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EXTENSION AND ADVISORY TEAM

# GUIDE TO PEST MANAGEMENT IN FIELD PEPPER

Nova Scotia Vegetable Crop Guide to Pest Management 2021  
[PEP1-21]



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**Updated April 12, 2021 by**  
**Talia Plaskett, Protected Crop Specialist, Perennia**  
**Jonathan Bento, Research Associate, Perennia**

## IMPORTANT

This publication was compiled by representatives from Perennia using information from the Pest Management Regulatory Agency of Health Canada, specific pesticide labels, previous Atlantic Provinces Vegetable Pest Guides, and manufacturer's information. **This information is continuously changing and therefore it can cease to be current and accurate. Pesticide labels are the best source of information and should always be consulted prior to using a product.** The label is the best source of information on registered crop uses, rates, days to harvest, compatibility with other pesticides, toxicity, and other special information on its effective and safe use.

By printing this publication, Perennia does not offer any warranty or guarantee, nor do they assume any liability for any crop loss, animal loss, health, safety, or environmental hazard caused by the use of a pesticide mentioned in this publication.

## WARNINGS

**This publication is meant to be used as a reference for possible pest control options.** Where there are multiple brand names of a specific active ingredient registered in Canada, Perennia has only listed a couple for reference purposes and as such does not endorse one brand over another. If you have purchased a generic product not specifically in this guide but has your crop and pest on the label, always follow that product label.

**If any information in this or any other publication conflicts with the information on the label, always use the label recommendation.** You are legally responsible for the safe use of pesticides you purchase. This means the safe transport and storage of these materials, the label rates used on crops, and the safe disposal of container.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	
<b>WEEDS:</b>								
<b>Preplant</b>  <i>Perennial weeds including quackgrass</i>	9	glyphosate	<b>Roundup WeatherMAX</b>	1.67-4.67 L/ha	12 hours	7	Apply in the fall or spring prior to planting. Annual weed control programs will be necessary to control weeds germinating after planting. For quackgrass control, apply to actively growing quackgrass when at least 4 new leaves are present. The low rate (1.67 L/ha) will provide a minimum of one season control, while higher rates (1.67 to 4.67 L/ha) will provide longer term control. The low rate of Roundup should be applied in 50 to 100 L/ha water. If higher water volumes are used add a suitable surfactant. Wait 72 hours before plowing under. Best control of quackgrass is obtained when these herbicides are applied in the fall.	
			<b>Touchdown Total</b>	1.8-5.0 L/ha	12 hours	7		
	14	carfentrazone-ethyl	<b>Aim EC</b>	36.5-117 mL/ha	12 hours	1		Apply in minimum spray volume of 100 L/ha. Refer to label for target weeds, buffer zones and rates. Use high flow rate nozzles to apply the highest spray volume.
	14	flumioxazin	<b>Chateau WDG</b>	140-210 g/ha	12 hours	-		Apply as a hooded or shielded application to row middles prior to transplanting. Rainfall or irrigation is necessary for activation. Plants should be grown on plastic raised beds that are at least 10 cm higher than row middles.
	26	Pelargonic acid	<b>Beloukha</b> <b>NEW 2021</b>	12 – 20 L/ha	Until dry	1		Apply as a burndown for seedbed preparation or inter-row weed management. Apply before or after sowing, but at least 3 days before emergence. Use the minimum effective rate

<b>Preplant</b> <i>Perennial weeds including quackgrass</i>							for weed control. For harder-to-control weeds, higher rates or repeat applications may be required.
<b>Preplant Incorporated</b> <i>Germinating annual grasses and some broadleaves</i>	3	trifluralin	<b>Treflan EC</b>	1.25-2.4 L/ha	12 hours	-	Transplants only. Incorporate within 24 hours of application. Ragweed and mustards are not controlled. This product has a carry-over effect on corn and cereal the following year.
			<b>Rival</b>	1.6-2.3 L/ha	12 hours	-	
	15	napropamide	<b>Devrinol 50 DF</b>	2.24-4.5 kg/ha	12 hours	-	Incorporate within 24 hours of application. Do not apply to soils with over 10% organic matter. Apply in 200-900 L of water / ha.
<b>Preemergence</b> <i>Germinating annual grasses and some broadleaves</i>	3	chlorthal dimethyl	<b>Dacthal W-75</b>	9.0-15.5 kg/ha	12 hours	-	Apply 4-6 weeks after transplanting. If weeds have emerged, cultivate before application.
	15	s-metolachlor	<b>Dual II Magnum or Komodo</b>	1.15-1.25 L/ha	12 hours	80	Nightshades and annual grasses. Apply within 48 hrs of transplanting. Risk of crop injury when soil temperature is below 10 C.
	13	clomazone	<b>Command 360 ME</b>	1.55-2.35 L/ha	12 hours	70	Command 360 ME herbicide may be utilized as a soil applied treatment prior to weed emergence in peppers. <b>DO NOT USE ON BANANA PEPPERS.</b> Make a single herbicide application in a minimum of 95 L water/ ha before transplanting, and prior to weed emergence. Place roots of the transplants below the chemical barrier when planting. Do not apply in sandy soil, do not incorporate. <b>Crop rotation restrictions may apply!</b>
<b>Postemergence</b> <i>Grasses</i>	1	Sethoxydim	<b>Poast Ultra plus Merge</b>	0.32-1.1 L/ha 1-2 L/ha	12 hours	30	Apply to actively growing grasses at the 1-6 leaf stage.

