

2023



EXTENSION AND ADVISORY TEAM

SPRAY GUIDE FOR HOPS

Nova Scotia Vegetable Crop Spray Guide 2023
[HOP1-23]



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LIABILITY STATEMENT

Recommendations in this guide are given for general information only and do not give the user the right to use a product in a manner not in accordance with the pesticide label or Pest Control Products Act. Perennia, by funding and printing this publication, and the editors/authors, do not offer any warranty or guarantee and do not assume any liability for crop loss, animal loss, health, safety, or environmental hazard caused by the use of any pesticide, advice, or recommendation in this schedule. Pesticides used in this schedule are products labeled for the target and crop. This information was retrieved from the Pest Management Regulatory online of Registered Products Database. The list of products presented in this schedule is intended to be complete, based on products known to be available in the region, but in no way is guaranteed to be complete. Some of the products listed may not be available. Trade names are given as a convenience to producers and are neither an endorsement of the product nor a suggestion that similar products are not available or effective.

CONTENTS

LIABILITY STATEMENT.....	1
PESTICIDE EMERGENCY CONTACT INFORMATION	3
ABBREVIATIONS AND CONVERSIONS	3
GUIDE TO WEED MANAGEMENT.....	4
GUIDE TO INSECT MANAGEMENT	6
GUIDE TO DISEASE MANAGEMENT	11

PESTICIDE EMERGENCY CONTACT INFORMATION

Poison Control Centres		
Nova Scotia	800.565.8161 or 902.470.8161	IWK, Halifax, NS
New Brunswick	911	Ask for Poison Information
Prince Edward Island	800.565.8161 or 902.470.8161	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 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!

Pest	Group	Active Ingredient	Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks
WEEDS:							
Pre-emergence <i>Soil applied</i>	14	Flumioxazin	Chateau	280-420 g/ha	12 hours	30	Do not allow spray to contact green stem (unless used for sucker control), foliage, flowers, or cones, or unacceptable injury may occur. Do not use with an adjuvant. Do not apply to fine-textured soils. Use an appropriate water volume to ensure thorough coverage. Pre-emergence weed control: Apply as a 30-45 cm (1-1.5 ft) band to each side of the hop row. Apply to dormant hops in the fall to ensure time for rain incorporation and activation. If weeds are emerged at the time of application, tank mix Chateau with a labeled burndown herbicide, such as carfentrazone-ethyl, to assist with control of emerged weeds. Do not mow or rake over treated areas, as dust created by mowing may drift to sensitive crops or vegetation, resulting in injury. Sucker control: Apply as a directed application after hops have reached a minimum of 1.8m (6 ft) in height for sucker control. Application should be directed to the lower 0.6m (2 ft) of the hops.
			Chateau EZ	298 - 448 mL/ha			
	29	Indaziflam	Alion 200 SC	375 ml/ha	12 hours	120	
			Indaziflam 200 SC				
			Indaziflam 500 SC	150 ml/ha			

Pest	Group	Active Ingredient	Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks
Post-emergence <i>Grass weeds</i>	1	Clethodim	Centurion EC + Amigo 0.5-1% v/v	0.19-0.38 L/ha	12 hours	21	Apply a maximum of one application per year. Apply as a broadcast spray directed to the ground.
			Select EC + Amigo 0.5-1% v/v				Apply a maximum of one application per season, using ground equipment. Apply as a broadcast spray directed to the ground. Apply in a minimum spray volume of 110 litres of water per hectare.
		Sethoxydim	Poast Ultra + Merge (adjuvant)	0.32-1.1 L/ha	12 hours	180	For post emergence control of annual grasses, wild oats, volunteer cereals and quackgrass. Merge Adjuvant must be applied to all applications of Poast Ultra.
Post-emergence <i>Broadleaf weeds</i>	14	Carfentrazone-ethyl	Aim EC + Agral 90 or Ag-Surf or Merge (adjuvant)	150 mL/ha	12 hours	7	Extreme caution must be taken during application to avoid upward drift of the spray solution and contact with the highly susceptible new growth. <i>Suggested use of inter-row shields or hooded sprayers to prevent drift.</i> Avoid applications until newly trained vines have developed sufficient barking to avoid damage to the stem and are high enough up the string to avoid contact with the apical bud. Sucker management: Direct application on lower 45 cm of plant and to the sucker mat. Maximum 2 applications per year.
Post-emergence <i>Grasses and Broadleaf weeds</i>	NS	Acetic Acid	Serene NEW 2023	179-219.5 L/ha	When residue is dry	-	Apply as a uniform band or spot application directed at weeds on the ground between the crops. Use hooded or shielded application equipment. Do not spray the crop directly. Do not apply it when plants are under stress. Retreatment is required for regrowth of weeds.

