS		21 mL/ 100 kg seed	N/A	For use in commercial seed treatment facilities only. Apply using standard commercial seed treatment equipment. Not for use in hopper-box, planter-box, slurry-box or similar seed treatment applications. Uniform application on seed is necessary to ensure seed safety and best disease protection.
		penflufen + prothioconazole + metalaxyl	EverGol Energy		65 mL/ 100 kg seed	N/A	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions. For control of early-season phytophthora in soybean, product may be tank-mixed with metalaxyl and metalaxyl-M but, again, see tank-mix partner label.

SOYBEAN DISEASES

Table 2–8. Chemical Control Options for Diseases in Soybeans — Phomopsis Seed Mould

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

N/A = not applicable

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
PHOMOPSIS SEED MOULD (<i>Phomopsis longicolla</i>) (cont'd)					
Foliar Treatment					
Symptoms appear mid-season as rows of small, black, raised dots or bumps on the stem and later on the pods. Management includes the use of full season varieties, crop rotation, fungicides and removal of soybean debris.	trifloxystrobin + prothioconazole	Stratego Pro	572 mL/ha (230 mL/acre)	20	Ground and aerial application. Begin fungicide applications preventively or at the first signs of disease from early flowering (R1) to complete pod fill (R5). A non-ionic surfactant at 0.125% vol/vol may be used with Stratego Pro fungicide.

SOYBEAN DISEASES

Table 2–9. Chemical Control Options for Diseases in Soybeans — Rhizoctonia Damping-Off

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, re-entry periods, etc.)
RHIZOCTONIA DAMPING-OFF (<i>Rhizoctonia solani</i>)				
Seed Treatment				
This disease can occur on all soil types and environmental conditions. Losses due to this disease are greatest when a dry spring is followed by wet conditions. Few management options exist since no resistant or tolerant varieties are available. Seed treatment and crop rotation with corn and small grains can help minimize the disease.	fludioxonil	Maxim 480 FS	5.2–10.4 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze treated crops or cut for forage within 30 days of planting.
	fludioxonil + metalaxyl-M	Apron Maxx RTA	325 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treatment using standard gravity- or mist-type seed treatment equipment. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers prior to use. Ensure uniform coverage.
		Apron Maxx RFC	100 mL + 230 mL of water/ 100 kg seed	For commercial and on-farm treating. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	saponins of <i>Chenopodium</i> <i>quinoa</i>	Heads Up Plant Protectant	1 g/1 L of water/ 100 kg seed Apply 1 L solution for every 163 kg of soybean.	Treat only healthy, vigorous seed. Treat only seed needed for immediate use and planting. Thoroughly coat the surface of the seed with dissolved solution. Soybean seeds must be prepared and ready for seeding. The object is to achieve a wet shiny appearance to the seed. This will dry off or be absorbed by the seed, however, the treatment will remain in effect. Treat the seeds by dipping, spraying or dribbling the solution into a rotating auger conveyor or some other seed treatment device. Spray applications to seeds within an enclosed spray booth or other enclosed spray device are also acceptable, providing thorough coverage is achieved.
	thiamethoxam + metalaxyl-M + fludioxonil	Cruiser Maxx Beans	195 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil + sedaxane	Cruiser Maxx Beans + Vibrance 500 FS (sold as a co-pack: Cruiser Maxx Vibrance Beans)	195 mL + 5–10 mL/ 100 kg seed (2.5–5 g ai/ 100 kg seed)	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Use the low rate of Vibrance 500 FS (2.5 g ai/100 kg) for control of pre-emergent damping-off, seed decay or seedling blight. For extended control of post-emergent damping-off and seedling blight or high disease pressure, use the high rate (5 g ai/100 kg). Follow resistance management instructions as stated on the label.
	carbathiin + thiram	Anchor	600 mL/ 100 kg seed	For drill box application. Ensure uniform coverage on seed. Do not apply Anchor through commercial seed-treating equipment or through an auger, as excessive seed wetness may result. Do not graze or feed livestock on treated areas for 4 weeks after planting.
		Vitaflo 280	260 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not store treated soybean seed. May be applied through commercial seed treatment equipment or auger. Ensure uniform coverage.
penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions. For control of early-season phytophthora in soybean, product may be tank-mixed with metalaxyl and metalaxyl-M but, again, see tank-mix partner label.	