<b>Post-transplant/Row middle application</b>  <i>Broadleaf weeds &amp; nutsedge</i>	2	Halosulfuron	<b>Sandea WG</b>	35-70 g/ha	12 hours	30	<i>Post-transplant</i> – Apply as a directed (away from crop) spray 21 days after transplanting, or when the plants have reached a minimum of 15.25 cm in height, but prior to flowering. <i>Row Middle Applications</i> - May be applied between rows of direct-seeded or transplanted peppers for the control of nutsedge and listed broadleaf weeds. Avoid contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.
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Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks
<b>INSECTS:</b>							
<b>Aphids and Pepper Maggot</b>	1B	dimethoate	<b>Lagon 480 E</b>	0.7-1 L/ha	12 hours	3	Maximum 2 applications per season
	4	acetamiprid	<b>Assail 70 WP Aceta 70 WP</b>	56-86 g/ha	12 hours	7	<b>Aphids.</b> Max 4 applications per season for aphids. Do not apply more than once every 7 days. Apply in a spray volume of 200 L/ha. Thorough and uniform spray coverage is required for adequate control. Use high rate under heavy pest pressure.
	4	thiamethoxam	<b>Actara 25 WG</b>	105 g/ha	12 hours	1	<b>Aphids.</b> Max. 2 applications/yr. Apply before aphids reach damaging levels. Allow at least 7 days between treatments. Use at least 100 L water/ha.

Aphids and Pepper Maggot	28	Tetraniliprole	Vayego 200 SC <b>NEW 2021</b>	150 mL/ha	12 hours	1	<b>Aphid Suppression.</b> Begin applications when treatment thresholds have been reached. Apply as a directed foliar spray ensuring thorough coverage. No more than 4 applications per season. Minimum interval between applications is 5 days. Do not apply less than 12 days prior to bloom. Do not apply while plants are blooming.
	28	Cyantraniliprole	Exirel	Aphids: 500-1500 ml/ha Pepper maggot: 1000-1500 ml/ha	12 hours	1	Aphids in field peppers, pepper maggot in greenhouse peppers. Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. Apply no more than 4 times per season.
	29	Flonicamid	Beleaf 50SG	0.12-0.16 kg/ha	12 hours	0 days	<b>Aphids only.</b> Thorough spray coverage of plant foliage is essential. Minimum of 94 L of water/ha. Maximum of 3 applications/season; allow 7 days between applications. <b>Avoid overnight storage of spray mixtures, do not use liquid fertilizer as a carrier and do not use adjuvants.</b>
Aphids, Psyllids and Whiteflies	23	spirotetramat	Movento 240 SC	220-365 ml/ha	12 hours	1	Minimum 7-day interval between applications. Maximum of 730 ml/ha of product applied per season. <b>DO NOT apply this product during crop flowering period or when flowering weeds are present. This product is TOXIC to bees through direct contamination of pollen and nectar.</b>

Aphids, Psyllids and Whiteflies			<b>Movento 150 OD</b>	347-585 ml/ha	12 hours	1	Minimum 7-day interval between applications. Maximum of 1.17 L/ha of product applied per season. <b>DO NOT apply this product during crop flowering period or when flowering weeds are present. This product is TOXIC to bees through direct contamination of pollen and nectar.</b>
	NC	Potassium salts of fatty acids	<b>Kopa Insecticidal Soap</b>	8L in 400L water applied at 700-1900 L/ha solution	-	0	Do not spray when plants are under stress. Avoid spraying during full sun. Spray early in morning or evening or when overcast.
Aphids, Whitefly	4D	Flupyradifurone	<b>BYI 02960 200SL</b> <b>NEW 2021</b>	<b>Aphids (foliar):</b> 500 – 750 mL/ha  <b>Whiteflies (foliar):</b> 750 – 1000 mL/ha  <b>Aphids and Whiteflies (soil):</b> 750-1000mL /1000 plants	12 hours	Foliar: 1 Soil: 45	<b>Foliar:</b> Apply as a directed foliar spray ensuring thorough coverage. Minimum of 7 days between applications. Maximum amount allowed per season is 2000 mL/ha. <b>Soil:</b> Plant population per hectare cannot exceed 26,650 when application rate used is 750 mL/10,000 plants, or 20,000 plants per hectare when application rate used is 1000 mL/10,000 plants. <b>DO NOT</b> apply this product through any other type of irrigation system. Apply specified dosage by the following method: 1. Chemigation into root-zone through low-pressure drip, trickle, micro-sprinkler, or equivalent equipment. <b>DO NOT</b> apply this product through any other type of irrigation system. 2. Injection below the eventual seed-line prior to planting. Place BYI 02960 200SL Insecticide 7-10 cm below seed-line

