

2023



EXTENSION AND ADVISORY TEAM

SPRAY GUIDE FOR GARLIC

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



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[DRY1-23]

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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	7
GUIDE TO DISEASE MANAGEMENT	10

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	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
WEEDS:							
Preplant <i>Perennial weeds including quackgrass</i>	9	Glyphosate	Roundup WeatherMAX	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 it 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.
			Touchdown Total	1.8-5.0 L/ha	12 hours	7	
	14	Carfentrazone-ethyl	Aim EC	36.5-117 mL/ha	12 hours	1	
Preemergence	3	Chlorthal dimethyl	Dacthal W-75	9.0-18.0 Kg/ha	12 hours	-	Apply at seeding or at transplanting.
		Pendimethalin	Prowl®H2O	2.2 – 3.3 L/ha	5 hours scouting and tinning otherwise 24 hours	45	Apply after the crop has emerged, up to the 4 true-leaf stage of garlic growth. Maximum of two applications per year (minimum 3 weeks interval between applications).

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
Preemergence <i>(cont.)</i>	14	Flumioxazin	Chateau EZ <i>NEW 2022</i>	298 – 448 mL/ha	12 hours	-	Apply prior to emergence of garlic, and within 3 days after planting garlic. Severe crop injury will result when soils are flooded following applications of Chateau. Apply only once per growing season. Use appropriate water volumes to ensure good spray coverage. This product will not control emerged weeds. Do not apply on soils with > 5% OM, or fine-textured soils.
	14	Flumioxazin	Chateau WDG	280-420 g/ha	12 hours	-	
	15	Napropamide	Devrinol 50 DF	2.25-4.5 Kg/ha	12 hours		Apply only one application per season.
Postemergence Grasses	1	Sethoxydim	Poast Ultra plus Merge	0.32-1.1 Kg/ha 1-2 L/ha	12 hours	50	Apply postemergence to annual grasses in the 1 to 6 leaf stage. Apply at 1.1 L/ha for quackgrass control.
		Clethodim	Select	0.38 L/ha + 0.5% v/v Amigo Adjuvant	12 hours	45	Post-emergence application when the crop is in the 1 to 4 leaf stage. One application per season.
Postemergence Broadleaf weeds	3	Pendimethalin	Prowl H₂O	2.2-3.3 L/ha 6.6 L/ha	5 days (scouting, thinning muck soils) 24 hours (all other activities)	45	Muck soils. 6.6 L/ha. After the crop has emerged, up to the 4 true-leaf stage of garlic growth. Maximum of two applications per year (minimum 3 weeks interval between applications). Mineral soils. 2.2-3.3 L/ha. Apply after the crop has emerged, up to the 4 true- leaf stage.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
Postemergence <i>Broadleaf weeds (cont.)</i>	6	bromoxynil	Pardner	1.0 L/ha	2 days (handset irrigation) 24 hours (all other activities)	58	Apply in 200 to 300 L/ha of water, early postemergence to weeds. Only one application per year.
Postemergence <i>Inter-row shielded</i>	14	carfentrazone-ethyl	Aim EC	36.5-117 mL/ha	12 hours	1	Apply in minimum spray volume of 100 L/ha. Refer to label for target weeds, buffer zones and rates. Use high flow rate nozzles to apply the highest spray volume.
	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.
Postemergence <i>Grasses and Broadleaves</i>	-	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.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks	
INSECTS								
Thrips	1B	malathion	Malathion 85E	535-1345 mL/ha	12 hours	3	Apply in enough spray volume to provide adequate coverage. Max. 1 application per year. Also controls aphids.	
	3	lambda-cyhalothrin	Matador 120 EC Or Labamba	188 mL/ha	24 hours	14	Thrips only – 3 applications per season.	
	5	spinetoram	Delegate WG	200-336 g/ha	12 hours	3	Suppression only. Water volume of 300-500 L water/ha with sufficient pressure to ensure spray solution penetrates leaf axils. Apply when thrips first appear. Use higher applications when insect pressure high or insects at advanced stage of growth. Maximum 3 applications per year with 7-10 days between treatments. Do not apply 2 consecutive applications of group 5 insecticides.	
			Spinosad	Success 480SC	218-262 ml/ha			When dry
				Entrust 80W	131-158 g/ha			
	6	Abamectin	Agri-Mek 1.9% EC	0.6-1.2 L/ha	When dry	30	Should be applied with a non-ionic surfactant to improve wetting of foliage and to smooth out spray deposits. Spreading and penetrating surfactants can improve insect control. Do not use binder or sticker-type surfactants. Max 3 applications/season.	
			Agri-Mek SC	135-270 mL/ha 0.25-0.5% v/v non-ionic surfactant	12 hours			