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Table 2–10. Chemical Control Options for Diseases in Soybeans — Pythium Damping-Off

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, re-entry periods, etc.)
SEED ROT/PREEMERGENCE DAMPING-OFF (<i>Pythium</i> spp.)				
Seed Treatment				
This disease can occur on all soil types but crop losses are greatest in cold, wet, clay soils. Try to minimize soil compaction and remove excess moisture through increased drainage. Plant seed when soil temperatures are above 13°C. Treat seed with metalaxyl or metalaxyl-M. There is no known resistance but there is some degree of tolerance available in varieties. Consult with your seed company and the Ontario Soybean and Canola Committee (OSACC) Variety Trial Results at www.gosoy.ca for variety profiles. Crop rotation has limited effect.	fludioxonil + metalaxyl-M	Apron Maxx RTA	325 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treatment using standard gravity or mist-type seed treatment equipment. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers prior to use. Ensure uniform coverage.
		Apron Maxx RFC	100 mL + 230 mL of water/ 100 kg seed	For commercial and on-farm treating. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil	Cruiser Maxx Beans	195 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil + sedaxane	Cruiser Maxx Beans + Vibrance 500 FS (sold as a co-pack: Cruiser Maxx Vibrance Beans)	195 mL + 5–10 mL/ 100 kg seed (2.5–5 g ai/ 100 kg seed)	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Use the low rate of Vibrance 500 FS (2.5 g ai/100 kg) for control of pre-emergent damping-off, seed decay or seedling blight. For extended control of post-emergent damping-off and seedling blight or high disease pressure, use the high rate (5 g ai/100 kg). Follow resistance management recommendations as stated on label.
	metalaxyl	Allegiance FL	46–93 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on seeded area for 4 weeks after planting.
		Apron FL		
	metalaxyl-M	Apron XL LS	20–40 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze or feed livestock on seeded area for 4 weeks after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions. For control of early-season phytophthora in soybean, product may be tank-mixed with metalaxyl and metalaxyl-M but see tank-mix partner label.
ethaboxam	Intego Solo Fungicide	19.6 mL/ 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. 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.	

SOYBEAN DISEASES

Table 2–11. Chemical Control Options for Diseases in Soybeans — Fusarium Seedling Blight