Aphids, Whitefly	4D	Flupyradifurone	Altus <b>NEW 2021</b>	Aphids: 500 – 750 mL/ha  Whiteflies: 750 – 1000 mL/ha	12 hours	3	<b>Greenhouse Only.</b> Monitor crops and commence applications once local thresholds are reached. Minimum application volume is 500 L/ha. Minimum interval between applications is 10 days. See label for directions regarding drench application.
	9D	Afidopyropen	Versys	Aphids: 0.1L/ha  Whiteflies: 0.35-0.5 L/ha	12 hours	0	Allow a minimum of 7 days between applications. Monitor pest population and reapply if necessary once thresholds are reached. Application during the crop blooming period may be made only in the evening when most bees are not foraging. Max 4 applications per year.
Cutworms	1B	chlorpyrifos	Lorsban 4 E  FINAL SALE 2022, FINAL USE 2023 Pyrinex 480 EC  Warhawk 480 EC  FINAL SALE 2022, FINAL USE 2023	1.2-2.4 L/ha	24 hours	40	<b>Green pepper only.</b> Apply 3-7 days before transplanting or at the 2-5 leaf stage of the crop.
	3	permethrin	Pounce 384 EC	180-390 ml/ha	12 hours	1	Apply up to 5 leaf stage. Do not disturb soil for 5 days after treating.



<b>Cutworms</b>	6, 28	Abamectin, cyantraniliprole	<b>Minecto Pro</b>	370-556 mL/ha	12 hours	7	Begin applications when treatment thresholds have been reached. For early season cutworm control, apply to foliage when rain is not expected in the next 24 hours. For optimal control, apply to smaller plants or when lower portions of plant can receive adequate coverage.
	28	Tetraniliprole	<b>Vayego 200 SC</b> <b>NEW 2021</b>	150 mL/ha	12 hours	1	Begin applications when treatment thresholds have been reached. Apply as a directed foliar spray ensuring thorough coverage. No more than 4 applications per season. Minimum interval between applications is 5 days. Do not apply less than 12 days prior to bloom. Do not apply while plants are blooming.
	28	Cyantraniliprole	<b>Exirel</b>	500-750 ml/ha	12 hours	1	Begin applications when treatment thresholds are reached. For early season cutworm control, apply to foliage when rain is not expected in the next 24 hours. For optimal control, apply to smaller plants or when lower portions of plant can receive thorough coverage. Do not make more than 4 applications per season.
<b>European Corn Borer</b>	3	deltamethrin	<b>Decis 5 EC</b>	250-300 ml/ha	12 hours	3	Apply when egg masses begin to hatch or when first signs of insect feeding are evident. Repeat at 5–7-day intervals. Max. 3 applications/season.
			<b>Poleci 2.5 EC</b>	500-600 ml/ha in 200-500 L water/ha			
	3	permethrin	<b>Pounce 384 EC</b>	180 ml/ha	When dry	1	Apply when corn borer is first noticed between end of July to mid-September. Max. 4 applications per year.

European Corn Borer	5	spinosad	<b>Success 480 EC</b>	83 ml/ha	12 hours	1	Maximum 2 applications/yr. Use only on small larvae and low infestations.
			<b>Entrust 80 W</b>	50 g/ha	12 hours	1	Maximum 2 applications/yr. Allow 7-10 days between applications. Applications should be timed to coincide with peak egg hatch.
			<b>Entrust SC</b>	167 ml/ha			
	11	<i>Bacillus thuringiensis</i>	<b>Bioprotec CAF</b>	2.8 L/ha	-	1	
	15	novaluron	<b>Rimon 10 EC</b>	410-820 ml/ha	12 hours	1	First application should be made just prior to egg hatch. Scout for European Corn Borer to monitor egg-laying and egg hatch to determine application timing. Use higher application rates and spray volumes for higher pest pressure, when larvae are large, or when the foliage canopy is tall or dense. Reapplication on a 7–10-day interval may be required to protect new growth or when monitoring indicates the need. For the most effective control, fields should be scouted, and sprays applied in a timely manner. Max. 3 applications per crop per season. <i>*Also suppresses pepper weevil.</i>
	18	Methoxyfenozide	<b>Intrepid 240F</b>	0.3 – 0.6 L/ha	12 hours	1	Apply at the first signs of feeding damage before the insect enters the fruit. Repeat applications after 7-14 days if required based on population monitoring. Monitoring insect populations is key to controlling this pest. Use higher rate for heavy infestations or larger crop canopies.

<b>European Corn Borer</b>	6, 28	Abamectin, cyantraniliprole	<b>Minecto Pro</b>	370-566 mL/ha	12 hours	7	Time the application to coincide with peak egg hatch. Scout for European corn borer by monitoring egg laying and egg hatch to determine application timing. Thorough coverage is important to obtain optimum control.
	28	Cyantraniliprole	<b>Exirel</b>	500-750 ml/ha	12 hours	1	Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. Do not make more than 4 applications per season.
	28	Tetraniliprole	<b>Vayego 200 SC</b> <b>NEW 2021</b>	150 mL/ha	12 hours	1	Time application to coincide with peak egg hatch. Apply as a directed foliar spray ensuring thorough coverage. No more than 4 applications per season. Minimum interval between applications is 5 days. Do not apply less than 12 days prior to bloom. Do not apply while plants are blooming.
	5	Spinetoram	<b>Delegate WG</b>	92-132 g/ha, 1000L water	12 hours	2	<b>Greenhouse peppers only.</b> Apply when eggs hatch and first instar larvae are present. Max. 3 applications per crop cycle.
<b>Mites</b>	3	Fenpropathrin	<b>Danitol</b> <b>NEW 2021</b>	779 mL/ha	See label	See label	<b>Two spotted spidermite.</b> Apply with ground equipment in adequate water for uniform coverage (a minimum of 250 L/ha). Apply when first pest activity is noticed. Treatment is recommended when mite populations are just beginning to build (less than 5 motiles/leaf). DO NOT tank mix with any copper formulations. Do not exceed 1 application/year.
	6, 28	Abamectin, cyantraniliprole	<b>Minecto Pro</b>	385-670 mL/ha	12 hours	7	Apply when mites first appear. Use a non-ionic surfactant at a rate of 0.1-0.5% v/v.

