



# GUIDE TO PEST MANAGEMENT IN COLE CROPS

**Nova Scotia Vegetable Crop Guide to Pest Management 2010**  
[COL2-10]

**Revised May 5, 2010 by**

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## **IMPORTANT**

This publication was compiled by representatives from AgraPoint 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, AgraPoint 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, AgraPoint 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	Pesticide Common Name	Pesticide Product Name	Rate	Days to Harvest	Remarks
<b>WEEDS:</b>					
<b>Preplant</b>  <i>Perennial weeds including quackgrass</i>	glyphosate	<b>Roundup 356 Sn</b>	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 when these herbicides are applied in the fall.
		<b>Roundup WeatherMAX</b>	1.67-8.0 L/ha	-	
		<b>Touchdown 480</b>	2.5-7.0 L/ha	-	
	carfentrazone-ethyl	<b>Aim EC</b>	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.
<b>Pre-Transplant</b>	dimethenamid	<b>Frontier</b>	1.1-1.4 L/ha	60	<b>Transplanted Cabbage only.</b> 11 month rotational restriction for seeding carrots or onions or transplanting celery. Follow label for rate adjustments depending on soil texture and % organic matter.
	dimethenamid-P	<b>Frontier Max</b>	756-963 ml/ha	60	<b>Apply prior to transplanting and before weed emergence.</b>

<b>Preplant Incorporated</b>  <i>Germinating annual grasses and some broadleaf weeds</i>	trifluralin	<b>Treflan 480 EC</b>	1.7-3.0 L/ha	-	Preplant incorporated in direct seeded cabbage and cauliflower or transplants of cabbage, cauliflower, broccoli and Brussels sprouts. Incorporate within 8 hours of application following label instructions. Ragweed and mustards are not controlled. Corn or cereal grains may be injured when planted in fields treated with trifluralin the previous year. <b>See label for rate according to soil type.</b>
		<b>Rival 500 EC</b>	1.2-2.3 L/ha	-	
		<b>Bonanza 400</b>	2.0-3.5 L/ha	-	
<b>Preemergence Treatments</b>  <i>Germinating grasses and some broadleaf weeds</i>	chlorthal dimethyl	<b>Dacthal W-75</b>	9.0-15.5 Kg/ha	-	Apply immediately after seeding or directly over transplants but before weeds emerge. Rainfall or irrigation is necessary for activity (min 1 cm). Ragweed, nutsedge, smartweed and mustards are not controlled.
	napropamide	<b>Devrinol 50 DF</b>	2.25-4.5 Kg/ha	60	Apply to direct seeded and transplanted cabbage, cauliflower and broccoli only.
	s-metolachlor	<b>Dual II Magnum</b>	1.25-1.75 L/ha	-	Apply after transplanting within two days. Once per year on transplanted cabbage, cauliflower and broccoli only.
<i>Stale seedbed technique</i>	paraquat	<b>Gramoxone 200 Sn</b>	2.75-5.5 L/ha	-	Apply in 300 to 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	<b>Reglone 200 Sn</b>	2.3-4.6 L/ha	-	
<b>Postemergence</b>  <i>Grasses</i>	fenoxaprop-p-ethyl	<b>Excel Super</b>	0.67 L/ha	35 (cabbage) 43 (cauliflower) 44 (broccoli)	Apply to actively growing annual grasses in the 1 to 6 leaf stage. For use on cabbage, broccoli and cauliflower.