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, re-entry periods, etc.)
FUSARIUM SEEDLING BLIGHT (<i>Fusarium oxysporum</i> or <i>Fusarium solani</i>)				
Seed Treatment				
Cool, wet spring conditions favour infection. Resistant varieties are not available. Minimize soil compaction and remove excess soil moisture through improved drainage. A small amount of tillage will help warm soil and improve surface drainage. Rotate with corn and wheat. Plant high-quality seed when soil temperatures are above 13°C. Fungicide seed treatment recommended. Mounding or ridging soil at the base of the plants produces adventitious roots that can minimize losses.	fludioxonil	Maxim 480 FS	5.2–10.4 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze treated crops or cut for forage within 30 days of planting.
	fludioxonil + metalaxyl-M	Apron Maxx RTA	325 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treatment using standard gravity- or mist-type seed treatment equipment. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers prior to use. Ensure uniform coverage.
		Apron Maxx RFC	100 mL + 230 mL of water/ 100 kg seed	For commercial and on-farm treating. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil	Cruiser Maxx Beans	195 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + metalaxyl-M + fludioxonil + sedaxane	Cruiser Maxx Beans + Vibrance 500 FS (sold as a co-pack: Cruiser Maxx Vibrance Beans)	195 mL + 5–10 mL/ 100 kg seed (2.5–5 g ai/ 100 kg seed)	For use in commercial seed treatment facilities only. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Use the low rate of Vibrance 500 FS (2.5 g ai/100 kg seed) for control of pre-emergent damping-off, seed decay or seedling blight. For extended control of post-emergent damping-off and seedling blight or high disease pressure, use the high rate (5 g ai/100 kg seed). Follow resistance management instructions as stated on the label.
	carbathiin + thiram	Anchor	600 mL/ 100 kg seed	For drill box application. Ensure uniform coverage on seed. Do not apply Anchor through commercial seed-treating equipment or through an auger, as excessive seed wetness may result. Do not graze or feed livestock on treated areas for 4 weeks after planting.
		Vitaflo 280	260 mL/ 100 kg seed	For commercial seed treating facilities only. Do not store treated soybean seed. May be applied through commercial seed-treatment equipment or auger. Ensure uniform coverage.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions. For control of early-season phytophthora in soybean, product may be tank-mixed with metalaxyl and metalaxyl-M but see tank-mix partner label.
	captan	Agrox FL	280 mL/ 100 kg seed	For commercial seed treatment facilities only. Mix with the amount of water required for the slurry treater equipment to be used.
trifloxystrobin	Trilex FS	21 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Apply using standard commercial seed treatment equipment. Not for use in hopper-box, planter-box, slurry-box or similar seed treatment applications. Uniform application on seed is necessary to ensure seed safety and best disease protection.	

SOYBEAN DISEASES

Table 2–12. Chemical Control Options for Diseases in Soybeans — White Mould

Integrated Pest Management Options		Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
LEGEND: PHI = Pre-Harvest Interval (in days) N/A = not applicable						
WHITE MOULD (<i>Sclerotinia sclerotiorum</i>)						
Foliar Treatment						
<p>White mould is a sporadic disease that thrives under cool, wet conditions during flowering or near harvest. Fields at risk have a history of white mould, good leaf growth, high plant populations and more than 48 hr of continuous wetness and air temperatures between 15°C and 20°C (day and night average temperatures).</p> <p>In fields with a history of white mould, use non-host crops and avoid growing other host crops such as canola, edible beans, buckwheat and sunflowers for 2–3 yr. Plant a tolerant variety, although none are resistant (immune), select a variety with good lodging resistance and keep sclerotia on the surface through conservation tillage practices. Consult with your seed company and the Ontario Soybean and Canola Committee (OSACC) Variety Trial Results at www.gosoy.ca for variety profiles.</p>	<i>Coniothyrium minitans</i>	Contans WG	0.5–4 kg/ha (0.20–1.6 kg/acre)	0	Provides suppression only. Ground application only. Good option for organically grown soybeans. 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.	
	<i>Bacillus subtilis</i>	Serenade ASO	4.0–15.0 L/ha (1.6–6.0 L/acre)	0	Provides suppression only. Ground and aerial application. Good option for organically grown soybeans. Under conditions of moderate-to-high disease pressure, use the higher rate and shorter application intervals. For maximum effectiveness, apply prior to, or at the early stages of disease development. Apply in sufficient water volume to ensure full coverage for effective control. Repeat as necessary on a 7–10-day interval.	
	pyraclostrobin + fluxapyroxad	Priaxor	0.45 L/ha (180 mL/acre)	21	Provides suppression only. Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Use high rate for suppression of sclerotinia stem rot. Maximum 2 applications/yr. 12-hr re-entry period.	
	fluazinam	Allegro 500F	Suppression: 0.44 L/ha (178 mL/acre) Control: 0.88–1.17 L/ha (356–475 mL/acre)	30	Ground application only. Begin applications at the R1–R2 stage of development, and repeat again 10–14 days later if conditions favour disease development. Use spray volumes of 200–600 L/ha, depending on amount of plant growth. Maximum amount of 2.34 L/ha during the year. Maximum 2 applications/yr. Do not apply after R3 stage. 24-hr re-entry period. DO NOT allow livestock to graze treated areas. DO NOT feed hay from treated fields to livestock.	
	picoxystrobin	Acapela	0.44–0.88 L/ha (180–350 mL/acre)	14	Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Optimal timing is typically R2–R3 growth stage. Use high rate and shorter interval when disease pressure is high. Apply no more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 2.64 L/ha/season. 12-hr re-entry period.	
	trifloxystrobin + prothioconazole	Stratego Pro	572 mL/ha (230 mL/acre)	20	Ground and aerial application. Begin fungicide applications preventively or at the first signs of disease from early flowering (R1) to complete pod fill (R5). A non-ionic surfactant at 0.125% vol/vol may be used with Stratego Pro fungicide.	

