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EXTENSION AND ADVISORY TEAM

GUIDE TO PEST MANAGEMENT IN PUMPKIN & SQUASH

Nova Scotia Vegetable Crop Guide to Pest Management 2021
[PUM1-21]



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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
WEEDS:							
Preplant <i>Perennial weeds including quackgrass</i>	9	Glyphosate	Roundup Transorb HC	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 (1.67-4.67 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. Allow 3 or more days after treatment before tillage. Best control of quackgrass is obtained when these herbicides are applied in the fall.
			Roundup WeatherMAX	1.67-4.67 L/ha			
			Touchdown Total	1.8-5.0 L/ha			
	14	Carfentrazone-ethyl	Aim EC	36.5-117 mL/ha	-	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.
Preemergence <i>Germinating annual grasses and some broadleaves</i>	3	Chlorthal dimethyl	Dacthal W-75	9.0-15.5 kg/ha	12 hours	-	Do not use on Pumpkins. Apply when plants have 4-5 true leaves but before weed seed germination (prior cultivation may be required).
	13	Clomazone	Command 360 ME	0.78-1.17 L/ha	12 hours	30	Apply as a pre-emergent application before emergence of the crop or weeds. Apply in 95-375 L/ha of spray volume. Apply low rate on coarse soils, high rate on fine textured soils. Do not apply on sandy soils. Apply once per season. Do not incorporate. Do not use on Jack-O-Lantern pumpkins or the following cultivars as unacceptable whitening of the fruit may occur: NK530, NK580, Turks Turban, Golden Delicious, all

Preemergence							Banana Types, and all other <i>Cucurbita maxima</i> that have a pink or burnt coloration at harvest.
<i>Germinating annual grasses and some broadleaves</i>	15	Napropamide	Devrinol DF	2.24-4.5 kg/ha	12 hours	-	Use on direct seeded pumpkin and squash only. 1 application per season.
	15	S-Metolachlor and R-enantiomer	Dual II Magnum or Komodo	1.15 L/ha	12 hours	30	One application per year. Can be applied before weed emergence, pre-emergence or early post emergence of direct seeded crop (1-2 leaf stage). Apply pre-transplant or within 48 hours of transplanting. Risk of crop injury with application of this herbicide.
Postemergence <i>Inter-row shielded</i>	14	Carfentrazone-ethyl	Aim EC	36.5-117 mL/ha	-	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.
	22	Diquat	Reglone, Dessicash	2.3-4.6 L/ha	24 hours	-	Do not spray solution on the crop plant since it could be injured or killed. Use gramoxone for best control of grasses.
		Paraquat	Gramoxone®	2.75-5.5 L/ha	24 hours	-	
26	Pelargonic acid	Belouhka NEW 2021	12 – 20 L/ha	Until Dry	1	Use a directed or shielded sprayer to avoid damage to crop. Apply in 200 – 300 L of water/ha. Do not make more than 4 applications per season. Subsequent applications should be made on a 7–14-day interval when pressure warrants re-application.	
<i>Grass weeds</i>	1	Sethoxydim	Poast Ultra plus Merge	0.32-1.1 L/ha 1-2 L/ha	12 hours	30	Apply to actively growing grasses at the 1-6 leaf stage.
Direct-seeded and Transplant. <i>Broadleaf weeds & nutsedge</i>	2	Halosulfuron	Sandea WG	35-52.5 g/ha	12 hours	30	<u>See label for application instructions and timing.</u> Max. 2 applications per season.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
INSECTS:							
Cucumber Beetle and Flea Beetle	1A	Carbaryl	Sevin XLR	2.5 L/ha	12 hours (low contact) 2 day (high contact activities)	5	Do not apply when field is in bloom or adjacent fields are in bloom. Max. 2 applications per year.
	4	Imidacloprid	Admire 240	Soil: 18 ml/100m row	24 hours	21	Cucumber Beetle. Apply in furrow on or below seed in 200 L/ha or as a narrow surface band over seeding line. Max. 1 application/season. Use on cucumber beetles expires April 11, 2022.
				Transplant: 25 ml/1000plants			Cucumber Beetle. Apply into planting hole before planting. Apply dosage in 150 ml of planting water per plant. Do not use on pickling cucumbers. Use on cucumber beetles expires April 11, 2022.
	NC	Kaolin	Surround WP	12.5-25 kg/ha	-	0	Suppression of cucumber beetle. Apply at 5–7-day intervals, starting prior to infestation of adult beetles, with the first two applications 3 days apart. Maximum 5 applications/yr.
	3	Lambda-cyhalothrin	Matador 120 EC or Labamba, Warrior	187-233 ml/ha	48 hours	1	Cucumber beetle. Base timing and frequency of applications upon insect populations reaching locally determined economic thresholds. Reapply after a minimum of 7 days if monitoring indicates it is necessary. Max. 3 applications per year, apply in 100-200 L of water /ha. Also controls Squash bug.
3, 28	Lambda-cyhalothrin, chlorantraniliprole	Voliam Xpress	500 mL/ha	24 hours	1	Max. 3 applications per growing season. Do not make a foliar application for a minimum of 60 days following an in-furrow or soil application or planting of seed treated with any Group 28 insecticide.	