<b>Mites</b>	20	Bifenazate	<b>Acramite 50WS</b>	851 g/ha	12 hours	3	Apply in a minimum of 500 L/ha. Ensure thorough coverage of all leaf surfaces. One application per year.
	23	spiromesifen	<b>Forbid 240 SC</b>	30-50 mL/100L of water	12 hours	7	<b>Two spotted spider mite. Greenhouse Only.</b> Max 2 applications per crop cycle. Minimum application volume of 100 L/ha. Also controls whiteflies.
	NC	mineral oil	<b>Purespray Green Spray Oil 13E</b>	10 L in 1000 L water (1% solution) otherwise phytotoxicity may result.	12 hours	-	<b>Suppression.</b> Use sufficient spray volume (up to 1000 L/ha) to ensure thorough crop coverage. Spider mites: begin when mites appear. Apply at 7-14- day intervals. Do not apply more than 8 summer spray applications per growing season.
		Silicon dioxide	<b>DX 13 Dust</b> <b>NEW 2021</b>		4 hours		<b>Greenhouse Only. Spider Mites.</b> Apply at first sign of infestation. Apply an even coating on all plant surfaces to be protected including both sides of the leaves, stems, and fruits. Use sufficient product to obtain good coverage. Re-apply after 7 – 14 days. Make 3-10 re-applications per pepper crop.
<b>Colorado Potato Beetle</b>	4	acetamiprid	<b>Assail 70 WP</b> <b>Aceta 70 WP</b>	40-80 g/ha	12 hours	7	Max 2 applications/season for at least 7 days apart. Apply in a spray volume of 200 L/ha. Thorough and uniform spray coverage is required to obtain adequate control. Use the high rate under heavy pest pressure.
	4D	Flupyradifurone	<b>BYI 02960 200SL</b> <b>NEW 2021</b>	750 – 1000 mL/ha	12 hours	1	Apply as a directed foliar spray ensuring thorough coverage. Minimum of 7 days between applications. Maximum amount allowed per season is 2000 mL/ha.

<b>Colorado Potato Beetle</b>	28	chlorantraniliprole	<b>Coragen</b>	250-375 ml/ha	12 hours	1	Begin applications when treatment thresholds have been reached. Use high rate under heavy insect pressure. Max. 4 applications per season. Do not apply more than once every 5 days. Do not exceed 1.125 L/ha/season.
	28	Tetraniliprole	<b>Vayego 200 SC</b> <b>NEW 2021</b>	150 mL/ha	12 hours	1	Do not apply if any Group 28 Insecticide was applied at planting. Begin applications when treatment thresholds have been reached. Apply as a directed foliar spray ensuring thorough coverage. No more than 4 applications per season. Minimum interval between applications is 5 days. Do not apply less than 12 days prior to bloom. Do not apply while plants are blooming.
	28	Cyantraniliprole	<b>Exirel</b>	750-1000 ml/ha	12 hours	1	Begin applications when treatment thresholds are reached. Thorough coverage is important to obtain optimum control. Do not make more than 4 applications per season.
	5	Spinosad	<b>Success</b>	83 ml/ha	12 hours	1	Apply up to a max of 3 applications/yr. Allow 7 - 10 days between applications.
<b>Cabbage Looper</b>	5	spinetoram	<b>Delegate WG</b>	140-200 g/ha	12 hours	1	Time application with peak egg hatch. Repeat applications based on monitoring. Use higher rate for higher infestations or advanced growth stages. Apply a maximum of 3 times/year with a minimum 5-day re-treatment interval.

<b>Cabbage Looper</b>	18	Methoxyfenozide	<b>Intrepid</b>	0.3 – 0.6 L/ha	12 hours	1	Apply at the first sign of feeding damage or when infestations reach threshold levels as determined by insect monitoring. Apply again after 7-14 days if required based on population monitoring. Use the higher rate for heavy infestations, advanced growth stages of the target pest or larger crop canopies.
	28	Cyantraniliprole	<b>Exirel</b>	250-500 ml/ha	12 hours	1	Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. Maximum of 4 applications per season.
	11	<i>Bacillus thuringiensis</i> , subsp. <i>aizawai</i> , (Strain ABTS-1857 fermentation solids, spores, and insecticidal toxins)	<b>XenTari WG</b>	500-1000 g/ha	4 hours	0	Apply every 5-7 days. Apply using 500–1000 L water per ha to ensure full coverage but not to the point of run off.
	5	Spinosad	<b>Success</b>	182 ml/ha	12 hours	1	Apply up to a maximum of 3 applications per year. Allow 7 - 10 days between applications. <i>Also controls imported cabbage worm, diamondback moth.</i>
<b>Armyworm, Beet armyworm, Fall armyworm</b>	3	Fenpropathrin	<b>Danitol</b> <b>NEW 2021</b>	779 mL/ha	See label	See label	Apply with ground equipment in adequate water for uniform coverage (a minimum of 250 L/ha). Apply when first pest activity is noticed. DO NOT tank mix with any copper formulations. Do not exceed 1 application/year.