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Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)
INSECTS:								
Spider Mites Including Two-Spotted Spider Mites	6	Abamectin	Agri-Mek® 1.9% EC + non-ionic surfactant 0.25% v/v	550-1100 mL/ha for 1.8-2.5 m trellis 1000 mL/ha for trellis beyond 2.5 m	12 hours	28	DO NOT apply more than 2 applications per year. Allow 21 days between applications.	No
			Agri-Mek SC + 0.25% v/v non-ionic surfactant	½ trellis growth (1.8 – 2.5 m in height): 125 - 250 mL/ha. Beyond ½ trellis growth: DO NOT use less than 225 mL product/ ha in a min.of 950 L of water/ha.				No
	20D	Bifenazate	Acramite 50 WS	851 g/ha Equivalent to 15 pouches/4 ha	12 hours, 5 days when stripping and/or training hops	14	Only 1 application per year. Apply in at least 1000 L/ha. Ensure thorough coverage of all leaf surfaces	No
	23	Spirodiclofen	Envidor 240 SC	0.75 L/ha	2 days	21	Only 1 application per year	No

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)
Spider Mites Including Two-Spotted Spider Mites (cont.)	NS	Potassium salts of fatty acids	Kopa	8L/ha	NS	0	Avoid spraying during full sun. Commence treatment when infestation is first noticed. Thoroughly spray insect pests on plants with diluted product to wetting.	Yes
			Neudosan Commercial	8 L/ha	NS	0	Avoid spraying during full sun. Repeat every 1-2 weeks as needed.	Yes
			Opal	8 L/ha	NS	0	Apply to a maximum of 3 consecutive applications to ensure plant injury does not occur. Additional applications may be possible – see label for details.	Yes
		Mineral oil	Purespray green spray oil 13E	10 L in 1000 L water/ha	12 hours	21	Begin applications when conditions are favourable for disease development and/or when 1 st symptoms appear. Apply at 10–14-day intervals. Suppression only	Yes
Caterpillars (Hop looper, Cutworms, Armyworm, Cabbage Looper)	11	Bacillus thuringiensis, var. kurstaki	Dipel® 2X DF	Hop Looper 275-550 g/ha, European corn borer 560-1120 g/ha	4 hours	0	Apply at first sign of infestation when larvae are small. Repeat, if necessary, at 3-14 days. Apply in sufficient water to obtain thorough coverage.	Yes
		Bacillus thuringiensis subspecies kurstaki,	Bioprotec CAF	Hop Looper 1.4-2.8 L/ha European corn borer 2.8-4.0 L/ha	-	0	Apply at first signs of infestations when larvae are small. Repeat applications, according to economic threshold, as necessary to maintain control.	Yes