Cucumber Beetle and Flea Beetle	28	Cyclaniliprole	Harvanta 50SL NEW 2021	1.2 L/ha	12 hours	1	Suppression of cucumber beetles. Avoid applying another Group 28 insecticide consecutively >2 times within a 30-day period. Make no more than 3 applications per crop per year. Minimal interval between treatments is 7 days. TOXIC to bees. Avoid application during the crop blooming period. If applications must be made during the crop blooming period, restrict applications to the EVENING AFTER FLOWER PETALS HAVE CLOSED
	28	Cyclaniliprole	Cyclaniliprole 50SL NEW 2021	1.2 L/ha	12 hours	1	Suppression of cucumber beetles. Avoid applying another Group 28 insecticide consecutively >2 times within a 30-day period. Make no more than 3 applications per crop per year. Minimal interval between treatments is 7 days. TOXIC to bees. Avoid application during the crop blooming period. If applications must be made during the crop blooming period, restrict applications to the EVENING AFTER FLOWER PETALS HAVE CLOSED
Aphids	1B	Malathion	Malathion 500 E	1.4-3 L/ha	1 day	3	Do not apply to cucurbits unless plants are dry. Max. 1 application per season.
	29	Flonicamid	Beleaf 50SG	0.12-0.16 kg/ha	12 hrs	0 days	Thorough spray coverage of plant foliage is essential. Minimum of 94 L of water/ha. Max. 3 applications per season, allow 7 days between applications. Avoid overnight storage of spray mixtures, do not use liquid fertilizer as a carrier and do not use adjuvants.
	28	Cyantraniliprole	Exirel	500-1500 ml/ha	12 hours	1	Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. For optimum control, apply Hasten NT Spray Adjuvant* at an application rate of 0.25% v/v or MSO Concentrate with Leci-Tech* at an application rate of 0.5% v/v. Make no more than 4 applications/season.

Aphids and Whiteflies	4D	Flupyradifurone	BYI 02960 NEW 2021	<u>Aphids (foliar):</u> 500-750 mL/ha <u>Whitefly (foliar):</u> 750-1000 mL/ha	12 hours	1 (foliar) 21 (soil)	Foliar: Apply as a directed spray ensuring thorough coverage. Minimum interval between application is 7 days. Minimum ground application volumes: 100 L/ha. Soil: See label for soil application rate. Apply specified dosage via 1). Chemigation into root-zone through low-pressure drip, trickle, micro-sprinkler, or equivalent equipment. Do not apply via irrigation system. 2). Injection below the eventual seed-line prior to planting. Maximum allowed per crop season, regardless of application method: 2000 mL/ha.
	23	Spirotetramat	Movento 240 SC	220-365 ml/ha	12 hours	1	Minimum of 7 days between applications. Maximum of 730 ml/ha of product applied/season. Movento is TOXIC to bees through direct contamination of pollen and nectar. DO NOT apply during crop flowering period or when flowering weeds are present in the field.
			Movento 150 OD	347-585 ml/ha	12 hours	1	Minimum of 7 days between applications. Maximum of 1.17 L/ha of product applied per season. TOXIC to bees through direct contamination of pollen and nectar. DO NOT apply during crop flowering period or when flowering weeds are present in the field.
	9D	Afidopyropen	Versys	0.1-0.5 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.

