

GUIDE TO PEST MANAGEMENT IN CHINESE VEGETABLES

Nova Scotia Vegetable Crop Guide to Pest Management 2011
[CHIN2-11]

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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.**

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. 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 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. Allow 3 or more days after treatment before tillage. Best control of quackgrass is obtained when these herbicides are applied in the fall.
			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 <i>Stale seedbed technique</i>	22	Diquat	Reglone® Desiccant	2.3-4.6 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.
		Paraquat	Gramoxone®	2.75-5.5 L/ha	24 hours	-	
<i>Germinating annual weeds</i>	15	Napropamide	Devrinol 50 DF	2.25-4.5 Kg/ha	-	-	Apply only to seeded Chinese broccoli, Chinese radish and Chinese mustard cabbage; Seeded and transplanted Chinese cabbage and transplanted kohlrabi. Max 1 application per season.
Postemergence <i>Broadleaf control</i>	4	Clopyralid	Lontrel 360	0.56 L/ha	-	30	Apply post planting to Chinese radish, Chinese broccoli and mustard cabbage. Apply in 300 L of water/ha. Adequate testing on different varieties has not been

							completed in Atlantic Canada.
<i>Inter-row shielded</i>	22	Diquat	Reglone® Desiccant	2.3-4.6 L/ha	-	-	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	-	
	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.
<i>Annual grasses and quackgrass</i>	1	Sethoxydim	Poast Ultra plus Merge	0.32-1.1 L/ha 1-2 L/ha	12 hours	30	Apply to Chinese broccoli, Chinese cabbage, Chinese radish and kohlrabi. Use high rate on quackgrass.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
INSECTS:							
Cutworms	1B ¹	Chlorpyrifos	Lorsban 4 E	2.4 L/ha	24 hours	32	Pre-plant treatment for Chinese cabbage.
Cabbage Looper, Imported Cabbage worm and Diamondback Moth	-	<i>Bacillus thuringiensis</i>	Dipel 2XDF	55-550 g/ha	-	0	Rates vary depending on pest (read label). Chinese cabbage, Chinese broccoli, bok choy and Asian radish. Max 5 applications per year. Apply in 400 l/ha when larvae are small.
	1A	Carbaryl	Sevin XLR Plus	2.5-5.25 L/ha	-	21 5 (kohlrabi)	Chinese cabbage, mustard greens.
	28	Chlorantraniliprole	Coragen	250 ml/ha	12 hours	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 100L/ha.
	15	Novaluron	Rimon 10 EC	410-820 ml/ha	12 hours	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. Apply in water volumes of 200-400 L /ha. Use higher rate under high insect pressure or when larvae are large.
	5	Spinetoram	Delegate WG	140-200 g/ha	12 hours	3	Time application with peak egg hatch or small larvae. Repeat applications based on population monitoring. Use higher rate for higher infestations or advanced growth stages. Maximum of 3 applications per year with a minimum re-treatment interval

