Extension and Advisory Team

Pumpkin & Squash Management Schedule

A guide to weed, insect and disease management in pumpkins and squash in Nova Scotia

2018

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GUIDE TO PEST MANAGEMENT IN PUMPKIN & SQUASH

Nova Scotia Vegetable Crop Guide to Pest Management 2018
[PUM1-18]

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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.**

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 containers.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
WEEDS:							
Preplant *Perennial weeds including quackgrass*	9	Glyphosate	**Roundup Original**	2.5-7.0 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 (2.5 L/ha) will provide a minimum of one season control, while higher rates (4.75 to 7 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 with fall application of these herbicides.
			Roundup WeatherMAX	1.67-8.0 L/ha			
			Touchdown® 480	2.5-7.0 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 *Stale Seedbed technique*	22	Diquat	**Reglone, Dessicash**	2.3-4.6 L/ha	24 hours	-	Apply in 300 – 1100 L of water/ha to foliage of emerged weeds but 3 days before the crop has emerged.
		Paraquat	**Gramoxone®**	2.75-5.5 L/ha	24 hours	-	
Preemergence *Germinating annual grasses and some broadleaves*	3	Chlorthal dimethyl	**Dacthal W-75**	9.0-15.5 kg/ha	-	-	**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	45	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 Banana Types, and all other *Cucurbita maxima* that have a pink or burnt coloration at harvest.
	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**	1.15 L/ha	12 hours	30	**One application per year.** Can be applied before weed emergence, pre-emergence or early post emergence of the crop (1-2 leaf stage). **Risk of crop injury with application of this herbicide.**
Postemergence *Inter-row shielded*	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	-	
Grass weeds	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 *Broadleaf weeds & nutsedge*	2	Halosulfuron ***NEW 2018***	**Sandea WG**	35-52.5 g/ha	12 hours	30	***See label for application instructions and timing.***

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 Plus**	2.5 L/ha	12 hours (hand harvest) 2 day (high contact activities)	5	Do not apply when field is in bloom or adjacent fields are in bloom.
	4	Imidacloprid	**Admire 240**	Soil: 18 ml/100m row	24 hours	21	Apply in furrow on or below seed in 200 L/ha or as a narrow surface band over seeding line. Max 1 application/season.
				Transplant: 25 ml/1000plants	24 hours	21	Apply into planting hole before planting. Apply dosage in 150 ml of planting water per plant.
	-	Kaolin	**Surround WP**	12.5-25 kg/ha	-	0	Cucumber beetle control only. 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, Warrior**	187-233 ml/ha	48 hours	1	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 beetle.**
Aphids	1B	Malathion	**Malathion 500 E**	1.8 L/ha	1 day	3	Do not apply to cucurbits unless plants are dry.
	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	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.**
Cutworms	1A	Carbaryl	**Sevin XLR Plus**	2.5 L/ha	12 hours (hand harvest) 2 days (high contact activities)	5	Do not apply when field is in bloom or adjacent fields are in bloom. Climbing cutworms only.
	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. Maximum of 4 applications/season.
Mites	3	Dicofol	**Kelthane 50 W**	1.0-1.25	-	7	Maximum 1 application/yr.
	1B	Malathion	**Malathion 500 E**	1.4-3 L/ha	1 day	3	Do not apply to cucurbits unless plants are dry.