Aphids and Whiteflies	NC	Potassium salts of fatty acids	Kopa Insecticidal Soap	8L in 400L water, 700-1900 L/ha solution	-	0	Do not spray when plants are under stress. Avoid spraying in full sun. spray early in the morning or in the evening when it is overcast.
Cutworms	1A	Carbaryl	Sevin XLR	2.5 L/ha	12 hours (low contact activities) 2 days (high contact activities)	5	Climbing cutworms. Do not apply when field is in bloom or adjacent fields are in bloom. Max. 2 applications per year.
	6, 28	Abamectin, cyantraniliprole	Minecto Pro	385-556 mL/ha	12 hours	7	Apply with a non-ionic surfactant. 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. Thorough coverage is important to obtain optimum control.
	28	Cyantraniliprole	Exirel	500-750 ml/ha	12 hours	1	Begin applications when treatment thresholds are reached. Thorough coverage is important to obtain optimum control. 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. Max. 4 applications/season.
Mites	1B	Malathion	Malathion 500 E	1.4-3 L/ha	1 day	3	Do not apply to cucurbits unless plants are dry. Max. 1 application per season.
	6, 28	Abamectin, cyantraniliprole	Minecto Pro	385-670 mL/ha	12 hours	7	Apply with a non-ionic surfactant. Apply when mites are first observed and repeat application, as needed, to maintain control within constraints of a sound resistance management program. Thorough coverage is important to obtain optimum control.

Mites	23	Spiromesifen	Oberon	500-600 ml/ha	12 hours	1	Max. 3 applications/season. Minimum application volume of 100 L/ha. Also controls whiteflies (including silverleaf, sweetpotato and greenhouse) See label for buffer zone restrictions.
	25	Bifenzate	Acramite 50WS	851 g / ha (15 pouches/4ha)	12 hours	3	Two Spotted Spider Mite. Minimum of 500 L/ha water to ensure thorough leaf coverage. Keep product dry prior to use.
	NC	Purespray Green Spray Oil 13E	Mineral oil	10 L in 1000 L water (1% solution) otherwise phytotoxicity may result.	12 hours	-	Suppression. 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. Apply no more than 8 summer spray applications per growing season.
	20B	Acequinocyl	Kanemite 15SC	2.07 L/ha	12 hours	1	Summer squash: Two-Spotted Spider and Broad Mite. Apply as a full coverage spray to the foliage to drip as soon as mite population reaches economic infestation levels. Allow a minimum of 21 days between applications.
Brown Marmorated Stink Bug	4A	Clothianidin	Clutch 50WDG or Clothianidin	210 g/ha	12 hours	7	Suppression only. Apply when target pest threshold populations are observed. Do not wait until population beyond threshold has been established. Monitor pest populations and make repeat applications at a minimum interval of 7 days if monitoring indicates that they are necessary. Max. 2 applications per season. <i>This product is toxic to bees exposed to direct treatment or residues on blooming crops. Do not apply during bloom or when bees are present.</i>

Cabbage looper	18	Methoxyfenozide	Intrepid	0.3 – 0.6 L/ha	12 hours	3	Apply at the first sign of feeding damage or when infestations reach threshold levels as determined by monitoring. Repeat applications after 7-14 days if required based on population monitoring. Use the higher rate for heavy infestations or advanced growth stages of the target pest.
	28	Cyantraniliprole	Exirel	250-500 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.
Squash Bug Nymphs, Tarnished Plant Bug Nymphs	4A	Clothianidin	Clutch 50WDG or Clothianidin	140 g/ha	12 hours	7	Suppression only. Apply when target pest(s) threshold populations are observed. Do not wait until population beyond threshold has been established. Monitor pest populations and make repeat applications at a minimum interval of 7 days if monitoring indicates that they are necessary. Max. 2 applications/season.
	1A	Carbaryl	Sevin XLR	2.5 L/ha	48 hours (hand-line irrigation) 12 hours (other)	5	Squash bug: Apply for thorough coverage when insects or damage appear. To avoid possible injury on tender foliage, do not apply when foliage is wet or when rain or excessive humidity is expected during the next 2 days.
	3	Lambda cyhalothrin	Warrior/Matador 120 EC or Labamba	187-233 ml/ha	24 hours	1	Squash bug. Timing and frequency of applications should be based upon insect populations reaching locally determined economic thresholds. Reapply after a minimum of 7 days if monitoring indicates it is necessary. Max. 3 applications per growing season.
	3-28	Lambda cyhalothrin-Cyantraniliprole	Voliam Xpress	500 ml/ha	24 hours	1	Timing and frequency of applications should be based upon insect populations reaching locally determined economic thresholds. Reapply after a minimum of 5 days if monitoring indicates it is necessary. Max. 3 applications/season.