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)
Caterpillars (Hop looper, Cutworms, Armyworm, Cabbage Looper) (cont.)	11	Bacillus thuringiensis subspecies kurstaki	Bioprotec PLUS	Hop Looper 0.9-1.8 L/ha European corn borer 1.5-2.5 L/ha	-	0	For European corn borer, up to 3 applications per generation for a max of 6 applications/year. Allow 5-10 days between applications. Monitor for the pest and apply it at hatching before larvae bore into plant tissues. Apply with a high-volume sprayer in a min of 300 L water/ha.	Yes
		Bacillus thuringiensis subsp. Aizawai Strain ABTS-1857	XenTari WG	Hop Looper 0.5 – 1 L/ha	4 hours	0	Apply at first sign of infestation when larvae are small. Use enough spray volume to ensure thorough coverage	Yes
	28	Chlorantranilipr ole	Coragen	250-375 ml/ha Cutworms, Armyworm 250 ml/ha Cabbage Looper	12 hours	0	Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. For black cutworm control, apply it to foliage when rain is not expected in the next 24 hours. For optimal control, apply to smaller plants or when lower portions of the plant can receive adequate coverage.	No
Aphids	4D	Flupyradifurone	Sivanto Prime	0.5 – 0.75 L/ha	12 hours	21	Minimum application volume: 100 L/ha. Maximum allowed per crop season: 750 mL/ha	No
		Flupyradifurone	BYI 02960 200SL	500 – 750 mL/ha	12 hours	21	Minimum application volume: 100 L/ha. Maximum allowed per crop season: 750 mL/ha	No

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)	
Aphids <i>(cont.)</i>	23	Spirotetramat	Movento 150 OD	585 – 700 mL/ha	12 hours	7	Ground application only. Minimum interval between applications: 14 days	No	
			Movento 240 SC	365 – 435 mL/ha				No	
	29	Fonicamid	Beleaf 50 SG	0.12 – 0.16 kg/ha	31 days for stripping and training	31	Thorough spray coverage of plant foliage is essential for optimum control. Minimum 7 days between applications and no more than 3 applications per year	No	
	NS	Mineral oil	Purespray green spray oil 13E	10 L in 1000 L water/ha	12 hours	21	Begin applications when conditions are favourable for disease development and/or when 1 st symptoms appear. Apply at 10 – 14-day intervals. Suppression only	Yes	
			Potassium Salts of Fatty Acids	Kopa	8L/ha	NS	0	Commence treatment when infestation is first noticed. Thoroughly spray insect pests on plants with diluted product to wetting.	Yes
				Opal	8 L/ha	NS	0	Repeat every 1-2 weeks as needed. Apply to a max of 3 consecutive applications to ensure plant injury does not occur. Additional applications may be possible – see label for details.	Yes
			Potassium Salts of Fatty Acids	Neudosan Commercial	8 L/ha	NS	0	Avoid spraying during full sun. Repeat every 1-2 weeks as needed. Apply to a max of 3 consecutive applications to ensure plant injury does not occur. Additional applications may be possible – see label for details.	Yes

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)
Leafhoppers	NS	Kaolin	Surround® WP Crop Protectant NEW 2023	25-50 kg/ha	-	0	Begin applications at initial infestation, as determined by monitoring. To avoid a residual white film on flowers, do not apply post-bloom. Apply at 7-to-14-day intervals once initial infestation is detected by monitoring	Yes

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Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)
DISEASES:								
Alternaria cone blight	NS	Hydrogen Peroxide and Peroxyacetic acid	OxiDate® 2.0 NEW 2023	1.0-2.5 % v/v	-	0	Partial suppression. Start applications before the disease occurs or at the first sign of disease and/or when weather conditions are favorable for disease development. maximum number of applications per year is 8. Apply at 7-day spray intervals, depending upon the level of disease pressure. 5-day spray interval if disease pressure is high.	Yes
Downy Mildew	4	Metalaxyl-M and S-isomer	Ridomil Gold 480 SL	570 mL/ha	12 hours	90	Only 1 application per year. Apply as a soil drench, do not use as a foliar application.	No
	7 & 11	Boscalid and Pyraclostrobin	Pristine WG	0.105 Kg/ha	8 days handset irrigation, 46 days harvesting, 12 hours all other activities.	46	Suppression only. Begin applications prior to disease development and continue a 10–14-day interval. Use the shorter interval and the higher rate when disease pressure is high. Should be alternated with another mode of action fungicide registered for the same pest after each application. Maximum 3 applications per year. Also, for powdery mildew control.	No