<b>Armyworm, Beet armyworm, Fall armyworm</b>	28	Tetraniliprole	<b>Vayego 200 SC</b> <b>NEW 2021</b>	150 mL/ha	12 hours	1	Apply as a directed foliar spray ensuring thorough coverage. No more than 4 applications per season. Minimum interval between applications is 5 days. Do not apply less than 12 days prior to bloom. Do not apply while plants are blooming.
	28	Cyantraniliprole	<b>Exirel</b>	500 ml/ha	12 hours	1	Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. Do not apply more than 4 times per season.
	11	<i>Bacillus thuringiensis</i> , subsp. <i>aizawai</i> , (Strain ABTS-1857 fermentation solids, spores, and insecticidal toxins)	<b>XenTari WG</b>	500-1000 g/ha	4 hours	0	<b>Beet armyworm.</b> Apply every 5-7 days. Apply using 500–1000 L water per ha to ensure full coverage but not to the point of run off.
<b>Tomato fruitworm (corn earworm) Tobacco hornworm (suppression) Tomato hornworm (suppression)</b>	3	Fenpropathrin	<b>Danitol</b> <b>NEW 2021</b>	779 mL/ha	See label	See label	Apply with ground equipment in adequate water for uniform coverage (a minimum of 250 L/ha). Apply when first pest activity is noticed. DO NOT tank mix with any copper formulations. Do not exceed 1 application/year.
	28	Cyantraniliprole	<b>Exirel</b>	750 ml/ha	12 hours	1	Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. Do not apply more than 4 times per season.

Tomato fruitworm (corn earworm) Tobacco hornworm (suppression) Tomato hornworm (suppression)	11	<i>Bacillus thuringiensis</i> , subsp. <i>aizawai</i> , (Strain ABTS-1857 fermentation solids, spores, and insecticidal toxins)	XenTari WG	500-1000 g/ha	4 hours	0	Tobacco budworm, Tomato fruitworm. Apply every 5-7 days. Apply using 500–1000 L water per ha to ensure full coverage but not to the point of run off.
Spotted wing drosophila	3	Fenpropathrin	Danitol <b>NEW 2021</b>	779 mL/ha	See label	See label	Apply with ground equipment in adequate water for uniform coverage (a minimum of 250 L/ha). Apply when first pest activity is noticed. DO NOT tank mix with any copper formulations. Do not exceed 1 application/year.
	5	Spinosad	Entrust SC	364 ml/ha	12 hours	1	Maximum of 3 applications per year with 7 - 10 days between applications. Application should be based on the presence of adult pests (flies) as determined by local monitoring.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks
<b>DISEASES:</b>							
Bacterial Leaf spot	M	copper hydroxide	Kocide 2000	2.52 kg/ha	48 hours	2	Apply at 7–14-day intervals. Max. 10 applications per year.



Bacterial Leaf spot	44	<i>Bacillus subtilis</i>	Serenade Opti	0.6-1.7 Kg/ha	-	0	<b>Biopesticide that will only suppress the indicated diseases.</b> Begin application soon after emergence or transplant when conditions are conducive to disease development. Repeat as necessary on 7–10-day intervals. When environmental conditions and plant stage are conducive to rapid disease development, use in a rotational program with other registered bactericides.
	24	Kasugamycin as hydrochloride hydrate	Kasumin	1.2 L/ha in 240 L/ha of water	12 hours	1 day	Begin applications when conditions favour disease development. Repeat applications at intervals that are necessary or when conditions favour disease development. Max 3 applications per season. Min interval of 7 days between applications.
	M1	Copper	Cueva	0.5% - 2% solution, at 470-940 L/ha	4 hours	1	Re-apply using 5–10-day intervals.
Leaf Blights	11	pyraclostrobin	Cabrio EG	560-840 g/ha	12 hours	0	<b>Anthracnose, early blight and late blight control.</b> Max 6 applications/yr. Make no more than 2 applications before rotating to a different fungicide group.
	7	boscalid	Cantus WDG	175-315 g/ha	12 hours	0	<b>Early blight.</b> Maximum 5 applications/yr. Do not make more than 2 applications before rotating to a different fungicide group.
	7	Fluopyram	Velum Prime <b>NEW 2021</b>	500 mL/ha	12 hours	0	<b>Early Blight.</b> Chemigation into root-zone through low-pressure drip, trickle, micro-sprinkler or equivalent equipment. Do not make more than 2 sequential applications of VELUM PRIME or any other Group 7 containing fungicide before rotating.