	sethoxydim	<b>Poast Ultra plus Merge</b>	0.32-1.1 L/ha 1-2 L/ha	70	Use on cabbage, cauliflower and broccoli. Treat at the 1 to 6 leaf stage of annual grasses. Use the higher rate for control of volunteer cereals and quackgrass. <b>Do not use on Brussels sprouts and do not exceed 0.45 L/ha on broccoli.</b>
	fluazifop-p-butyl	<b>Venture L</b>	0.8-2.0 L/ha	40	Apply to annual grasses at the full 2 to 5 leaf stages (2 to 4 leaves for foxtails) use high rate on quackgrass. One application per season.
<b>Postemergence</b> <i>Seedling annual broadleaf weeds lamb's quarters and redroot pigweed</i>	clopyralid	<b>Lontrel 360</b>	0.56 L/ha	30	Post transplant on cabbage, cauliflower and broccoli. One application per year.
<i>Inter-row shielded</i>	paraquat	<b>Gramoxone 200 Sn</b>	2.75-5.5 L/ha	-	Do not spray solution on the crop plant since it could be injured or killed. Use Gramoxone for best control of grasses.
	diquat	<b>Reglone 200 Sn</b>	2.3-4.6 L/ha	-	
	carfentrazone-ethyl	<b>Aim EC</b>	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.
<b>INSECTS:</b>					
<b>Cabbage Maggots</b>	chlorpyrifos	<b>Lorsban 50 W</b>	1.55-1.625 Kg/ha	32	<b>For cabbage only.</b> Do not use starter fertilizer with Lorsban 50 W. 65 g/200 L in transplant water and apply 200 mL with each plant. Apply once per season.
		<b>Lorsban 15 G</b>	0.6-1.0 kg / 1000m of row	32	Apply in furrow at planting time. Rates vary based on row spacing see label for details. (Broccoli, Brussels sprouts, Cabbage Cauliflower)

		<b>Lorsban 4 E</b>	Rate varies with row spacing – see label	32	<p><b>At planting treatment</b> 210ml / 1000m of row in 1000L/ha spray solution, 10 cm either side of the plant 7-10 days after seeding or 3 days after transplanting.</p> <p><b>Post planting drench:</b> Mix 1.68 L in 1000L of spray solution. Apply 12.5 L of solution per 100m of row 10 cm on each side of the plant. Can be repeated 21 days after the transplanting drench or 28 days after the seeding drench.</p> <p><b>Do not apply to harvestable portions of the crop.</b> (Broccoli, Brussels sprouts, Cabbage Cauliflower)</p>
<b>Cabbage Looper, Imported Cabbageworm &amp; Diamondback Moth Larvae</b>	<i>Bacillus thuringiensis</i>	<b>Dipel 2X DF</b>	55-550 g/ha	0	Check labels for details on rates according to species
		<b>Thuricide HPC</b>	2.0-4.25 L/ha	0	
	spinosad	<b>Success 480 SC</b>	0.182 L/ha	3	Maximum 3 applications per year.
		<b>Entrust 80 W</b>	109 g/ha	3	Maximum 3 applications per year. Allow 7-10 days between applications.
	spinetoram	<b>Delegate WG</b>	140-222 g/ha	1	Target egg hatch or small larvae. Repeat at a minimum re-treatment interval of 5 days with a maximum of 3 applications per year. Use higher rate for higher infestations or larger larvae.
permethrin	<b>Pounce 384 EC</b>	90-180 mL/ha	3 (Cabbage, cauliflower, brussel sprouts) 7 (broccoli)	Apply when insects or insect damage first appears. 3 days to harvest for cabbage, cauliflower and Brussels sprouts. 7 days to harvest on broccoli. See note under Decis.	

	deltamethrin	<b>Decis 5 EC</b>	0.15-0.2 L/ha	1 (Brussels sprouts) 3 (broccoli, cabbage, cauliflower)	Apply when insects or insect damage are present. Repeat every 10 days as necessary. Pounce and Decis are more effective than other insecticides under cool, fall conditions. Will also control late climbing cutworm. Apply in 350-550 L/ha of water.
	methomyl	<b>Lannate</b>	270-540 g/ha	1 (cabbage) 7 (broccoli, cauliflower, Brussels sprouts)	Apply with low pressure ground equipment. Repeat at 5 to 7 day intervals. <b>Cabbage looper only on broccoli.</b> Apply in 250-850 L/ha of water
	methamidophos	<b>Monitor 480</b>	1.1-2.25 L/ha	7 (cabbage, cauliflower) 14 (broccoli, Brussels sprouts)	Rates above 1.8 L/ha are for severe infestations only.
	endosulfan	<b>Thiodan 4 EC</b>	1.5-2.0 L/ha	7	Use lower rate for small larvae only. For Loopers spray 2 L/ha to underside of foliage using drop pipes and repeat every 7 days.
	cypermethrin	<b>Ripcord 400 EC</b>	87.5-125 mL/ha	3	Begin treatment when insects or signs of insect feeding appear. Repeat every 10 – 14 days if necessary, up to 3 applications per season.
		<b>UP-Cyde plus Agral 90</b>	140 ml/ha plus 0.03% (v/v)	3	Use as needed on two week intervals up to a maximum of 3 applications per season.