Armyworm Fall armyworm	28	Cyantraniliprole	Exirel	500 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.
Corn earworm				750 ml/ha			
Dipteran leafminers (larvae)				750-1000 ml/ha			

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
DISEASES:							
Alternaria blight	7	Boscalid	Cantus WDG	460 g/ha	12 hours	0	Max. 4 applications/yr. Do not make more than 2 applications before rotating to a different fungicide group.
	M3	Mancozeb	Dithane DG Rainshield	1.1-3.25 kg/ha	24 hrs	14	Start applications when runners begin to form or at first sign of disease, repeat on weekly intervals.
	M		Manzate Pro-Stick	1.1-3.25 kg/ha			
	11	Pyraclostrobin	Cabrio EG	560-840 g/ha	12 hours	3	Max. 4 applications/yr. Do not make more than 1 application before rotating to a different fungicide group.
	M1	Copper	Cueva	0.5% to 2% solution, applied at 470-940 L/ha.	4 hours	1	Re-apply using 5–10-day intervals.
	7	Benzovindiflupyr	Aprovia	500-750 ml/ha	12 hours	1	Begin applications prior to disease development; continue throughout season on a 7-day interval. 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

Alternaria blight							broadcast foliar spray in a minimum of 150 L/ha of water for thorough coverage.
	7-3	Benzovindiflupyr & Difenconazole	Aprovia Top	761-967 ml/ha	12 hours	1	Begin applications prior to disease development and continue throughout the season on a 7-day interval. 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.
	7, 3	Pydiflumetofen, difenoconazole	Miravis Duo	1 L/ha	12 hours	0	Apply on a 14-day interval, starting prior to disease establishment. Apply as a broadcast spray in sufficient water (minimum of 150 L/ha) for thorough coverage. Max. 2 applications per season.
	7, 11	Pyraclostrobin & Fluxapyroxad	Merivon NEW 2021	0.4 L/ha	12 hours 3 days (hand harvesting, thinning, pruning, turning)	0	Begin applications prior to onset of disease development. Use the higher rate, where applicable, when disease pressure is high. Subsequent applications may be applied if disease persists, or weather conditions are favourable for disease development. DO NOT apply to cucurbit vegetables as a tank mix with any other pesticide products (including fungicides, insecticides, herbicides), adjuvants, liquid fertilizers, nutrients, any other additives, or anything other than water.
Anthracnose and Downy Mildew	M	Chlorothalonil	Bravo ZN	3.2 L/ha	12 hours	2	Repeat on 7-day intervals. Also controls scab when applied at a rate of 4.8 L/ha.
			Echo 90DF	1.8 kg/ha	48 hours	1	Anthracnose. Also controls scab when applied at a rate of 2.7 kg/ha. Not for Downy Mildew. Begin applications when plants are in first true leaf stage or when conditions are favourable for disease development and repeat at 7-day intervals. Under severe conditions, shorten the
			Echo 720	2.2 L			