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
Thrips (cont.)	6 & 28	Abamectin Cyantraniliprole	Minecto Pro	778 mL/ha	12 hours	7	Apply a methylated seed oil (MSO) surfactant at an application rate of 0.25% v/v. Apply in a thrips management program and when thrips are at economic threshold. Do not use as a rescue treatment.
	23	Spirotetramat	Movento 240 SC	365 mL/ha	12 hours	3	Apply when thrips are first noticed. Should be used when adult populations are relatively low or building. Reductions in numbers of thrips larvae may take 3 to 4 days after application.
	28	Cyantraniliprole	Exirel	1000-1500 ml/ha	12 hours	1	Suppression only. Begin applications when populations are low. 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. If thrips populations are high, use a registered insecticide with a different mode of action to reduce thrips populations before applying Exirel. Do not make more than 4 applications per season. Do not apply more than once every 5 days.
Onion maggot	1B	Chlorpyrifos FINAL USAGE 2023	Lorsban 4 E	3.5 L/ha in 1000 L water	24 hours	50	Apply as soil drench banded over the seedling row.
			Pyrinex 480 EC				
			Warhawk 480 EC				
Cutworms	1B	Chlorpyrifos FINAL USAGE 2023	Pyrinex 480 EC	1.2-2.4 L/ha	24 hours	50	Apply once per season as soil or seedling treatment. Make an application 3-7 days before planting or at the 2-5 leaf stage when damage is observed.
			Warhawk 480 EC				

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks						
Leek Moth	3	lambda-cyhalothrin	Matador 120 EC	188 mL/ha	24 hours	14	Timing of application should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring.						
			Labamba										
	5	spinetoram	Delegate WG	200-336 g/ha	12 hours	3		Suppression. Recommended water volume of 300-500 L water/ha with sufficient pressure to ensure spray solution penetrates leaf axils. Apply when thrips first appear targeting eggs at hatch and small nymphs. Use higher applications when insect pressure is high or when insects are at an advanced stage of growth. Maximum 3 applications per year with 7-10-days between treatments. Do not apply 2 consecutive applications of group 5 insecticides. Rotate to another class of insecticide for at least one application.					
			Spinosad						Success 480 SC	218-262 ml/ha	When dry	3	Suppression. Apply in high water volume to ensure the spray solution penetrates the leaf axils. Reapply at 7–10-day intervals. Do not apply more than 2 sequential applications. Max 3 applications per year. Target eggs at hatch or small larvae.
									Entrust 80W	131-158 g/ha			
									Entrust SC	437-527 ml/ha			
11	<i>Bacillus thuringiensis, subsp. aizawai,</i>	XenTari WG	500-1000 g/ha	4 hours	0	Apply sufficient spray volume to ensure uniform deposition on all plant surfaces; recommend 1000 L per ha.							
Allium Leafminer	28	Cyantraniliprole	Exirel	1000-1500/ha		1	Begin applications when treatment thresholds have been reached. Do not make more than 4 applications per season. Do not apply more than once every 5 days.						

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
DISEASE							
Purple blotch <i>Alternaria</i>	7	boscalid	Cantus WDG	475 g/ha	12 hours	7	Maximum 6 applications/year. No more than two applications in succession without rotating to different fungicide family.
		penthiopyrad	Fontelis	1.25-1.75 L/ha	12 hours	3	Begin applications prior to disease development, continue a 7–10-day interval. Use higher rate and shorter intervals when disease pressure is high. Max seasonal rate is 5.25 L/ha. Make no more than 2 sequential applications before switching to another mode of action.
		Benzovindiflupyr	Aprovia	750 ml/ha	12 hours	7	Begin applications when the plants are 5-10 centimeters high or when conditions become favourable for disease development. Make applications on a 7-14-day interval. Use the shorter interval when conditions are more conducive to disease. Also controls garlic rust (<i>Puccinia allii</i>).
	7 & 3	Pydiflumetofen & Difenoconazole	A20259 Fungicide	1.0 L/ha	12 hours	7	Apply on a 7-to-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. 4L/ha/season.
		Benzovindiflupyr & Difenoconazole	Aprovia® Top NEW 2023	967 mL/ha	12 hours	7	Begin applications when the plants are 5-10 centimetres high or when conditions become favourable for disease development. Make applications on a 7 – 14 days interval. Use the shorter interval when conditions are more conducive to disease. Apply specified rates in a minimum of 150 L of water per hectare up to 600 L of water per hectare