	cyhalothrin lambda	<b>Matador 120 EC</b>	42 mL/ha (Imported Cabbageworm, Diamondback Moth) 83 mL/ha (Cabbage Looper)	1 (cabbage) 3 (broccoli, cauliflower, Brussels sprouts)	Do not apply more than 3 times per season. Allow 7 days between applications.
		<b>Warrior</b>	42 mL/ha (Imported Cabbageworm, Diamondback Moth) 83 mL/ha (Cabbage Looper)	1 (cabbage) 3 (broccoli, cauliflower, Brussels sprouts)	Do not apply more than 3 times per season. Allow 7 days between applications.
	acephate	<b>Orthene 75 SP</b>	0.75-1.1 Kg/ha	28	Do not apply more than 4 times each season. Apply in 225-1650 L/ha of water.
	chlorantraniliprole	<b>Coragen</b>	250 ml/ha	3	Begin applications when treatment thresholds have been reached. Maximum of 4 applications per season. Do not apply more than once every 3 days. Do not exceed 1 L of Coragen per ha per season. For optimal control, apply with a modified seed oil adjuvant such as Hasten or MSO. Apply in a finished spray volume of 100 L/ha.

	novaluron <i>(added May 5, 2010)</i>	<b>Rimon 10 EC</b>	410-820 ml/ha	2-4	Reapplication on at a 7-10 day interval will be required to protect new growth or monitoring indicates that it is necessary. Do not apply more than 3 applications per crop per season. Do not apply more than 2460 ml of product per hectare per season. Do not apply within 2-4 days of harvest. Apply in water volumes of 200-400 L /ha. Use higher rate under high insect pressure or when larvae are large.
<b>Flea Beetles</b>	endosulfan	<b>Thiodan 50 WP</b>	1 Kg/ha	7	Add 125-250 g of a wetter-sticker/1000 L of spray for Thiodan 50 WP. Do not feed crop refuse to livestock after application.
		<b>Thiodan 4 EC</b>	1.5-2.0 L/ha	7	
	carbaryl	<b>Sevin XLR Plus</b>	1.25-2.5 L/ha	3 (Cabbage, Cauliflower) 5 (Broccoli, brussel sprouts)	Use the lower rate on young plants. Apply when insects or damage appears and repeat at intervals of 7-10 days.
	cyhalothrin lambda	<b>Matador 120 EC</b>	42 mL/ha	1 (Cabbage)	Maximum 3 applications per season.
		<b>Warrior</b>	42 mL/ha	3 (broccoli, cauliflower and Brussels sprouts)	
	cypermethrin	<b>Ripcord 400 EC</b>	87.5-125 mL/ha	3	Use up to 3 applications per year.
	deltamethrin	<b>Decis 5.0 EC</b>	150-200 mL/ha	3	<b>Use on cabbage only.</b> In 350-505 L water/ha.

<b>Aphids</b>	dimethoate	<b>Lagon 480 EC</b>	0.7-1.0 L/ha	4 (Broccoli, cauliflower) 21 (Brussels sprouts)	Use repeat applications as necessary. Max 3 applications per season.
	acetamiprid	<b>Assail 70 WP</b>	0.056-0.086 Kg/ha	7	Maximum 5 applications per year and alternate with other insecticide families. <b>Also registered for swede midge at high rate.</b>
	endosulfan	<b>Thiodan 4 EC</b>	2 L/ha	7	Add 125-250 g of a wetter-sticker/1000 L of spray for Thiodan 50 WP. Do not feed crop refuse to livestock after application.
		<b>Thiodan 50 WP</b>	1.75 Kg/ha	7	
	methamidophos	<b>Monitor 480</b>	1.1-2.25 L/ha	7 (cabbage, cauliflower) 14 (broccoli, Brussels sprouts)	Begin applications when insects or their damage first appear repeat on a 7-14 day schedule.
	imidacloprid	<b>Admire (240 g/L)</b>	Sidedress: 730 mL/ha	21	<b>Brussels sprouts only.</b> One application per season. <b>Do not apply a foliar application after a sidedress treatment.</b>
			Foliar: 200 mL/ha	7	<b>Brussels sprouts only.</b> Two applications per season. Second application should be applied 7 days after the first. <b>Do not apply a foliar application after a sidedress treatment.</b>