SOYBEAN DISEASES

Table 2-12. Chemical Control Options for Diseases in Soybeans — White Mould

LEGEND: PHI = Pre-Harvest Interval (in days) N/A = not applicable					
Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
WHITE MOULD (<i>Sclerotinia sclerotiorum</i>) (cont'd)					
Seed Treatment					
See foliar treatment section above.	saponins of <i>Chenopodium</i> <i>quinoa</i>	Heads Up Plant Protectant	1 g/1 L of water/ha Apply 1 L solution for every 163 kg of soybean.	N/A	Provides suppression only. Treat only healthy vigorous seed. Treat only seed needed for immediate use and planting. Thoroughly coat the surface of the seed with dissolved solution. Soybean seeds must be prepared and ready for seeding. The object is to achieve a wet shiny appearance to the seed. This will dry off or be absorbed by the seed, however, the treatment will remain in effect. Treat the seeds by dipping, spraying or dribbling the solution into a rotating auger conveyor or some other seed treatment device. Spray applications to seeds within an enclosed spray booth or other enclosed spray device are also acceptable, providing thorough coverage is achieved.

SOYBEAN DISEASES

Table 2–13. Chemical Control Options for Diseases in Soybeans — Powdery Mildew

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
POWDERY MILDEW (<i>Microspora diffusa</i>)					
Foliar Treatment					
This disease is most noticeable when conditions are wet or humid. Powdery mildew develops on the leaves, usually in August and September. Outbreaks arise when disease symptoms begin in early July and the environmental conditions remain cool, cloudy and humid through to pod fill. Removal of crop residue and rotation with non-host crops, such as corn and wheat, will help reduce disease risk.	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	20	Ground and aerial application. Apply when first symptoms of disease can be found or when risk of infection is imminent. Use the higher rate when disease pressure is severe. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required, as it is built into the formulation. Maximum 1 application/yr. 12-hr re-entry period.
		Folicur 432 F	220–292 mL/ha (90–118 mL/acre)	20	Ground and aerial application. Apply when first symptoms of disease can be found or when risk of infection is imminent. Use the higher rate when disease pressure is severe. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Always use a non-ionic surfactant such as Agral 90 or Agsurf at 0.125% vol/vol. Maximum 1 application/yr. 12-hr re-entry period.
	propiconazole	Tilt 250 E	500 mL/ha (200 mL/acre)	30	Ground and aerial application. First application should be made at the first sign of disease, followed by a second application 14 days after the first application, if environmental conditions are favourable for disease development. Good spray coverage and canopy penetration are important for best results. See label for resistance management strategy. Maximum 2 applications/yr.
	azoxystrobin	Quadris	500 mL/ha (200 mL/acre)	15	Ground and aerial application. See label for resistance management strategy. Maximum 2 applications/yr. Re-entry possible once residues have dried.
	azoxystrobin + propiconazole	Quilt	1.0 L/ha (400 mL/acre)	30	Ground and aerial application. First application should be made at the first sign of disease, followed by a second application 14 days after the first application, if environmental conditions are favourable for disease development. Good spray coverage and canopy penetration are important for best results. See label for resistance management strategy. Maximum 2 applications/yr.

