

Garlic Management Schedule

*A guide to weed, insect and
disease management in garlic
in Nova Scotia*



2019



GUIDE TO PEST MANAGEMENT IN GARLIC



Nova Scotia Vegetable Crop Guide to Pest Management 2019 [GAR1-19]

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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. If you have an old label, your pesticide supplier should be able to give you the newest label. 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 <i>Perennial weeds including quackgrass</i>	9	glyphosate	Roundup 356 Sn	2.5-7.0 L/ha	-	-	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	12 hours	-	
			Touchdown 480	2.5-7.0 L/ha	12 hours	-	
	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.
Stale Seedbed Technique	22	paraquat	Gramoxone 200 Sn	2.75-5.5 L/ha	12 hours	-	Apply in 300 - 1100 L of water/ha to foliage of the emerged weeds but before the crop has emerged. Use Gramoxone for best control of grasses.
		diquat	Reglone, Dessicash	2.3-4.6 L/ha	24 hours	-	
Preemergence	3	chlorthal dimethyl	Dacthal W-75	9.0-18.0 Kg/ha	12 hours	-	Apply at seeding or at transplanting.

	15	napropamide	Devrinol 50 DF	2.25-4.5 Kg/ha	12 hours	60	Apply only one application per season.
	14	Flumioxazin	Chateau WDG	280-420 g/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.
			<i>NEW 2019</i>				
Postemergence	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.
<i>Grasses</i>	1	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.
<i>Broadleaf weeds</i>	6	bromoxynil	Pardner (280 g/L)	1.0 L/ha	24 hours	58	Apply in 200 to 300 L/ha of water, early postemergence to weeds. Only one application per year.
	3	Pendimethalin	Prowl H₂O	2.2-3.3 L/ha 6.6 L/ha	5 days	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.
			<i>NEW 2019</i>				
<i>Inter-row shielded</i>	22	paraquat	Gramoxone 200 Sn	2.75-5.5 L/ha	12 hours	-	Do not spray solution on the crop plant since it could be injured or killed. Use

		diquat	Reglone, Dessicash	2.3-4.6 L/ha	24 hours	-	Gramoxone for best control of grasses.
	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.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-harvest Interval (days)	Remarks
INSECTS:							
Aphids and thrips	3	lambda-cyhalothrin	Matador 120 EC	188 mL/ha	24 hours	14	Thrips only – 3 applications per season.
	1B	malathion	Malathion 85E	4.25 Kg/ha	12 hours	3	Apply in enough spray volume to provide adequate coverage.
	5	spinetoram	Delegate WG	200-336 g/ha	12 hours	3	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 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. Rotate to another class of insecticide for at least one application. Do not apply within 3 days to Harvest.
	5	Spinosad	Success 480SC	218-262 ml/ha	-	3	Target small nymphs and eggs at hatching. Allow 7-10 days between applications. Max 3 applications per year. Apply in 300-500 L/ha.
			Entrust 80W	131-158 g/ha			
Entrust SC			437-527 ml/ha				
28	Cyantraniliprole	Exirel	1000-1500 ml/ha	12 hours	1	Thrips (Suppression only). Begin applications when thrips populations are low. Thorough coverage is essential for	