<b>Aphids and Whiteflies</b>	spirotetramat	<b>Movento 240 SC</b>	220-365 ml/ha	1	Minimum interval between applications is 7 days. Maximum of 730 ml/ha of product applied per season. <b>This product is TOXIC to bees through direct contamination of pollen and nectar. DO NOT apply this product during crop flowering period or when flowering weeds are present in the field, orchard or vineyard.</b>
		<b>Movento 150 OD</b>	347-585 ml/ha	1	Minimum interval between applications is 7 days. Maximum of 1.17 L/ha of product applied per season. <b>This product is TOXIC to bees through direct contamination of pollen and nectar. DO NOT apply this product during crop flowering period or when flowering weeds are present in the field, orchard or vineyard.</b>
<b>Cutworms</b>	permethrin	<b>Pounce</b>	0.18-0.39 L/ha	3 (Cabbage, cauliflower, brussel sprouts) 7 (broccoli)	Applications should be made under warm and moist conditions. Do not disturb the soil surface for 5 days after treatment.
	cypermethrin	<b>Ripcord 400 EC</b>	175 mL/ha	21	Spray under warm moist conditions and do not disturb the soil surface for at least 5 days.
<b>Thrips</b>	cypermethrin	<b>Ripcord 400 EC</b>	87.5-125 mL/ha	3	Begin treatment when insects or signs of feeding appear. Repeat every 10-14 days if necessary, up to 3 applications per season. It is critical to control them at early head formation (3 inch leaf ball).
		<b>UP-Cyde</b> plus <b>Agral 90</b>	200 ml/ha plus 0.03% (v/v)	3	Use as needed on two week intervals up to a maximum of 3 applications per season.

<b>Slugs (Grey Garden)</b>	methomyl	<b>Lannate L</b>	3.25 L/ha	30	Apply in 1 application with ground equipment and use sufficient water volume for good coverage. Apply late in the evening when slugs are more active. <b>For Brussels sprouts only.</b>
	ferric phosphate	<b>Sluggo</b>	25-50 Kg/ha	0	
<b>Whitefly (including silverleaf, sweetpotato and greenhouse)</b>	spiromesifen	<b>Forbid 240 SC</b>	500-600 ml/ha	7	Maximum of 3 applications per season. Minimum application volume of 100 L/ha. 2 day re-entry interval for workers pruning or hand harvesting. See label for buffer zone restrictions.
<b>DISEASES:</b>					
<b>Black Rot</b>	-	<b>Hot Water</b>	-	-	Contact an extension specialist for methods.
<b>Damping Off and Wirestem</b>	metam sodium	<b>Vapam</b>	Follow manufacturer's directions	-	Fumigate seed beds in fall prior to planting.
	methyl isothiocyanate and dichloropropene	<b>Vorlex</b>		-	
<b>Damping Off</b>	captan	<b>Captan 80 WDG</b>	78 to 141 g / 100 m <sup>2</sup>	-	Work into upper 8 to 10 cm of soil.
<b>Clubroot (<i>Plasmodiophora brassicae</i>)</b>	quintozene	<b>Quintozene 75 WP</b>	250-270 g/100 L	-	Apply 200 to 300 mL per plant at transplanting. Provide good agitation. Avoid infested fields. If this is not possible, adjust pH of field soil to 7.2 or use at least 1700 Kg/ha of hydrated lime in the spring at least 6 weeks prior to planting. Maintain high soil levels of calcium and magnesium.
	fluazinam	<b>Allegro 500F</b>	<b>Transplant treatment:</b> 50 ml/100L of water Apply 100ml of solution per plant	Head and stem brassica (65)	Apply solution to plant immediately after planting.