Anthracnose and Downy Mildew							spray interval. DO NOT make more than 2 applications per season.
	M	Copper sulfate	Copper 53W	2.5-3 kg/ha	48 hours	2	Apply in 1000 L of water per ha. Max. 5 applications per year.
	M3	Mancozeb	Dithane DG Rainshield	1.1-3.25 kg/ha	24 hours	14	Start applications when runners begin to form or at first sign of disease, repeat on weekly intervals.
	M		Manzate Pro-Stick	1.1-3.25 kg/ha			
	11	Pyraclostrobin	Cabrio EG	560-840 g/ha	12 hours	3	Max 4 applications/yr. Do not make more than 1 application before rotating to a different fungicide group.
	M1	Copper	Cueva	0.5% to 2% solution, applied at 470-940 L/ha.	4 hours	1	Re-apply using 5–10-day intervals.
	7	Benzovindiflupyr	Aprovia	750 ml/ha	12 hours	1	Anthracnose , Begin applications prior to disease development; continue throughout the season on a 7-day interval. 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.
	7-3	Benzovindiflupyr & Difenconazole	Aprovia Top	967 ml/ha	12 hours	1	Anthracnose , Begin applications prior to disease development; continue throughout the season on a 7-day interval. 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.
	7, 11	Pyraclostrobin & Fluxapyroxad	Merivon NEW 2021	0.4 L/ha	12 hours (mechanical harvesting)	0	Anthracnose and Downy Mildew . Begin applications prior to onset of disease development. Use the higher rate, where applicable, when disease pressure is high.

Anthracnose and Downy Mildew					3 days (hand harvesting, thinning, pruning, turning)		Subsequent applications may be applied if disease persists, or weather conditions are favourable for disease development. DO NOT apply to cucurbit vegetables as a tank mix with anything other than water. Max. 3 applications per year.
	19	Polyoxin D Zinc Salt	Diplomat 5SC	463-926 ml/ha	When dry	0	Suppression of Downy mildew, control of Anthracnose. 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 (anthracnose) or 5-8-day (downy mildew) interval as needed to maintain control.
Downy Mildew	44	<i>Bacillus subtilis</i>	Serenade Opti	0.6-1.7 Kg/ha	-	0	Biopesticide that will only suppress the indicated diseases. 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 fungicides.
	21	Cyazofamid	Torrent 400SC and Sylgard 309 (organosilicone surfactant)	0.15-0.2 L/ha 0.15 L/ha	12 hours	1	Do not make sequential applications of Cyazofamid or products within the same group. Apply in 200 – 600 L water/ha on a 7–10-day schedule beginning at initial flowering or when disease conditions are favorable but prior to an outbreak. Plant back interval 30 days.

Downy Mildew	11	Fenamidone	Reason 500 SC	400 ml/ha	When dry	14	Begin application as soon as crop and/or environmental conditions become favourable for disease development. Apply in 300-600 L/ha on a 5–10-day interval. Max. 4 applications per year. Plant back interval of 30 days. Do not apply more than 1 application of Reason 500 SC or any other Group 11 fungicide before alternating with a fungicide from a different Group.
	40	Mandipropamid	Revus plus Non-ionic adjuvant	400-600 ml/ha plus 0.25% v/v	12 hours	0	Suppression of Downy mildew. Begin applications prior to disease development and continue throughout the season on a 7-10-day schedule, following resistance management guidelines. Max. 4 applications/year. May be tank mixed with Bravo 500 for any field cucurbits listed on that label. Follow the most restrictive use directions of either label.
	U15	Oxathiapiprolin	Zorvec Enicade	0.0875-0.35 L/ha	12 hours	0	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 or for susceptible varieties.
	43	Fluopicolide	Presidio	292 ml/ha	12 hours	2	Max. 2 applications/season. Do not make sequential applications. Begin when conditions favour disease and repeat on a 7–10-day interval. Use the higher rate and shorter interval if disease is present. Use lower rate and longer interval as preventive applications.
	40	Dimethomorph	Acrobat 50 WP	450 g/ha	2 days (hand activities) 12 hours (general)	2	Acrobat must be applied as a tank mix partner with another fungicide against downy mildew. Begin prior to disease infection and continue on a 5-10-day schedule. Do not exceed 5 applications per year. Avoid more than 2 sequential applications; the number of Group 40 applications must not exceed 50% of intended applications.