Leaf Blights	7	Fluopyram	<b>FPY 500</b> <b>NEW 2021</b>	500 mL/ha	12 hours	0	<b>Early Blight.</b> Chemigation into root-zone through low-pressure drip, trickle, micro-sprinkler or equivalent equipment. See label for instructions on different application methods. Do not make more than 2 sequential applications of VELUM PRIME or any other Group 7 containing fungicide before rotating.
	44	<i>Bacillus subtilis</i>	<b>Serenade Opti</b>	2.5 Kg/ha	-	0	<b>Biopesticide that will only suppress Early Blight.</b> Make the first application when plants are 6-10 cm high, or when conditions are conducive for disease development. Repeat on an interval of 5-7 days.
	44	<i>Bacillus amyloliquifaciens</i> strain D747	<b>Double Nickel LC(1x10<sup>10</sup>spores/mL)</b>	2.5-10 L/ha	When dry	0	<b>Early blight.</b> Growth stage: From flowering to fruiting. Repeat application every 3-10 days for as long as conditions favor disease development.
			<b>Double Nickel 55 (5x10<sup>10</sup>spores/g)</b>	0.5-2.0 kg/ha			
	7	<i>penthiopyrad</i>	<b>Fontelis</b>	1.25-1.75 L/ha	12 hours	0	<b>SUPPRESION of Early Blight.</b> Begin applications prior to disease development, continue on a 7–10-day interval. Use higher rate and shorter interval when disease pressure is high. Maximum seasonal rate is 5.25 L/ha. Do not make more than 2 sequential applications before switching to another mode of action.
	40	Dimethomorph	<b>Acrobat 50 WP</b>	450 g/ha	12 hours	0	<b>Must be applied as a tank mix with another fungicide active against late blight.</b> Begin applications when conditions favour disease development; continue on a 5–10-day schedule as needed until weather conditions favouring infection and sporulation decrease. DO NOT use less than 200 L water/ha for ground applications. Max 5 applications/yr.

Leaf Blights	9, 12	Cyprodinil and fludioxonil	<b>Switch 62.5 WG</b>	775-975 g/ha	12 hours	0	<b>Anthracnose.</b> Begin applications prior to or at the onset of disease and repeat at 7–10-day intervals if conditions remain favourable for disease development. Make no more than 2 sequential applications before using another fungicide. Apply in sufficient water to ensure thorough coverage. Do not make more than 3 applications/yr.
	7	Benzovindiflupyr	<b>Aprovia</b>	500-750 ml/ha	12 hours	1	<b>Early blight, Anthracnose, Septoria leaf spot.</b> Begin applications prior to disease development; continue throughout the season on a 7-day interval, starting at first fruit set for all diseases except Early blight. For Early blight apply on a 7–14-day interval starting prior to disease establishment. If disease pressure is high, use the highest rate. Max. 3L/ha/season.
	7-3	Benzovindiflupyr & Difenconazole	<b>Aprovia Top</b>	643-967 ml/ha	12 hours	1	<b>Early blight, Anthracnose, Septoria leaf spot.</b> Begin applications prior to disease development and continue throughout the season on a 7-day interval, starting at first fruit set for all diseases except Early blight. For Early blight apply on a 7–14-day interval starting prior to disease establishment. If disease pressure is high, use the highest rate. For best results, sufficient water volume must be used to provide thorough coverage. Apply as a broadcast foliar spray in a minimum of 150 L/ha of water for thorough coverage.
	U15	Oxathiapiprolin	<b>Zorvec Enicade</b>	0.175-0.35 L/ha	12 hours	0	<b>Late blight.</b> Begin applications prior to disease development and continue on a 5–14-day interval. Use higher rate and shorter interval when disease pressure is high.

Leaf Blights	19	Polyoxin D zinc salt	Diplomat 5SC	537 – 926 ml/ha	When dry	0	Early blight. Apply as a foliar spray in sufficient water to provide thorough coverage of foliage (and fruit when present). Begin as a preventative application when conditions favour disease development and continue on a 7–14-day interval as needed to maintain suppression. Do not apply more than 150 g a.i./ha/season or 12 months.
	49, 40	Oxathiapiprolin, Mandipropamid	Orondis Ultra <b>NEW 2021</b>	0.6 L/ha	12 hours	1	Begin applications prior to disease development and continue on a 7-14-day interval. Use shorter interval when disease pressure is high.
Botrytis Grey Mold	44	<i>Bacillus subtilis</i>	Serenade Opti	1.7-3.3 Kg/ha	-	0	Biopesticide that will only suppress the indicated diseases. Make the first application when plants are 6-10 cm high, or when conditions are conducive for disease development and repeat on an interval of 5-7 days.
	44	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel LC (1x10 <sup>10</sup> spores/mL)  Double Nickel 55 (5x10 <sup>10</sup> spores/g)	6.25-18 L/ha  Low disease pressure: 4.5-5 L/ha  1.25-3.6 kg/ha  Low disease pressure: 0.9-1 kg/ha	When dry	0	Growth stage: From flowering to fruit maturity. Repeat application every 3 to 10 days for as long as conditions favor disease development.

<b>Botrytis Grey Mold</b>	BM02	<i>Bacillus amyloliquifaciens</i> strain MBI 600	<b>Serifel</b> <b>NEW 2021</b>	0.25 – 0.5 Kg/ha	4 hours	0	Begin application shortly after emergence or transplanting and continue on 7-10-day intervals if conditions are favourable for disease development. Use the highest rate and the shortest interval when conditions favour high disease pressure.
	7	boscalid	<b>Cantus WDG</b>	420 g/ha	12 hours	0	Maximum 5 applications/yr. Do not make more than 2 applications before rotating to a different fungicide group.
	7	penthiopyrad	<b>Fontelis</b>	1.25-1.75 L/ha	12 hours	0	<b>Field and Greenhouse use.</b> Begin applications prior to disease development; continue on a 7–10-day interval. Use higher rate and shorter interval when disease pressure is high. Maximum seasonal rate is 5.25 L/ha. Do not make more than 2 sequential applications before switching to another mode of action.
	9, 12	Cyprodinil, fludioxinil	<b>Switch 62.5 WG</b>	775-975 g/ha	12 hours	0	Begin applications when conditions become favorable for disease but before infection. Max. 3 applications per year.
	19	Polyoxin D zinc salt	<b>Diplomat 5SC</b>	463 – 926 ml/ha	When dry	0	<b>Suppression.</b> Apply as a foliar spray in sufficient water to provide thorough coverage of foliage (and fruit when present). Begin as a preventative application when conditions favour disease development and continue on a 7–10-day interval as needed to maintain suppression. Do not apply more than 150 g a.i./ha/season or 12 months.
<b>Powdery Mildew</b>	44	<i>Bacillus subtilis</i>	<b>Serenade Opti</b>	1.7-3.3 Kg/ha	-	0	<b>Biopesticide that will only suppress the indicated diseases.</b> Begin application soon after emergence or transplant and repeat on an interval of 7-10 days.