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
Purple blotch <i>Alternaria</i> (cont.)	7 & 9	Fluopyram & pyrimethanil	Luna Tranquility	1200 ml/ha	12 hours 24 hours (hand thinning)	7	Begin fungicide applications preventatively. Continue as needed, on a 7-12-day interval.
	7 & 11	boscalid & pyraclostrobin	Pristine WG	1-1.3 Kg/ha	3 days	7	Maximum 6 applications per growing season. Apply at 7–14-day intervals.
		Pyraclostrobin & Fluxapyroxad	Merivon	0.4 – 0.6 L/ha	12 hours, 7 days (hand harvesting, mechanical harvesting)	7	Begin applications of MERIVON Fungicide prior to onset of disease development. 7 – 14-day spray interval. Use the shorter interval and/or the higher rate, where applicable, when disease pressure is high. Apply subsequent applications if disease persists or weather conditions are favourable for disease development.
	9 & 12	Cyprodinil and Fludioxinil	Switch 62.5 WG	775-975 g/ha	12 hours 3 days (hand weeding)	7	Suppression. Begin when conditions are favorable for disease but before infection. Maximum 3 applications/yr. Apply at 7–14-day intervals. Suppression of purple blotch only.
	11	pyraclostrobin	Cabrio EG	560-840 g/ha	12 hours 3 days (thinning)	7	Maximum 2 sequential applications. Maximum total of 3 applications.
Botrytis and Stemphylium leaf blights	7	boscalid	Cantus WDG	0.475 Kg/ha	12 hours	7	Botrytis. Maximum 6 applications per year. No more than two applications in succession without rotating to different fungicide family.
		Benzovindiflupyr	Aprovia	750 ml/ha	12 hours	7	Suppression of Stemphylium. Begin applications when the plants are 5-10 centimeters high or when conditions become favourable for disease development. Make applications on a 7 – 14-day interval. Use the shorter interval when conditions are more conducive to disease.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
Botrytis and Stemphylium leaf blights (cont.)	7 & 9	Fluopyram & pyrimethanil	Luna Tranquility	1200 ml/ha	12 hours 24 hours (hand thinning)	7	Botrytis and Stemphylium. Begin fungicide applications preventatively. Continue as needed, on a 7- to 12-day interval. Apply maximum of 2 applications per season for Botrytis.
	7 & 11	boscalid & pyraclostrobin	Pristine WG	1-1.3 Kg/ha	3 days	7	Botrytis. Max 6 applications/growing season. Apply at 7–14-day intervals. Do not make sequential applications when downy mildew occurs.
		Pyraclostrobin & Fluxapyroxad	Merivon	0.4 – 0.6 L/ha	12 hours 7 days (hand harvesting, mechanical harvesting)	7	Botrytis control. Suppression of Stemphylium. Begin applications of MERIVON Fungicide prior to onset of disease development. 7–14-day spray interval. Use the shorter interval and/or the higher rate, where applicable, when disease pressure is high. Apply subsequent applications if disease persists or weather conditions are favourable for disease development. Use higher rate for <i>Botrytis</i> .
	9 & 12	Cyprodinil and Fludioxinil	Switch 62.5 WG	775-975 g/ha	12 hours 3 days (hand weeding)	7	Botrytis Maximum of 3 applications/yr. Begin when conditions are favorable for disease but before infection. Apply at 7–14-day intervals, no more than 2 sequential applications.
	11 & 3	Azoxystrobin, difenoconazole	Quadris Top	710-1000 mL/ha	12 hours	7	Control of Botrytis, suppression of Stemphylium. Apply no more than 1 application to target this <i>stemphylium</i> . Apply as a broadcast foliar spray in sufficient water for thorough coverage. A minimum spray volume of 150 L/ha is recommended. Apply on a 7-to-14-day interval, starting prior to disease onset when conditions are conducive to disease.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
Botrytis and Stemphylium leaf blights (cont.)	M1	Copper	Cueva	0.5% -2% solution, applied at 470-940 L/ha	4 hours	1	Botrytis. Re-apply using 5–10-day intervals.
	BM02	<i>Bacillus subtilis</i>	Serenade Opti	1.7-2.5 Kg/ha	4 hours	0	Suppression of Botrytis. Also suppresses Botrytis neck rot. Begin applications at the first sign of disease, or when conditions become conducive for disease development. Repeat as necessary on a 7–10-day interval.