SOYBEAN DISEASES

Table 2–14. Chemical Control Options for Diseases in Soybeans — Asian Soybean Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
ASIAN SOYBEAN RUST (<i>Phakopsora pachyrhizi</i>)					
Foliar Treatment					
<p>Asian soybean rust is an invasive fungal disease. Scouting and early detection are critical to managing this disease. The early stages of the disease can be confused with other common foliar diseases such as septoria brown spot, bacterial pustule, downy mildew, frog-eye leaf spot and bacterial blight.</p> <p>Numerous factors such as crop stage (R1–R6), yield potential, disease risk or presence are critical components of the fungicide decision process. Strobilurin fungicides such as Headline or Quadris are protective products that stop spore germination and penetration into the soybean leaf. The strobilurins have no effect on the fungus once inside the leaf. Since the strobilurin group of fungicides have no curative activity, do not make solo applications of a strobilurin if any rust is present. The triazole fungicides such as Tilt and Folicur have varying protective abilities and are usually considered “early post-infection” fungicides. The post-infection or curative abilities are limited, and the fungicides may not perform well if 5%–10% disease is present in the lower crop canopy. Combination products containing both a strobilurin and triazole fungicide such as Quilt have preventive (pre-infection) and curative (post-infection) properties.</p> <p>Long periods of leaf wetness are needed for spore germination, as well as temperatures between 15°C and 30°C and a high relative humidity. Yield loss is very likely once rust can be found in the mid-crop canopy. For these reasons, scouting, fungicide selection, timing and application are critical to successful management of soybean rust.</p> <p>For further information on scouting techniques, sentinel plots, thresholds, management options and emergency use registrations, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>, as well as the Grain Farmers of Ontario website at www.gfo.ca.</p>	pyraclostrobin	Headline EC	400–600 mL/ha (160–240 mL/acre)	21	Ground and aerial application. Classified as a strobilurin fungicide; use this product in a preventive fungicide program (pre-infection). See label for resistance management strategy. Maximum 2 applications/yr.
	azoxystrobin	Quadris	500 mL/ha (200 mL/acre)	15	Ground and aerial application. Classified as a strobilurin fungicide; use this product in a preventive fungicide program (pre-infection). See label for resistance management strategy. Maximum 2 applications/yr. Re-entry possible once residues have dried.
	propiconazole	Tilt 250 E	500–750 mL/ha (200–300 mL/acre)	30	Ground and aerial application. First application should be made at the first sign of disease, followed by a second application 14 days after the first application, if environmental conditions are favourable for disease development. Good spray coverage and canopy penetration are important for best results. See label for resistance management strategy. Maximum 2 applications/yr.
	azoxystrobin + propiconazole	Quilt	1.0–1.5 L/ha (400–600 mL/acre)	30	Ground and aerial application. First application should be made at the first sign of disease, followed by a second application 14 days after the first application, if environmental conditions are favourable for disease development. Good spray coverage and canopy penetration are important for best results. See label for resistance management strategy. Maximum 2 applications/yr.
	prothioconazole	Proline 480 SC	210 mL/ha (85 mL/acre)	20	Ground and aerial application. Apply when first symptoms of disease can be found or the risk of infection is imminent. Maximum 1 application/yr. 24-hr re-entry period.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	20	Ground and aerial application. Apply when first symptoms of disease can be found or when risk of infection is imminent. Use the higher rate when disease pressure is severe. Use a minimum of 100 L of water for ground application, 47 L of water for aerial application. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required, as it is built into the formulation. Maximum 1 application/yr. 12-hr re-entry period.
	Folicur 432 F	220–292 mL/ha (90–118 mL/acre)	20	Ground and aerial application. Apply when first symptoms of disease can be found or when risk of infection is imminent. Use the higher rate when disease pressure is severe. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Always use a non-ionic surfactant such as Agral 90 or Agsurf at 0.125% vol/vol. Maximum 1 application/yr. 12-hr re-entry period.	
pyraclostrobin + fluxapyroxad	Priaxor	0.3–0.45 L/ha (120–180 mL/acre)	21	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr re-entry period.	