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)
Downy Mildew <i>(cont.)</i>	21	Cyazofamid	Torrent 400SC	0.15 to 0.2 L/ha	12 hours	3	For downy mildew control, make applications on a 7–14-day schedule beginning when disease is first seen or when weather and downy mildew disease pressure are expected to initiate a disease epidemic. Use the low rate and long interval for preventative applications or very low disease pressure, increasing the rate and shortening the interval as disease pressure and/or fast crop development increases up to the maximum rate and shortest interval. Use water spray volume of at least 935 L/ha Should be tank-mixed with a non-ionic or organosilicone surfactant (such as Sylgard 309) at the manufacturer’s label recommendations.	No
			Cyazofamid 400SC					
	40	Mandipropamid	Revus	600 mL/ha + non-ionic Adjuvant (0.25% v/v is recommended)	12 hours	7	Post-emergent foliar broadcast treatment by ground or air. Prior to disease development and continue throughout the season on a 7–10-day interval. Use the shorter interval under high pressure or when conditions are conducive to disease. Maximum of 3 applications with no more than 2 consecutive applications. No more than 50% of the total number of sprays should be Revus.	No

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)
Downy Mildew <i>(cont.)</i>	40	Dimethomorph	Forum	450 mL/ha	Hand harvesting, 7 days. Other activities – 12 hours	7	Suppression of downy mildew. Maximum 3 applications per year and 10 days interval between applications. DO NOT use less than 200 litres of water per hectare. Do not make more than two sequential applications of Forum before alternating to another fungicide with a different mode of action.	No
	40 & 45	Ametoctradin and Dimethomorph	Zampro	0.8 - 1.0 L/ha	Hand harvesting, 7 days Other activities – 12 hours	7	Begin applications prior to disease development and continue for a 10-day interval. Use the higher rate when disease pressure is high. The addition of a spreading/penetrating adjuvant is recommended to improve disease control performance.	No
	45	Ametoctradin	Initium SC	1.2 – 1.5 L/ha	12 hours	7		No
	49 & 40	Oxathiapiprolin Mandipropamid	Orondis Ultra	0.6 L/ha	12 hours	7	Begin applications prior to disease development and continue a 7 – 10-day interval. Do not make more than 2 consecutive sprays. Maximum number of applications per crop: 3. Do not use for more than 33% of the total fungicide applications.	No
	M	Copper	Copper 53W	4-5 kg/ 1000 L	48 hours	2	Four applications at weekly intervals. Maximum 4 applications per year	Yes

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)
Downy Mildew (cont.)	P5	<i>Reynoutria sachalinensis</i>	Regalia Maxx	0.25 – 0.50% v/v (2.50 – 5.00ml/L or 1.875 – 3.75 litres of product in 750 litres of water)	When dry	0	Partial suppression of downy mildew. Apply this product preventatively when environmental conditions are conducive for disease development. Continue spraying at a minimum 7-day interval. Maximum of 8 applications per season.	Yes
			Regalia Rx	7.5L-15 L/ha	When dry	0	Apply a minimum of 750 litres of water per hectare. Apply this product preventatively when environmental conditions are conducive for disease development. Continue spraying at a minimum 7-day interval. Maximum of 8 applications per year.	Yes
	BM02	<i>Bacillus subtilis</i> Strain QST 713	Serenade® Opti™	3.3 kg/ha	4 hours	0	Partial suppression of downy mildew: Begin application when environmental conditions are conducive to disease development and repeat on 7–10-day intervals. Use the shorter application intervals under conditions of moderate to high disease pressure.	Yes
	NS	Hydrogen Peroxide and Peroxyacetic acid	OxiDate® 2.0 NEW 2023	1.0% v/v	-	0	Start applications before the disease occurs or at the first sign of disease and/or when weather conditions are favorable for disease development. maximum number of applications per year is 8. Apply at 7-day spray intervals, depending upon the level of disease pressure. 5-day spray interval if disease pressure is high.	Yes