	23	Spiromesifen	**Oberon**	500-600 ml/ha	12 hours	7	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	Use for Two Spotted Spider Mite. Minimum of 500 L/ha water to ensure thorough leaf coverage. **Keep product dry prior to use.**
	-	Purespray Green Spray Oil 13E	**Mineral oil**	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. 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 ***NEW 2018***	**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	1B	Malathion	**Malathion 85E**	880 mL/ha	1 day	3	Ensure sufficient water volume is used to guarantee thorough coverage. Use a minimum of 500 L water/ha. Apply prior to harvest when treatment thresholds have been reached, as determined by local monitoring.
	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. *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.*
Cabbage looper	18	Methoxyfenozide	**Intrepid 240F**	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.
Cucumber Beetles, Squash Bug Nymphs, Tarnished Plant Bug Nymphs	4A	Clothianidin	**Clutch 50WDG** **or** **Clothianidin**	210 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**	187-233 ml/ha	24 hours	1	**Squash bug & Striped cucumber beetle.** 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:							
Pythium **damping-off**	4	Metalaxyl-M and S-isomer	**Apron XL LS**	20–40 ml / 100kg of seed	-	-	One application as a seed treatment.
Alternaria **Leaf spot**	7	Boscalid	**Cantus WDG**	460 g/ha	12 hours	0	Maximum 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 broadcast foliar spray in a minimum of 150 L/ha of water for thorough coverage.
	7-3	Benzovindiflupyr & Difenoconazole	**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.

***Anthracnose* and Downy Mildew**	M	Chlorothalonil	**Bravo 500 / Bravo ZN**	3.2 L/ha	48 hours	1 (500) 2 (ZN)	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	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 spray interval. DO NOT make more than 8 applications per season.
			Echo 720	3.3 L 2.2 L for Anthracnose			Also controls scab.
	M	Copper sulfate	**Copper 53W**	2.5-3 kg/ha	48 hours	2	Apply in 1000 L of water per ha.
	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 & Difenoconazole	**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.

Downy Mildew	-	*Bacillus subtilis*	**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	**Maximum 6 applications/crop/year. Do not make sequential applications of Cyazofamid or products within the same group.** Apply in 200 – 600 L water/ha. Apply on a 7-10 day schedule beginning at initial flowering or when disease conditions are favorable but prior to an outbreak. A plant back interval of 30 days is required.
	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.** Applications should begin prior to disease development and continue throughout the season on a 7-10 day schedule, following resistance management guidelines. Max 4 applications/year. M**ay 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 to 14 day interval. Use higher rate and shorter interval when disease pressure is high or for susceptible varieties.

	43	Fluopicolide	**Presidio**	220-292 ml/ha	12 hours	2	Max 4 applications/season. Do not make more than 2 sequential applications. Begin when conditions favour disease and repeat on a 7-14 day interval. Must be tank-mixed with a labelled rate of another fungicide registered for the target pathogen, but with a different mode of action for resistance management. Apply in a tank mix with Bravo 500. Follow the most restrictive use directions of either label. Make foliar applications on a 7-10 day schedule beginning with initial flowering, or when disease conditions are favourable, but prior to disease development. 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	2	**Acrobat must be applied as a tank mix partner with another fungicide against downy mildew and Phytophthora blight**. 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.
	33	Mono and dibasic sodium and potassium and ammonium phosphites	**Phostrol**	2.9-5.8 L/ha	-	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. Maximum 3 applications.

	21	Cyazofamid	**Torrent 400SC** and **Sylgard 309 (organosilicone surfactant)**	0.15-0.2 L/ha 0.15 L/ha	12 hours	1	Apply in 200-600 L of water/ha. Apply on a 7-10 day schedule. Do not make sequential applications. Maximum 6 applications per season.
	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	-	*Bacillus subtilis*	**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.
	44	*Bacillus amyloliquefaciens* strain D747	**Double Nickel LC ($1x10^{10}$spores/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 to 10 days for as long as conditions favor disease development.
			Double Nickel 55 ($5x10^{10}$spores/g)	0.5-2.5 kg/ha Low disease pressure: 0.5-1 kg/ha			
	M	Chlorothalonil	**Echo 720**	3.3 L/ha	48 hours	1	Begin applications at first true leaf stage and repeat on 7 day intervals. Shorten the spray interval under severe disease pressure. Max 7 applications per season.
			Bravo ZN	4.8 L/ha	48 hours	2	
	13	Quinoxyfen	**Quintec**	300-440 ml/ha	12 hours	3	Maximum 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. <u>* Note *</u> –** *product is toxic to bees exposed to direct treatment, drift, or residues on crops or weeds.*
	-	Potassium bicarbonate	**MilStop**	2.8-5.6 kg/ha	4 hours	0	Maximum 10 applications/yr. Apply at 7-14 day intervals in 500-1000 L/ha spray solution. Start application at first sign of disease. **Suppression only!**