SOYBEAN DISEASES

Table 2–14. Chemical Control Options for Diseases in Soybeans — Asian Soybean Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
ASIAN SOYBEAN RUST (<i>Phakopsora pachyrhizi</i>) (cont'd)					
Foliar Treatment (cont'd)					
(cont'd)	trifloxystrobin + propiconazole	Stratego 250 EC	500 mL/ha (200 mL/acre)	20	Ground and aerial application. Begin applications preventively from early flowering (R1) to complete pod fill (R5) when risk of rust infection is high. Use 100–200 L/ha of water for ground application, 50 L/ha for aerial application. Maximum 2 applications/yr. 12-hr re-entry period.
		Stratego Pro	572 mL/ha (230 mL/acre)	20	Ground and aerial application. Begin fungicide applications preventively or at the first signs of disease from early flowering (R1) to complete pod fill (R5). A non-ionic surfactant at 0.125% vol/vol may be used with Stratego Pro fungicide.
	picoxystrobin	Acapela	0.44–0.88 L/ha (180–350 mL/acre)	14	Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Optimal timing is typically R2–R3 growth stage. Use high rate and shorter interval when disease pressure is high. Apply no more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 2.64 L/ha/season. 12-hr re-entry period.
	penthiopyrad	Vertisan	1–1.75 L/ha (400–700 mL/acre)	14	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. 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 re-entry period.
	flutriafol	Fullback 125 SC	0.512–1.024 L/ha (207–414 mL/acre)	21	Ground application only. Apply as a broadcast foliar spray when conditions are favourable for development of soybean rust. Repeat 21–35 days after first application if environmental conditions are favourable for continued disease development. Do not apply more than 2,048 mL/ha per season. Do not apply more than 3 applications per growing season. No single application may exceed 1,024 mL/ha; only 1 application at 1,024 mL/ha may be made to any one field during a single growing season. 12-hr re-entry period. Apply only to soybeans harvested for dry seed.

SOYBEAN DISEASES

Table 2–15. Chemical Control Options for Diseases in Soybeans — Frogeye Leaf Spot

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
FROGEYE LEAF SPOT (<i>Cercospora sojina</i>)					
Foliar Treatment					
The economic impact of this disease is minimal. Frogeye leaf spot occurs under hot, humid conditions particularly on very susceptible varieties. Consult with your seed company for variety profiles. This disease is most frequent in the extreme southwest counties.	pyraclostrobin	Headline EC	400–600 mL/ha (160–240 mL/acre)	21	Ground and aerial application. First application should be applied at the first sign of disease, followed by the second application 14 days after, if environmental conditions are favourable for disease development. Maximum 2 applications/yr. 12-hr re-entry period.
	trifloxystrobin + propiconazole	Stratego 250 EC	500 mL/ha (200 mL/acre)	20	Ground and aerial application. Spray between R3 and R4 (early pod fill) or when first symptoms appear. Use 100–200 L/ha of water for ground application, 50 L/ha for aerial application. Maximum 2 applications/yr. 12-hr re-entry period.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	20	Ground and aerial application. Apply when first symptoms of disease can be found or when risk of infection is imminent. Use the higher rate when disease pressure is severe. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required, as it is built into the formulation. Maximum 1 application/yr. 12-hr re-entry period.
		Folicur 432 F	220–292 mL/ha (90–118 mL/acre)	20	Ground and aerial application. Apply when first symptoms of disease can be found or when risk of infection is imminent. Use the higher rate when disease pressure is severe. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Always use a non-ionic surfactant such as Agral 90 or Agsurf at 0.125% vol/vol. Maximum 1 application/yr. 12-hr re-entry period.
	pyraclostrobin + fluxapyroxad	Priaxor	300 mL/ha (120 mL/acre)	21	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Use high rate for suppression of sclerotinia stem rot. Maximum 2 applications/yr. 12-hr re-entry period.
	prothioconazole	Proline 480 SC	210 mL/ha (85 mL/acre)	20	Ground and aerial application. Apply when first symptoms of disease can be found or the risk of infection is imminent. Maximum 1 application/yr. 24-hr re-entry period.
	propiconazole	Bumper 418 EC	300–455 mL/ha (121–184 mL/acre)	50	For use on soybeans grown for seed only. Ground application only. Apply when disease first appears. Under severe disease pressure, make a second application 14 days after. Harvested soybean seed should not be used for human food or animal feed.
		Tilt 250 E	500–760 mL/ha (200–308 mL/acre)	30	Ground application only. Apply when disease symptoms first appear. Under severe disease pressure, make a second application 14 days after. Harvested soybean seed should not be used for human food or animal feed.