Downy Mildew	7 & 11	boscalid & pyraclostrobin	Pristine WG	1-1.3 Kg/ha	3 days (thinning), when dry (general)	7	Maximum 6 applications per growing season. Apply at 7–14-day intervals. Do not make sequential applications of Pristine WG when downy mildew occurs. Suppression only of downy mildew.
		Pyraclostrobin & Fluxapyroxad	Merivon	0.6 L/ha	12 hours, 7 days (hand harvesting, mechanical harvesting)	7	Suppression only. Begin applications of MERIVON Fungicide prior to onset of disease development. 7 – 14-day spray interval. Use the shorter interval and/or the higher rate, where applicable, when disease pressure is high. Apply subsequent applications if disease persists or weather conditions are favourable for disease development.
	11	fenamidone	Reason 500 SC	400 ml/ha	When dry	7	Suppression Only. Begin application as soon as crop and/or environmental conditions become favourable for disease development. Apply in 300-600 L/ha. Applications should be made on a 5–10-day interval. Maximum 4 applications per year. Plant back interval of 30 days. Do not apply more than 2 sequential applications of Reason 500 SC or any other Group 11 fungicide before alternating with a fungicide from a different Group.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
Downy Mildew (cont.)	11	pyraclostrobin	Cabrio EG	0.56-0.84 Kg/ha	3 days (thinning), 12 hours (general)	7	Maximum 2 sequential applications. Maximum 3 applications/yr.
	40	Mandipropamid	Revus	400 mL/ha	12 hours	7	Applications should begin prior to disease development and continue throughout the season on a 7-day schedule of fungicides, following the resistance management guidelines. The use of a non-ionic adjuvant (0.25% v/v) or mineral oil at 1.0% v/v is recommended.
	40 & 45	Ametoctradin, dimethomorph	Zampro	1.0 L/ha	12 hours	0	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 a 5-7-day interval. Max 3 applications.
	49 & 4	Oxathiapiprolin	Orondis	0.0875 – 0.35 L/ha	12 hours	7	Apply as a foliar spray with the 1st application at beginning of infection risk (preventively). Subsequent applications should be at an interval of 5 to 10 days (depending on disease pressure). The minimum water volume is 200-800L/ha. Maximum 3 applications a year.
	49 & 40	Mandipropamid, oxathiapiprolin	Orondis Ultra	400 mL/ha	12 hours	7	Begin applications prior to disease development and continue a 7-10-day interval. Use shorter intervals when disease pressure is high. The use of a penetrating surfactant is recommended.
	M1	Copper	Cueva	0.5% to 2% solution, applied at 470-940 L/ha	4 hours	1	Re-apply using 5–10-day intervals.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
Downy Mildew <i>(cont.)</i>	U15	Oxathiapiprolin	Zorvec - Enicade	0.0875-0.35 L/ha	12 hours	0	Begin applications prior to disease development and continue a 5-to-10-day interval. Use higher rate and shorter interval when disease pressure is high.
	P07	Mono- and dibasic sodium, potassium, and ammonium phosphites	Phostrol	2.9-4.3 L/ha	12 hours	0	<u>For preventative suppression of downy mildew</u> begin foliar applications when conditions favouring disease development exist and continue a 7–14-day interval. Do not apply more than 7 applications per year.
	BM02	<i>Bacillus subtilis</i>	Serenade Opti	1.7-3.3 Kg/ha	4 hours	0	Biopesticide that will only suppress the indicated diseases. Begin applications at the first sign of disease, or when conditions become conducive for disease development. Repeat as necessary on a 7–10-day interval.
Garlic Rust <i>Puccinis allii</i>	3 & 7	Benzovindiflupyr & Difenconazole	Aprovia® Top NEW 2023	967 mL/ha	12 hours	7	Begin applications when the plants are 5-10 centimeters high or when conditions become favorable for disease development. Make applications on a 7 – 14 days interval. Use the shorter interval when conditions are more conducive to disease. Apply specified rates in a minimum of 150 L of water per hectare up to 600 L of water per hectare
Stem and Bulb Nematode	7	Fluopyram	Velum™ Prime NEW 2023	500 mL/ha or 3.75 mL/100m row spacing (based on 75m row spacing)	12	30	Apply in 50-300 L of water per hectare. Do not apply more than one application per year for this use. When applied as a soil application, use another mode of action for the first foliar fungicide application.

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>