			<b>Pre-transplant treatment:</b> 2.9 L/ha	Leafy brassica (30)	Apply in 500 L/ha in a 25 cm band along the planting row and incorporate to a depth of 15-20 cm in the same operation. Transplant the seedlings into the treated band. If forming a bed, broadcast application should be made prior to forming the bed.
<b>Downy Mildew, Black Leaf Spot (<i>Alternaria</i>)</b>	chlorothalonil	<b>Bravo 500 F</b>	2.5-4.8 L/ha	7	Begin applications after treatments are set in the field or when conditions favor development. Repeat on 7-10 day intervals.
	zineb	<b>Zineb 80 WP</b>	1.1-3.3 Kg/ha	7	Apply at 5-10 day intervals. Spray in 1000-1500 L of water /ha
	copper sulphate	<b>Copper 53 W (tribasic copper sulphate)</b>	4 kg/ha Follow manufacturer's directions	1	Apply in a maximum 1000 L/ha. Max 2 applications per year for Brussels sprouts.
	iprodione	<b>Rovral 50 WP</b>	3.0 Kg/ha	7 (cabbage) 5 (cauliflower)	<b>Black leaf spot (alternaria) only.</b> Rovral may be used on cabbage and cauliflower. For <i>Alternaria</i> control on storage cabbage apply 1 application of Rovral 7 to 14 days prior to harvest. For <i>Alternaria</i> control on cauliflower, apply 1 application of Rovral 1-2 days prior to tying.
	fosetyl-al	<b>Aliette 80 WDG</b>	2.25-3.125 Kg/ha	7	<b>Broccoli only.</b> Maximum 5 applications per year.
	mandipropamid	<b>Revus plus Non-ionic adjuvant</b>	400-600 ml/ha plus 0.125% v/v	1	<b>Downy mildew.</b> Applications should begin prior to disease development and continue throughout the season on a 7-10 day schedule of fungicides, following the resistance management guidelines. Maximum four applications per year. <b>REVUS Fungicide may be tank mixed with Bravo 500 Agricultural Fungicide for any Brassica crop listed on that label. Follow the most restrictive use directions of either label.</b>

	<i>Bacillus subtilis</i>	<b>Serenade MAX</b>	2.0-3.0 Kg/ha	0	<b>Serenade Max and Serenade ASO are biopesticides that will only suppress the indicated diseases.</b> Make the first application at emergence, or immediately following transplanting. Repeat applications on 10-14 day intervals if conditions for disease development continue. <b>May also control <i>Sclerotinia</i> rot (see product label).</b>
		<b>Serenade ASO</b>	8.0-15.0 L/ha	0	
		<b>Rhapsody ASO</b>	1.0-2.0 L/100 L of water	0	
<b>Alternaria and Cercospora</b>	pyraclostrobin	<b>Cabrio EG</b>	0.56-1.1 Kg/ha	3	<b>Horseradish only.</b> Maximum of 3 applications a year and no more than two sequential applications.
<b>Alternaria Leaf blight (Cabbage Only)</b>	cyprodinil and fludioxonil	<b>Switch 62.5 WG</b>	775-975 g/ha	7	Maximum of 3 applications per year. Allow 7-10 days between applications.
<b>Watery Soft Rot of Lettuce (<i>Sclerotinia</i>)</b>	<i>Bacillus subtilis</i>	<b>Serenade MAX</b>	3.0-6.0 Kg/ha	0	<b>Serenade Max is a biopesticide that will only suppress the indicated</b>

<i>sclerotium</i> )					<b>diseases.</b> Make the first application at emergence, or immediately following transplanting. Repeat applications on 10-14 day intervals if conditions for disease development continue.
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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.pmra-arla.gc.ca/portal/page?\\_pageid=34,17551&\\_dad=portal&\\_schema=PORTAL](http://pr-rp.pmra-arla.gc.ca/portal/page?_pageid=34,17551&_dad=portal&_schema=PORTAL)

# PESTICIDE EMERGENCY CONTACT INFORMATION

<b>Poison Control Centres</b>		
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

<b>Environmental Emergencies (Pesticide Spills)</b>	
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

<b>Formulation and Measurement Abbreviations</b>			
FORMULATIONS		MEASUREMENTS	
DF	Dry flowable	mL	millilitre
EC, E	Oil-based emulsifiable concentrate	kPa	kilopascal
EG	Water dispersible granule	kg	kilogram
F	Flowable	g	gram
G	Granule	L	litre
L	Liquid	BIU	Billions of International Units
WG	Wettable Granule	ppm	parts per million (1000 ppb)
WDG	Wettable dry granule	ppb	parts per billion (1/1000 ppm)
WP, W	Wettable powder		
SC	Suspension concentrate		
SP	Soluble powder		
Sn	Solution		

<b>Helpful Conversions<sup>1</sup></b>	
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

<sup>1</sup> **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!