Downy Mildew	33	Mono and dibasic sodium and potassium and ammonium phosphites	Phostrol	2.9-5.8 L/ha	12 hours	1	For preventative suppression of downy mildew in cucurbits, begin foliar applications when conditions favouring disease development exist and continue on a 7–14-day interval. May be tank mixed with Bravo 500, Bravo 720, or Bravo Ultrex. Read and follow the use directions on the individual product labels. Maximum 7 applications/season.
	40,45	Ametoctradin, dimethomorph	Zampro	0.8-1.0 L/ha	Hand harvesting –1 day All other activities – 12 hours	1	To reduce the risk of the development of resistance Zampro must be used in rotation with other fungicides having a different mode of action active against downy mildew. Begin applications prior to disease development and continue on a 5-7-day interval. Max. 3 applications.
	BM02	<i>Bacillus amyloliquefaciens</i> strain MBI 600	Serifel NEW 2021	0.25 – 0.5 kg/ha	4 hours, or until dry	0	Begin applications prior to infection and continue with 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.
Powdery Mildew	44	<i>Bacillus subtilis</i>	Serenade Opti	1.7-3.3 Kg/ha	-	0	Biopesticide that will only suppress the indicated diseases. Begin applications soon after emergence or transplant when conditions are conducive for disease development. Repeat applications on an interval of 7-10 days.
		<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel LC (1x10¹⁰spores/ml)	5-12.5 L/ha Low disease pressure: 2.5-5 L/ha	When dry	0	Growth stage: Fruit formation to end of maturity of cucurbits. Repeat application every 3-10 days for as long as conditions favor disease development.
			Double Nickel 55 (5x10¹⁰spores/g)	0.5-2.5 kg/ha Low disease pressure: 0.5-1 kg/ha			

Powdery Mildew	M	Chlorothalonil	Echo 720	3.3 L/ha	12 hours	1	Begin applications at first true leaf stage and repeat on 7-day intervals. Shorten the spray interval under severe disease pressure. Max. 2 applications per season.
			Bravo ZN	4.8 L/ha	12 hours	2	
	13	Quinoxifen	Quintec	300-440 ml/ha	12 hours	3	Max. 4 applications/year. Repeat applications on 10–14-day intervals. Quintec has no curative properties and will not control established infections. Apply before visual symptoms of Powdery Mildew appear. * Note * – product is toxic to bees exposed to direct treatment, drift, or residues on crops or weeds.
	NC	Potassium bicarbonate	MilStop	2.8-5.6 kg/ha	4 hours	0	Suppression only. Maximum 10 applications/yr. Apply at 7–14-day intervals in 500-1000 L/ha spray solution. Start application at first sign of disease.
	11	Pyraclostrobin	Cabrio EG	560-840 g/ha	12 hours	3	Max. 4 applications/yr. Do not make more than 1 application before rotating to a different fungicide group.
	7	Fluopyram	Velum Prime NEW 2021	500 mL/ha	12 hours	0	Do not apply more than 500 g fluopyram/ha per year, regardless of formulation or method of application (soil or foliar). Disease pressure should be monitored throughout the growing season. Minimum 5-day interval between soil applications.
	7	Fluopyram	FPY 500 NEW 2021	500 mL/ha	12 hours	0	Do not apply more than 500 g fluopyram/ha per year, regardless of formulation or method of application (soil or foliar). Disease pressure should be monitored throughout the growing season. Minimum 5-day interval between soil applications.

Powdery Mildew	7	Penthiopyrad	Fontelis	1.25L/ha	12 hours	1	Begin applications prior to disease development; continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Max seasonal rate is 4.9 L/ha. Make no more than 2 sequential applications before switching to another mode of action.
	NC	<i>Streptomyces lydicus</i>	Actinovate SP	420g/470-800L water	4 hours	1	Spray to wet but avoid run-off. Apply as a foliar spray to leaves and blossom. Make first application when conditions are conducive to disease development and repeat every 7-14 days.
	P5	<i>Reynoutria sachalinensis</i>	Regalia Maxx	Outdoor Grown: 0.125 - 0.25% v/v in 500 - 1000 L water/ha Greenhouse: 0.125 - 0.25% v/v (1.25 - 2.50 ml/L or 500 -1000 ml per 400 L water)	When dry	0	Apply preventatively or when disease symptom 1 st appears. Repeat at 7-10-day intervals.
	NC	<i>Citric acid-Lactic acid</i>	Tivano	12-16 L/ha	4 hours	0	Begin applications when conditions are conducive to disease development. Application interval: 7-10 days.
	3	myclobutanil	Nova 40W	175 g/ha	12 hours	3	Apply at the first sign of disease development and again 10-14 days later. Apply in a minimum of 250 L water/ha. Use a maximum of 2 applications/year.