							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. 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.
	6	Abamectin	Agri-Mek 1.9% EC	0.6-1.2 L/ha	- 12 hours (Agri-Mek SC)	30	Thrips: 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			
Onion maggots	1B	chlorpyrifos	Lorsban 4 E	3.5 L/ha in 1000 L water	24 hours	50	Apply as a drench over the row on newly emerged plants (in the spring).
			Pyrinex 480 EC	3.5 L/ha in 1000 L water		50	Apply as soil drench banded over the seedling row.
			Warhawk 480 EC				
Cutworms	1B	chlorpyrifos	Pyrinex 480 EC	2.4 L/ha	24 hours	50	Apply once per season in 200-400 L/ha. Make an application 3-7 days before planting or at the 2-5 leaf stage when damage is observed.
			Warhawk 480 EC	1.2-2.4 L/ha			
Leek Moth	5	spinetoram	Delegate WG	200-336 g/ha	12 hours	3	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 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. Do not apply within 3 days of harvest.
	5	Spinosad	Success 480 SC	218-262 ml/ha	-	3	Apply in high water volume to ensure spray solution penetrates into 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</i> , subsp. <i>aizawai</i> , (Strain ABTS-1857 fermentation solids, spores, and insecticidal toxins)	XenTari WG	500-1000 g/ha	-	0	Apply sufficient spray volume to ensure uniform deposition on all plant surfaces; recommend 1000 L per ha.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-harvest Interval (days)	Remarks
DISEASES:							
Purple blotch <i>Alternaria</i>	7	boscalid	Cantus WDG	0.475 Kg/ha	12 hours	7	Maximum 6 applications/year. No more than two applications in succession without rotating to different fungicide family.
	11	pyraclostrobin	Cabrio EG	0.56-0.84 Kg/ha	12 hours	7	Maximum 2 sequential applications. Maximum total of 3 applications.
	7-11	boscalid & pyraclostrobin	Pristine WG	1-1.3 Kg/ha	-	7	Maximum 6 applications per growing season. Apply at 7-14 day intervals.
	7	penthiopyrad	Fontelis	1.25-1.75 L/ha	12 hours	3	Begin applications prior to disease development, continue on a 7-10 day interval. Use higher rate and shorter interval 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.
	9-12	Cyprodinil and Fludioxinil	Switch 62.5 WG	775-975 g/ha	12 hours 3 days (hand weeding)	7	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.
	7-9	Fluopyram & pyrimethanil	Luna Tranquility	1200 ml/ha	12 hours	7	Begin fungicide applications preventatively. Continue as needed, on a 7- 12 day interval.
	7	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 days interval. Use the shorter interval when conditions are more conducive to disease. Also controls garlic rust (<i>Puccinia allii</i>).

Green Mold <i>Penicillium</i>	2	iprodione	Rovral 500 WP	4 g/L water	12 hours	-	Dip garlic cloves in the Rovral suspension for 30 minutes prior to planting in the fall.
Botrytis leaf blight and neck rot	7-11	boscalid & pyraclostrobin	Pristine WG	1-1.3 Kg/ha	-	7	Max 6 applications/growing season. Apply at 7-14 day intervals. Do not make sequential applications when downy mildew occurs. Suppression only of downy mildew.
	7	boscalid	Cantus WDG	0.475 Kg/ha	12 hours	7	Maximum 6 applications per year. No more than two applications in succession without rotating to different fungicide family.
	44	<i>Bacillus subtilis</i>	Serenade Opti	1.7-2.5 Kg/ha	-	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.
	9-12	Cyprodinil and Fludioxinil	Switch 62.5 WG	775-975 g/ha	12 hours 3 days (hand weeding)	7	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.
	M1	Copper	Cueva	0.5% -2% solution, applied at 470-940 L/ha	4 hours	1	Re-apply using 5-10 day intervals.
	7-9	Fluopyram & pyrimethanil	Luna Tranquility	1200 ml/ha	12 hours	7	Begin fungicide applications preventatively. Continue as needed, on a 7- to 12-day interval. Apply maximum of 2 applications per season for Botrytis.
	7	Benzovindiflupyr	Aprovia	750 ml/ha	12 hours	7	Suppression of Leaf blight (<i>Stemphylium vesicarium</i>). Begin applications when the plants are 5-10 centimeters 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.

Downy Mildew	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.
	11	pyraclostrobin	Cabrio EG	0.56-0.84 Kg/ha	3 days	7	Suppression only. Maximum 2 sequential applications. Maximum 3 applications/yr.
	*44	<i>Bacillus subtilis</i>	Serenade Opti	1.7-3.3 Kg/ha	-	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.
	7-11	boscalid & pyraclostrobin	Pristine WG	1-1.3 Kg/ha	-	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.
	40,45	Ametoctradin, dimethomorph	Zampro	1.0 L/ha	Hand harvesting -1 day All other activities – 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 on a 5-7-day interval. Max 3 applications.
	M1	Copper	Cueva	0.5% to 2% solution, applied at 470-940 L/ha	4 hours	1	Re-apply using 5-10 day intervals.

	33	Mono- and dibasic sodium, potassium, and ammonium phosphites	Phostrol	2.9-4.3 L/ha	12 hours	-	For preventative suppression of downy mildew begin foliar applications when conditions favouring disease development exist and continue on a 7-14 day interval. Do not apply more than 7 applications per year.
	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 10 day interval. Use higher rate and shorter interval when disease pressure is high.

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	Oil-based emulsifiable concentrate	kPa	kilopascal
EG	Water dispersible granule	kg	kilogram
WG	Wettable 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 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!