							of 5 days. Oriental Radish, Chinese Celery, read label for other labeled crops
	5	Spinosad	Success 480 SC	182 ml/ha	-	1 (Chinese celery) 3 (Oriental radish)	Maximum 3 applications per year. Allow 7-10 days between applications.
			Entrust 80 W	109 g/ha			
	3&4	Imidacloprid Deltamethrin	Concept	650 ml/ha	2 days	7	Apply at threshold. Repeat on a minimum 5 day interval. Maximum 3 applications per year.
Aphids	4	Acetamiprid	Assail 70 WP	56-86 g/ha	12 hours	7	Mustard greens, amaranth, chrysanthemum greens, kale, kohlrabi, Chinese cabbage and bok choy. Maximum 5 applications per year. Alternate with other insecticide groups. Also registered for Swede Midge.
	1B	Dimethoate	Lagon 480 EC	600-1000 mL/ha	-	7	Chinese broccoli, bok choy and Chicory only. Maximum 3 applications per season.
	9C	Flonicamid	Beleaf 50SG	0.12-0.16 kg/ha	-	0 days	Leafy Vegetables. Thorough spray coverage of plant foliage is essential. Minimum of 94 litres of water/ha. Maximum of 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.
Aphids and Whiteflies and Swede Midge larvae	23	Spirotetramat Update June 16th	Movento 240 SC	220-365 ml/ha	12 hours	3	Minimum interval between applications is 7 days. Maximum of 730 ml/ha of product applied per season. 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.
			Movento 150 OD	347-585 ml/ha	12 hours	3	Minimum interval between applications is 7 days. Maximum of 1.17 L/ha of product applied per season. 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.
Tarnished Plant Bug	1A	Carbaryl	Sevin XLR Plus	2.5-5.5 L/ha	-	21 5 (kohlrabi)	Chinese cabbage, mustard greens
Flea Beetles	1A	Carbaryl	Sevin XLR Plus	1.25-2.5 L/ha	-	21 5 (kohlrabi)	Chinese cabbage, mustard greens
	3&4	Imidacloprid Deltamethrin	Concept	650 ml/ha	2 days	7	Apply at threshold. Repeat on a minimum 5 day interval. Maximum 3 applications per year.
Cabbage Maggot	1B ¹	Chlorpyrifos	Lorsban 4 E	2-7 L/ha	24 hours	15	Pak choy, Chinese cabbage and cabbage broccoli. Rate depends on row spacing. See label for details.
				210 mL per 1000 L of water		32	Asian radish apply 1000 L per 1000 m row as a drench over seeded rows 7, 20 and 35 days after seeding.
Whitefly (including silverleaf, sweetpotato and greenhouse)	23	Spiromesifen	Oberon	500-600 ml/ha	2 days	7	Maximum of 3 applications per season. Minimum application volume of 100 L/ha. See label for buffer zone restrictions.
Thrips	5	Spinosad <i>Added June 16</i>	Success 480 SC	146 ml/ha	-	3	Leafy Brassica crops only. Apply when thrips first appears. Reapply at 7-10 day intervals. Max 3 applications per year. Also suppresses swede midge.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
DISEASES:							
Downy Mildew	-	<i>Bacillus subtilis</i>	Serenade MAX	2.0-3.0 Kg/ha	-	0	Serenade MAX, Serenade ASO and Rhapsody ASO are biopesticides that will only suppress the indicated diseases. Make the first application at emergence, or immediately following transplanting. Repeat applications on 10-14 day intervals if conditions for disease development continue. May also suppress <i>Sclerotinia rot</i> (see product labels).
			Serenade ASO	8.0-15.0 L/ha	-	0	
			Rhapsody ASO	1.0-2.0 L/100 L of water	-	0	
	11	Fenamidone	Reason 500SC	400 – 600 ml/ha	48 hours	2	Suppression of Downy Mildew. Do not apply more than 3 applications of Reason per growing season, to Brassica leafy vegetables only. Begin applications as soon as conditions become favorable for disease development. Do not apply sequential applications of Reason or other group 11 fungicides.
	U	Fosetyl-al	Aliette WDG	2.25-3.125 Kg/ha	12 hours	7	Bok-choy only. Maximum 5 applications per year.
40	Mandipropamid	Revus plus Non-ionic adjuvant	400-600 ml/ha plus 0.125% v/v	12 hours	1	Downy mildew. 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 4 applications per year. 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.	
7-11	Pyraclostrobin/ boscalid	Pristine WG	1.0 Kg/ha	4 days	4	Maximum of 4 applications per season. Begin prior to disease development and continue on a 7-14 day schedule. Do not	

							make sequential applications of Pristine or other Group 11 fungicides.
	43	Fluopicolide	Presidio (NEW)	220-292 ml/ha	1 day	2 (head and stem vegetables) 7 (root vegetables)	<p>Maximum of 4 applications per season, Do not make more than 2 sequential applications. Begin when conditions favour disease and repeat on a 7-14 day interval.</p> <p>For resistance management, Presidio Fungicide must be tank-mixed with a labelled rate of another fungicide registered for the target pathogen, but with a different mode of action. Apply Presidio Fungicide in a tank mix with Bravo 500. Follow the most restrictive use directions of either label.</p> <p>Make foliar applications on a 7 to 10 day schedule beginning with initial flowering, or when disease conditions are favourable, but prior to disease development. Use the lower rate and longer interval as preventive applications. Use the higher rate and shorter interval if disease is present.</p>
Clubroot <i>(Plasmodiophora brassicae)</i>	29	Fluazinam	Allegra 500F	Transplant treatment: 50 ml/100L of water Apply 100 ml of solution per plant	-	65 (Head and stem brassica) 30 (Leafy brassica)	Apply solution to plant immediately after planting.
				Pre-transplant treatment: 2.9 L in 500 L water/ha		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.	

Sclerotinia White Mold (<i>Sclerotinia spp.</i>)	7-11	Pyraclostrobin/ boscalid	Pristine WG	1.0 – 1.3 Kg/ha	24 hours	0	For suppression of white mold in Celtuce, cardoon and Chinese celery. Apply once per season before disease develops. For hand harvesting and thinning in leafy vegetables do not enter for 9 days after application.
Botrytis	7-11	Pyraclostrobin/ boscalid	Pristine WG	1.0 Kg/ha	4 days	4	Maximum of 4 applications per season. Begin prior to disease development and continue on a 7-14 day schedule. Do not make sequential applications of Pristine or other Group 11 fungicides.

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>

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
WDG	Wettable dry granule	kg	kilogram
WP, W	Wettable powder	g	gram
SC	Suspension concentrate	L	litre
Sn	Solution	BIU	Billions of International Units
		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!