Powdery Mildew	NC	Garlic powder	Influence WP	6.9-8.0 kg/ha	When dry	0	Apply as a foliar spray on the crop to suppress the fungi in a recommended minimum dilution rate of 700 L/ha. Subsequent applications may be made every 7-14 days if symptoms persist. Maximum of 4 applications per season.
	NC	Mineral oil	Purespray Green Spray Oil 13E	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 conditions are favourable for disease development and/or when 1st symptoms appear. Apply at 7 – 14-day intervals. Do not apply more than 8 summer spray applications per growing season.
	U8	Metrafenone	Vivando SC	0.75-1.12 L/ha	12 hours	0	Begin applications prior to onset of disease. Apply at 7–14-day intervals. Use shorter interval if conditions are conducive to high disease pressure or very rapid growth to ensure new growth is adequately protected. Do not apply more than 2 sequential applications before alternating to at least one application of a fungicide with a different mode of action. Max. 3 applications/season.
	U8	Pyriofenone	Property 300SC	0.3-0.366	12 hours	0	Initiate applications prior to disease development and continue on a 7-10-day interval beginning with initial flowering or when disease conditions are favorable for disease development.
	M1	Copper	Cueva	0.5% to 2% solution, applied at 470-940 L/ha.	4 hours	1	Re-apply using 5–10-day intervals.

Powdery Mildew	7	Benzovindiflupyr	Aprovia	500-750 ml/ha	12 hours	1	Begin applications prior to disease development; continue throughout season on a 7-day interval. 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.
	7-3	Benzovindiflupyr & Difenconazole	Aprovia Top	761-967 ml/ha	12 hours	1	Begin applications prior to disease development; continue throughout season on a 7-day interval. 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.
	7, 11	Pyraclostrobin & Fluxapyroxad	Merivon NEW 2021	0.3 - 0.4 L/ha	12 hours (mechanical harvesting) 3 days (hand harvesting, thinning, pruning, turning)	0	Begin applications prior to onset of disease development. Use the higher rate, where applicable, when disease pressure is high. Subsequent applications may be applied if disease persists, or weather conditions are favourable for disease development. DO NOT apply to cucurbit vegetables as a tank mix with anything other than water. Max. 3 applications per year.
	19	Polyoxin D Zinc Salt	Diplomat 5SC	463-926 ml/ha	When dry	0	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 control.
	BM02	<i>Bacillus amyloliquefaciens</i> strain MBI 600	Serifel NEW 2021	0.25 – 0.5 kg/ha	4 hours, or until dry	0	Begin applications prior to infection and continue with 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.

Scab	M	Copper sulfate	Copper 53W	2.5-3 kg/ha	48 hours	1	Apply in 1000 L of water per ha. Max. 5 applications per year.
	M3	Mancozeb	Dithane DG Rainshield	1.1-3.25 kg/ha	24 hours	14	Start applications when runners begin to form or at first sign of disease, repeat on weekly intervals.
	M		Manzate Pro-Stick				
	M	Chlorothalonil	Bravo 500 / Bravo ZN	4.8 L/ha	48 hours	1 (500) 2 (ZN)	Begin applications when plants are in the first true leaf stage or when conditions are favourable for disease development. Repeat on 7-day intervals.
Gummy Stem Blight	7	Boscalid	Cantus WDG	460 g/ha	12 hours	0	Max. 4 applications/yr. Do not make more than 2 applications before rotating to a different fungicide group.
	M3	Mancozeb	Dithane DG Rainshield	1.1-3.25 kg/ha	24 hours	14	Start applications when runners begin to form or at first sign of disease, repeat on weekly intervals.
	M		Manzate Pro-Stick				
	11	Pyraclostrobin	Cabrio EG	840 g/ha	12 hours	3	Max. 4 applications/yr. Do not make more than 1 application before rotating to a different fungicide group.
	7	Benzovindiflupyr	Aprovia	750 ml/ha	12 hours	1	Begin applications prior to disease development; continue throughout season on 7-day interval. For best results, sufficient water volume must be used to provide thorough coverage. Apply as a broadcast foliar spray in 190 L/ha of water.
	7-3	Benzovindiflupyr & Difenconazole	Aprovia Top	967 ml/ha	12 hours	1	Begin applications prior to disease development; continue throughout season on a 7-day interval. For best results, sufficient water volume must be used to provide thorough coverage. Apply as a broadcast foliar spray in 190 L/ha of water.
	7, 11	Pyraclostrobin & Fluxapyroxad	Merivon NEW 2021	0.4 L/ha	12 hours (mechanical harvesting)	0	Begin applications prior to onset of disease development. Use the higher rate, where applicable, when disease pressure is high. Subsequent applications may be applied if