SOYBEAN DISEASES

Table 2–15. Chemical Control Options for Diseases in Soybeans — Frogeye Leaf Spot**LEGEND:** PHI = Pre-Harvest Interval (in days)

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
FROGEYE LEAF SPOT (<i>Cercospora sojina</i>) (cont'd)					
Foliar Treatment (cont'd)					
(cont'd)	<i>Bacillus subtilis</i>	Serenade ASO	1.0–4.0 L/ha (0.4–1.6 L/acre)	0	Provides suppression only. Ground and aerial application. Good option for organically grown soybeans. Under conditions of moderate-to-high disease pressure, use the higher rate and shorter application intervals. For maximum effectiveness, apply prior to, or at the early stages of disease development. Apply in sufficient water volume to ensure full coverage for effective control. Repeat as necessary on a 7–10-day interval.
	trifloxystrobin + prothioconazole	Stratego Pro	572 mL/ha (230 mL/acre)	20	Ground and aerial application. Begin fungicide applications preventively or at the first signs of disease from early flowering (R1) to complete pod fill (R5). A non-ionic surfactant at 0.125% vol/vol may be used with Stratego Pro fungicide.
	azoxystrobin + propiconazole	Quilt	1.0–1.5 L/ha (400–600 mL/acre)	30	Susceptible varieties are most prone to the disease. Scout for disease and make the first application at growth stage R3 (early pod set) and 14 days later, at approximately growth stage R5, if needed.
	picoxystrobin	Acapela	0.44–0.88 L/ha (0.18–0.35 L/acre)	14	Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Optimal timing is typically R2–R3 growth stage. Use high rate and shorter interval when disease pressure is high. Apply no more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 2.64 L/ha/season. 12-hr re-entry period.
	penthiopyrad	Vertisan	1–1.75 L/ha (400–700 mL/acre)	14	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. 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 re-entry period.
	flutriafol	Fullback 125 SC	0.512–1.024 L/ha (207–414 mL/acre)	21	Ground application only. Apply as a broadcast foliar spray when conditions are favourable for development of frogeye leaf spot. Repeat 14–21 days after first application if environmental conditions are favourable for continued disease development. Do not apply more than 2,048 mL/ha per season. Do not apply more than 3 applications per growing season. No single application may exceed 1,024 mL/ha; only 1 application at 1,024 mL/ha may be made to any one field during a single growing season. 12-hr re-entry period. Apply only to soybeans harvested for dry seed.