	11	Pyraclostrobin	**Cabrio EG**	560-840 g/ha	12 hours	3	Maximum 4 applications/yr. Do not make more than 1 application before rotating to a different fungicide group.
	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.
	-	*Streptomyces lydicus*	**Actinovate SP**	420-470g /800L water	4 hours	1	Spray to wet but avoid run-off. Apply as a foliar spray to leaves and blossom. Make first application at transplant and repeat every 7-14 days.
	-	*Reynoutria sachalinensis*	**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)	-	Can be applied up to and including day of harvest	Apply preventatively or when disease symptoms 1st appear. Repeat at 7-10 day intervals.
	-	*Citric acid-Lactic acid*	**Tivano**	8% dilution in water solution Foliar spray volume: 500-700 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.
	-	Garlic powder	**Influence WP**	6.9-8.0 kg/ha	-	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.

	-	Purespray Green Spray Oil 13E	**Mineral oil**	10 L in 1000 L water (1% solution) otherwise phytotoxicity may result.	-	-	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 to 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.
	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 & Difenoconazole	**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.

	19	Polyoxin D Zinc Salt ***NEW 2018***	**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 and continue on a 7-14 day interval as needed to maintain control.
Scab	M	Copper sulfate	**Copper 53W**	2.5-3 kg/ha	48 hours	1	Apply in 1000 L of water per ha.
	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			
	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	Maximum 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**	1.1-3.25 kg/ha			
	11	Pyraclostrobin	**Cabrio EG**	840 g/ha	12 hours	3	Maximum 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	*Cercospora leaf spot, Gummy stem blight.* 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 a minimum of 150 L/ha of water for thorough coverage. To control Gummy stem blight use 190 L/ha of water.
	7-3	Benzovindiflupyr & Difenoconazole	**Aprovia Top**	967 ml/ha	12 hours	1	*Cercospora leaf spot, Gummy stem blight.* 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 a minimum of 150 L/ha of water for thorough coverage. To control Gummy stem blight use 190 L/ha of water.
	19	Polyoxin D Zinc Salt ***NEW 2018***	**Diplomat 5SC**	463-926 ml/ha	-	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 control.
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. Maximum 2 applications allowed.
	40	Dimethomorph	**Acrobat 50 WP**	450 g/ha	2 days	2	**Acrobat must be applied as a tank mix partner with another fungicide against downy mildew and Phytophthora blight**. Begin prior to disease infection and continue on a 5-7 day schedule under high pressure, 7-10 day schedule when disease pressure is low. 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.
	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. Maximum 3 applications.
	U15	Oxathiapiprolin	**Orondis**	0.35-1.4 L/ha	12 hours	0	**Phytophthora blight-soil phase**. 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.

			Zorvec Enicade	Foliar phase: 0.175-0.35 L/ha Soil phase: 0.7-2.8 L/ha			**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 Epicaltrin ***NEW 2018***	0.35-1.4 L/ha	12 hours	0	**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. **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.*
	44	*Bacillus amyloliquefaciens* 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			
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
DG	Dry granule	kPa	kilopascal
EC, E	Oil-based emulsifiable concentrate	kg	kilogram
EG	Water dispersible granule	g	gram
WDG	Wettable dry granule	L	litre
WP, W	Wettable powder	BIU	Billions of International Units
Sn	Solution	ppm	parts per million (1000 ppb)
		ppb	parts per billion (1/1000 ppm)

Helpful Conversions[1]	
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!