Gummy Stem Blight					3 days (hand harvesting, thinning, pruning, turning)		disease persists, or weather conditions are favourable for disease development. DO NOT apply to cucurbit vegetables as a tank mix with anything other than water. Max. 3 applications per year.
	19	Polyoxin D Zinc Salt	Diplomat 5SC	463-926 ml/ha	When dry	0	Suppression. 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; continue at 7–14-day intervals as needed to maintain suppression.
Phytophthora Blight/Crown Rot	43	Fluopicolide	Presidio	220-292 ml/ha	12 hours	2	Apply in 200-1000 L/ha. 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. Max. 2 applications allowed.
	40,45	Ametoctradin, dimethomorph	Zampro	1.0 L/ha	Hand harvesting – 1 day All other activities – 12 hours	1	In order to reduce the risk of the development of fungicide resistance Zampro must be used in rotation with other fungicides having a different mode of action active against downy mildew. Begin applications of Zampro prior to disease development and continue on a 5-7-day interval. Max. 3 applications.
	U15	Oxathiapiprolin	Orondis	Foliar phase: 0.175-0.35 L/ha Soil pase: 0.7-2.8 L/ha	12 hours	0	Foliar phase: 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. Soil phase: Apply at plant, in furrow, drip or in transplant water. See specific soil application directions on label.
			Zorvec Enicade	Foliar phase: 0.175-0.35 L/ha Soil phase: 0.7-2.8 L/ha			

Phytophthora Blight/Crown Rot			Zorvec Epicaltrin	0.35-1.4 L/ha			Phytophthora Blight – soil phase: Apply at plant, in furrow, drip or in transplant water. Use the 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 OR foliar applications but not both, to control the relevant disease.</i>
	BM02	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel LC (1x10 ¹⁰ spores/mL)	1-2.5 L/ha	When dry	0	Partial suppression of soil level Phytophthora blight infection. Growth stage: From planting/transplanting until maturity. For transplanted crops: Make preventative applications to transplants in the greenhouse or nursery before transplanting. See soil application instructions on label. 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.
			Double Nickel 55 (5x10 ¹⁰ spores/g)	0.5-2.5 kg/ha			
BM02	<i>Trichoderma asperellum</i> strain T34	Asperello T34 NEW 2021	Incorporation in the growing media: 10 g/m ³ of growing media Spray/drench: 0.5 g/m ² in sufficient water (5 L/ m ²) Chemigation after planting: 5 – 10 g/(50 – 100 L of water per	4 hours	0	Greenhouse cucurbit vegetables and transplants. Partial suppression of crown rot. See label for specific instructions pertaining to each application type.	

Phytophthora Blight/Crown Rot				m ³ of growing media)			
Grey Mold	7	Penthiopyrad	Fontelis	1-1.5 L/ha	12 hours	1	Begin applications prior to disease development, continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Maximum seasonal rate is 4.9 L/ha. Do not make more than 2 sequential applications before switching to another mode of action.

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

Poison Control Centres		
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

Environmental Emergencies (Pesticide Spills)	
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

Formulation and Measurement Abbreviations			
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)

Helpful Conversions¹	
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

¹ **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!