SOYBEAN DISEASES

Table 2-16. Chemical Control Options for Diseases in Soybeans — Septoria Brown Spot

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
SEPTORIA BROWN SPOT					
Foliar Treatment					
<p>The disease is common but, in most cases, of minor economic importance unless disease development begins early in the season, which can lead to significant defoliation on very susceptible varieties. Varieties differ in susceptibility so if you have multiple varieties, make note of the differences in their response to the disease. Symptoms may be difficult to distinguish from those of bacterial blight, soybean rust and downy mildew. A good rotation with non-host crops such as wheat and corn will lower disease levels. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>, for more information.</p>	pyraclostrobin + fluxapyroxad	Priaxor	0.3 L/ha (120 mL/acre)	21	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Use high rate for suppression of sclerotinia stem rot. Maximum 2 applications/yr. 12-hr re-entry period.
	picoxystrobin	Acapela	0.44–0.88 L/ha (0.18–0.35 L/acre)	14	Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Optimal timing is typically R2–R3 growth stage. Use high rate and shorter interval when disease pressure is high. Apply no more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 2.64 L/ha/season. 12-hr re-entry period.
	penthiopyrad	Vertisan	1–1.75 L/ha (400–700 mL/acre)	14	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. 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 re-entry period.
	trifloxystrobin + prothioconazole	Stratego Pro	572 mL/ha (230 mL/acre)	20	Ground and aerial application. Begin fungicide applications preventively or at the first signs of disease from early flowering (R1) to complete pod fill (R5). A non-ionic surfactant at 0.125% vol/vol may be used with Stratego Pro fungicide.
	flutriafol	Fullback 125 SC	0.512–1.024 L/ha (207–414 mL/acre)	21	Ground application only. Apply as a broadcast foliar spray when conditions are favourable for development of soybean rust. Repeat 14–21 days after first application if environmental conditions are favourable for continued disease development. Do not apply more than 2,048 mL/ha per season. Do not apply more than 3 applications per growing season. No single application may exceed 1,024 mL/ha; only 1 application at 1,024 mL/ha may be made to any one field during a single growing season. 12-hr re-entry period. Apply only to soybeans harvested for dry seed.

SOYBEAN DISEASES

Table 2–17. Chemical Control Options for Diseases in Soybeans — Charcoal Rot, Cercospora Blight and Leaf Spot

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, re-entry periods, etc.)
CHARCOAL ROT (<i>Macrophomina phaseolina</i>)					
Foliar Treatment					
The disease is common but, in most cases, of minor economic importance unless disease development begins early in the season, which can lead to significant defoliation on very susceptible varieties. Varieties differ in susceptibility so if you have multiply varieties, make note of the differences in their response to the disease. Symptoms may be difficult to distinguish from those of bacterial blight, soybean rust and downy mildew. A good rotation with non-host crops such as wheat and corn will lower disease levels. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> , for more information.	trifloxystrobin + prothioconazole	Stratego Pro	572 mL/ha (230 mL/acre)	20	Ground and aerial application. Begin fungicide applications preventively or at the first signs of disease from early flowering (R1) to complete pod fill (R5). A non-ionic surfactant at 0.125% vol/vol may be used with Stratego Pro fungicide.
CERCOSPORA BLIGHT and LEAF SPOT (<i>Cercospora kikuchii</i>)					
Foliar Treatment					
This disease often appears late in the season and can cause leaf blighting and staining of the seed. Yield losses are often minimal, but a reduction in seed quality can occur due to staining. Management includes using clean seed and a fungicide seed treatment. Crop rotation and removal of crop residues can reduce infection potential.	flutriafol	Fullback 125 SC	0.512–1.024 L/ha (207–414 mL/acre)	21	Ground application only. Apply as a broadcast foliar spray when conditions are favourable for development of soybean rust. Repeat 14–21 days after first application if environmental conditions are favourable for continued disease development. Do not apply more than 2,048 mL/ha per season. Do not apply more than 3 applications per growing season. No single application may exceed 1,024 mL/ha; only 1 application at 1,024 mL/ha may be made to any one field during a single growing season. 12-hr re-entry period. Apply only to soybeans harvested for dry seed.