Powdery Mildew	BM02	<i>Bacillus amyloliquifaciens</i> strain MBI 600	<b>Serifel</b> <b>NEW 2021</b>	0.5 Kg/ha	4 hours	0	Begin application shortly after emergence or transplanting and continue on 7-10-day intervals if conditions are favourable for disease development. Use the highest rate and the shortest interval when conditions favour high disease pressure.
	NC	Potassium bicarbonaDite	<b>MilStop</b>	2.8-5.6 kg/ha	4 hours	0	Start application at first sign of disease. Repeat as required on 7-day intervals. Apply in a spray volume of 1000 L/ha.
		<i>Streptomyces lydicus</i>	<b>Actinovate SP</b>	425g/1100 L water	1 hour	-	Spray to wet but avoid run-off. Apply as a foliar spray to leaves and blossom starting at transplant and repeat every 7-14 days.
		mineral oil	<b>Purespray Green Spray Oil 13E</b>	10 L in 1000 L water (1% solution) otherwise phytotoxicity may result.	12 hours	-	Use sufficient spray volume (up to 1000 L/ha) to ensure thorough crop coverage. Begin when first symptoms appear, or conditions are favourable for disease development. Apply at 7 – 14-day intervals. Apply no more than 8 summer spray applications per growing season.
	7	Penthiopyrad	<b>Fontelis</b> <b>NEW 2021</b>	1.0 – 1.75 L/ha	12 hours	0	<b>Field and greenhouse use.</b> Begin applications prior to disease development and repeat on a 7- to- 10-day interval. Use the highest rate and the shortest interval when conditions favour high disease pressure. Do not make more than 2 consecutive applications before switching to a fungicide with a different mode of action. Maximum seasonal use is 5.25 L/ha.
7	Benzovindiflupyr	<b>Aprovia</b>	500-750 ml/ha	12 hours	1	Begin applications prior to disease development; continue throughout season at 7-day intervals, starting at first fruit set. If disease pressure is high, use the highest rate.	

Powdery Mildew	7-3	Benzovindiflupyr & Difenoconazole	<b>Aprovia Top</b>	643-967 ml/ha	12 hours	1	Begin applications prior to disease development; continue throughout season at 7-day intervals, starting at first fruit set. If disease pressure is high, use the highest rate. Apply as a broadcast foliar spray in a minimum of 150 L/ha of water for thorough coverage.
	-	Tea tree oil	<b>Timorex Gold</b>	1.0 – 1.5 L/ha	4 hours	2	Apply in 400-800 L/ha spray volume. For preventative treatments, apply at 7–14-day intervals, depending on disease level. Use shorter interval when conditions promote rapid disease development.
Phytophthora Blight ( <i>Phytophthora capsici</i> )	40	mandipropamid	<b>Revus</b> plus <b>Non-ionic</b> <b>adjuvant</b>	600 ml/ha plus 0.125% v/v	12 hours	1	<b>Suppression.</b> Make one application as a drench, immediately before transplant to the field <b>or</b> begin applications prior to disease development and continue on a 7–10-day schedule (greenhouse or field).
	43	fluopicolide	<b>Presidio</b>	220-292 ml/ha	12 hours	2	<b>Suppression.</b> For resistance management Presidio must be tank-mixed with a labeled rate of another fungicide registered for the target pathogen, but with a different mode of action. Apply as a soil or foliar application on a 7–10-day schedule beginning when conditions are favourable for disease development and prior to disease onset. For best results, application should begin at planting or transplanting.
	40	Dimethomorph	<b>Acrobat 50 WP</b>	450 g/ha	12 hours	0	Begin applications prior to the onset of disease infection. Applications should be made on a 5-7-day schedule under higher disease pressure and on a 7-10-day spray schedule under low to moderate disease pressure. Maximum of 2 applications per season. Do not use less than 200 L water/ha.