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Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)	
Powdery Mildew	7 & 11	Fluopyram Trifloxystrobin	Luna Sensation	300-600 ml/ha	12 hours	14	Begin fungicide applications preventatively when conditions are favourable for disease. Continue as needed on a 10–14-day spray interval. Use the low rate when the vines are small and increase the rate as the vines grow. Make applications in sufficient water volume (just to the point of runoff). Thorough coverage is needed for disease control.	No	
	50	Metrafenone	Vivando SC	0.75 – 1.12 L/ha	12 hours	14	Suppression only. Maximum 2 applications per season.	No	
	NS	Potassium bicarbonate	MilStop	Sirocco <i>LAST USE 2024</i>	2.8-5.6 kg/ha	4 hours	0	Suppression only. Maximum 10 applications per year. Begin application at the first sign of disease. Repeat at 7–14-day intervals until conditions are no longer favorable for disease development.	Yes
			Yes						
		Mineral oil 99%	Purespray green spray oil 13E		10 L in 1000 L water/ha	12 hours	-	Suppression only. Begin applications when conditions are favourable for disease development and/or when 1 st symptoms appear. Apply at 10 – 14-day intervals.	Yes

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks	Permitted in some organic systems (Check with certifier)
Powdery Mildew (cont.)	NS	Canola oil	Vegol Crop Oil	1 part concentrate to 50 parts water (1L concentrate per 50L water) to make a 2% solution	-	0	Suppression powdery mildew. Initiate sprays when disease first appears. Continue sprays every 7-14 days. The 7-day application interval is recommended under moderate to high disease pressure.	Yes
			Doktor Doom Formula 420 Professional Use 3-in-1					Yes
	BM01	Tea Tree Oil	Timorex Gold	1.0 – 1.5 L/ha	4 hours	2	Suppression. Make applications preventatively or in the early stages of disease infestation for the best results. Reapply Timorex Gold throughout the growing season at 7–14-day intervals. Apply using a spray volume of 400 – 800 L/ha.	Yes
	NS	Hydrogen Peroxide and Peroxyacetic acid	OxiDate® 2.0 NEW 2023	1.0% v/v	-	0	Start applications before the disease occurs or at the first sign of disease and/or when weather conditions are favorable for disease development. maximum number of applications per year is 8. Apply at 7-day spray intervals, depending upon the level of disease pressure. 5-day spray interval if disease pressure is high.	Yes
Root rot <i>Pythium spp.</i> <i>Rhizoctonia spp.</i> <i>Fusarium spp.</i>	NS	<i>Trichoderma harzianum</i> Rifai strain KRL-AG2	RootShield® HC or WP	3-4 kg/ha in 1000 L/ha	4 hours	0	Suppression only. Drench application to potting soil or mix. Apply to the soil surface immediately around the plants.	Yes

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Grey mold <i>Botrytis cinerea</i>	7	Fluopyram	Luna Privilege	500 ml/ha	12 hours	7	Begin fungicide applications preventatively. Continue as needed on a 14-day interval. Apply maximum of 2 applications per season for Botrytis.	No
	BM01	Tea Tree Oil	Timorex Gold	1.5 – 2.0 L/ha	4 hours	2	Make applications preventatively or in the early stages of disease infestation for the best results. Reapply Timorex Gold throughout the growing season at 7–14-day intervals. Apply using a spray volume of 400 – 1200 L/ha.	Yes
	NS	Hydrogen Peroxide and Peroxyacetic acid	OxiDate® 2.0 <i>NEW 2023</i>	1.0-2.5 % v/v	-	0	Partial suppression. Start applications before the disease occurs or at the first sign of disease and/or when weather conditions are favorable for disease development. maximum number of applications per year is 8. Apply at 7-day spray intervals, depending upon the level of disease pressure. 5-day spray interval if disease pressure is high.	Yes

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/lr-re/index-eng.php>

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