<b>Phytophthora Blight</b> ( <i>Phytophthora capsici</i> )	40,45	Ametoctradin, dimethomorph	<b>Zampro</b>	1.0 L/ha	12 hours	4	Use in rotation with fungicides having a different mode of action active against downy mildew to reduce the risk of resistance development. Begin applications prior to disease development and continue on a 5-7-day interval. Maximum 3 applications.
	49, 40	Oxathiapiprolin, Mandipropamid	<b>Orondis Ultra</b> <b>NEW 2021</b>	0.6 L/ha	12 hours	1	<b>Foliar phase:</b> Begin applications prior to disease development and continue on a 7-14-day interval. Use shorter interval when disease pressure is high. <b>Soil phase:</b> Suppression. ORONDIS Ultra Fungicide must be applied in a manner that ensures the product solution adequately saturates the root zone of the transplant plug through a transplant water application. When applied to crown/roots, will suppress <i>Phytophthora</i> root and crown rot.
	29	Fluazinam	<b>Allegro 500F</b>	1.75 L of product/ha (875 g fluazinam per ha) Spray volume: 280 to 560 L of water per hectare.	24 hours	30	<b>Suppression.</b> Soil drench and/or foliar, broadcast, ground application only. Begin applications at transplant. The initial application may be by soil drench or foliar application. All subsequent applications should be foliar, spraying the foliage, stem, and plant base. 7-day interval. Max 6 applications per year. No more than 3 sequential applications before alternating to a fungicide from a different chemical family.
<b>Phytophthora Blight</b> ( <i>Phytophthora capsici</i> )	BM02	<i>Bacillus amyloliquefaciens</i> strain D747	<b>Double Nickel LC</b> ( $1 \times 10^{10}$ spores/mL)	0.5-2.5 L/ha	When dry	0	<b>Partial suppression of soil level <i>Phytophthora</i> blight infection.</b> Growth stage: From planting or transplanting until maturity. For transplanted crops: Apply preventatively to transplants in the greenhouse or nursery before transplanting. See soil application instructions on label.



<b>Phytophthora Blight</b> ( <i>Phytophthora capsici</i> )			<b>Double Nickel 55</b> (5x10 <sup>10</sup> spores/g)	0.1-0.5 kg/ha			For crops grown from seed: Apply at planting, following instructions for banded/in furrow application. See 'Soil application' instructions on label. Follow up applications can be made at 2–4-week intervals after planting or transplanting.
	49	Oxathiapiprolin	<b>Orondis 200SC</b>	0.35-1.4 L/ha	12 hours	0	<b>Soil phase.</b> Apply at plant, in furrow, drip or in transplant water. Use the higher rates for heavier soils, for longer application intervals, or for susceptible varieties.
	U15		<b>Zorvec Enicade</b>	Foliar phase: 0.175-0.35 L/ha Soil phase: 0.7-2.8 L/ha			<b>Foliar phase:</b> Begin applications prior to disease development and continue at 5–14-day intervals. Use higher rate and shorter interval when disease pressure is high. <b>Soil phase:</b> Apply at plant, in furrow, drip or in transplant water. See specific soil application directions on label.
			<b>Zorvec Epicaltrin</b>	0.35-1.4 L/ha	12 hours	0	<b>Soil phase:</b> Apply at plant, in furrow, drip or in transplant water. Use higher rates for heavier soils, longer application intervals, or susceptible varieties. <i>*Do not follow soil applications of Epicaltrin with foliar applications of Zorvec Enicade or other oxathiapiprolin-containing fungicides. Use either soil applications or foliar applications but not both to control the relevant disease.</i>

Use the following web link to search for any pesticide label mentioned in this guide, or any other pesticide registered in Canada: <http://pr-rp.hc-sc.gc.ca/ls-re/index-eng.php>

## PESTICIDE EMERGENCY CONTACT INFORMATION

<b>Poison Control Centres</b>		
Nova Scotia	800.565.8161 or 902.428.8161	IWK, Halifax, NS
New Brunswick	911	Ask for Poison Information
Prince Edward Island	800.565.8161 or 902.428.8161	IWK, Halifax, NS
Newfoundland	709.722.1110	Dr. Charles A. Janeway Child Health Care Centre, St. John's, NF

<b>Environmental Emergencies (Pesticide Spills)</b>	
Transport Canada Regional Operations Centre (24 hours)	
Nova Scotia	800.565.1633
New Brunswick	800.565.1633
Prince Edward Island	800.565.1633
Newfoundland	800.563.9089

## ABBREVIATIONS & CONVERSIONS

<b>Formulation and Measurement Abbreviations</b>			
FORMULATIONS		MEASUREMENTS	
DF	Dry flowable	mL	millilitre
EC, E	Emulsifiable concentrate	kPa	kilopascal
L	Liquid	kg	kilogram
Sn / Su	Suspension	g	gram
WP/W	Wettable powder	L	litre
		BIU	Billions of International Units
		ppm	parts per million (1000 ppb)
		ppb	parts per billion (1/1000 ppm)

<b>Helpful Conversions<sup>1</sup></b>	
kPa X 0.14 = pounds per square inch (psi)	millilitres X 0.035 = fluid ounces
hectares X 2.47 = acres	litres X 35 = fluid ounces
kilograms X 2.2 = pounds	litres X 0.22 = imperial gallons
kilograms per hectare X 0.89 = pounds per acre	litres per hectare X 14.17 = fluid ounces per acre
kilograms per hectare X 0.40 = kilograms per acre	litres per hectare X 0.40 = litres per acre
	degree-days C X 1.8 = degree-days F

<sup>1</sup> **Pesticide Units of Measurement**

It is not recommended to convert label rates to imperial units because there is a high probability of mathematical and rounding errors. Present day pesticides are formulated to be more effective in smaller amounts. Therefore, even small conversion errors can lead to the use of incorrect rates (either too high or too low). Use metric – you will be glad you did!