2018 POTATO CROP

Pest Control Guide

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Prince Edward Island

Prince Edward Island
CANADA

Agriculture and Fisheries

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HAZARD RATING TABLE

LH	Low Hazard	These products should be considered first in a pest control strategy.
MH	Moderate Hazard	Use of these products should include taking all necessary preventative measures to avoid exposure and to minimize environmental risk.
HH	High Hazard	Use of these products should only be as a last resort and require all necessary preventative measures to avoid exposure and minimize environmental risk
EH	Extremely High Hazard	These products should be used only after exhausting all other options. Take all necessary measures to prevent any form of exposure and to minimize environmental risk.

NOTE:

The risk symbols refer to the active ingredients and their risk to acute human health and acute fish health.
Chronic risk is not taken into account.
Routes of exposure vary greatly among active ingredients.
The ratings take into account only dose; and not exposure.
Derived from SAGE PESTICIDES: https://www.sagepesticides.qc.ca/

PESTICIDE ABBREVIATIONS

SU	Suspension	**SC**	Spray Concentrate	**DP**	Dispersible Powder
WP	Wettable Powder	**SN**	Solution	**EC**	Emulsifiable Concentrate
DU	Dust	**SP**	Soluble Powder	**GR**	Granular
FC	Flowable Concentrate	**DF**	Dry Flowable	**SURF**	Surfactant
kg	Kilogram	**g**	Gram	**FLO**	Flowable Liquid
ha	Hectare	**L**	Litre	**EW**	Water Base
mL	Millilitre				

POTATO SEED PIECE TREATMENT

Product		Formulation	Product/ 100 Kg Seed	Hazard Rating[7] Mammals
Fenamidone[1]	Reason	SC	10 ml	LH
Fludioxonil	Maxim PSP	0.5% DU	0.5 kg	LH
Fludioxonil + Difenoconazole	Maxim D	1.94 % + 1.94 %	65 - 130 ml	LH
Fludioxonil + Difenoconazole + (Thiamethoxam)	Cruiser Maxx Potato Extreme	6.25 % + 1.23 % + (2.5%)	20 ml	LH
Fludioxonil + Mancozeb	Maxim MZ PSP	0.5% + 5.7 % DU	0.5 kg	MH
Mancozeb	Dithane M-45	8 % DU	1.0 kg	MH
Mancozeb	MancoPlus	16% DU	0.5 kg	MH
Mancozeb	Penncozeb	80 % DU	0.1 kg	MH
Mancozeb	Potato ST 16	16% DU	0.5 kg	MH
Mancozeb	Solan MZ	16% DU	0.5 kg	MH
Mancozeb + Douglas Fir bark	Tuberseal	16% DU	0.5 kg	MH
Mandipropamid[2]	Revus	SU	13-26 ml	LH
Penflufen / Prothioconazole[3]	Emesto Silver	10 %, 1.8 %	20 ml	LH
Thiophanate-methyl	Senator PSPT	10% DU	0.5 kg	HH
Insecticide				
Clothianidin[4,5]	Titan ST	48 % SU	20.8 ml	LH
Imidacloprid[5]	Admire 240	F	26 - 39 ml	LH
	Alias 240	SC	26 - 39 ml	LH
Thiamethoxam[6]	Actara 240	SC	10.2 - 24.4 ml	LH

[1]Reason - Registered for control of seedborne late blight.

[2]Revus is registered for seed-borne late blight and suppression of pink rot. Do not make more than four applications per season of REVUS Fungicide. DO NOT apply more than 600 g mandipropamid/ha/year. If REVUS Fungicide was used as a seed piece treatment, apply a fungicide belonging to a group other than Group 40 as the first foliar application of the season, refer to label for more information on the maximum number of foliar applications allowed following the use of REVUS. Maximum Residue Levels for Revus have not been established for export outside of NAFTA as of Feb 2018. Please consult with your potato buyer before using Revus as a seed piece treatment. When using Revus on seed, the amount of active ingredient applied per acre must be subtracted from the maximum of mandipropamid allowed per acre per crop season (243 g AI/acre) When using Revus as a seed treatment, the first foliar fungicide applied must not contain a Group 40 fungicide.

[3]Emesto Silver is contained in the Titan Emesto co-pak

[4]Use the high rate of insecticide seed treatment for suppression of wireworms in potatoes

[5]Controls Colorado Potato Beetle, Potato Leafhopper, Aphids, and over wintering adults of Potato Flea Beetle.

[6]Actara is the insecticide included in Cruiser Maxx D and Cruiser Maxx Potato Extreme

[7]Hazard ratings are derived from www.sagepesticides.qc.ca and only consider dose; not exposure.

Actual risk is a combination of both dose and exposure.

RESISTANCE MANAGEMENT: Do not use Senator PSPT if Mertect has been used as a post-harvest fungicide. To avoid development of Colorado Potato Beetle resistance, if Admire, Actara, Alias, or Titan has been used, do not apply any subsequent applications of Actara, Admire, Alias, Assail, Clutch or Titan.

IN-FURROW INSECTICIDES/NEMATICIDES

Product		Product Rate / 100 m row						Days to Harvest	Hazard Rating[8]	
		Early Blight	Verticillium	Nematodes	Pink Rot Suppression	Silver Scurf	Rhizoctonia		Humans	Fish
Metalaxyl	Ridomil Gold 480 SL[1]	-	-	-	4 ml	-	-	80	HH	LH
Azoxystrobin	Quadris F[2]	-	-	-	-	4 - 6 ml	4 - 6 ml	N/A	MH	HH
	Azoshy[2]	-	-	-	-	4 - 6 ml	4 - 6 ml	N/A	MH	HH
	Elatus A[2]	-	-	-	-	4 - 6 ml	4 - 6 ml	N/A	MH	HH
Penthiopyrad	Vertisan	-	-	-	-	-	15.5 - 31 ml	7	LH	HH
Bacillus Amyloliquefaciens	Double Nickel LC[3]	-	-	-	-	-	90 - 450 ml	0	HH	LH
Benzovindiflupyr	Elatus B[2,4]	-	6.8 ml	-	-	4.5 - 6.8 ml	4.5 - 6.8 ml	15	MH	EH
Fluoxastrobin	Evito[5]	-	-	-	-	-	168 - 256 ml	7	LH	HH
Fluxapyroxad	Sercadis[6]	-	-	-	-	-	3 ml	7	LH	HH
Fluopyram	Velum Prime[2,7]	4.5 ml	-	4.5 ml	-	-	-		LH	MH

ALL RATES ARE BASED ON 91 CM OR 36 INCH ROWS; IF PLANTING OTHER ROW WIDTH CONSULT PRODUCT LABEL FOR CORRECT RATES

[1]Apply directly over the seed pieces in furrow as a 15 - 20 cm band prior to row closure. Apply in a minimum of 30 L of water per ha. To reduce the potential of pink rot resistance if Ridomil has been applied in-furrow, do not apply Ridomil as a foliar spray.

[2]Apply as an in furrow spray in 50 - 150 L of water per ha at planting. Mount the spray nozzle so the spray is directed into the furrow as a 15 - 20 cm band just before the seed is covered.

[3]Apply as a banded spray 10 - 15 cm wide.

[4]Do not apply more than 750 ml of foliar benzovindiflupyr-containing products on potato crops per hectare per season.

[5]For application, band width should be limited to 18 cm or less. Apply in 28 - 140 L of water per hectare. Do not apply more than 1.67 litres of EVITO 480 SC Fungicide per hectare per year including any seed treatment use.

[6]Spray pattern should be a 10 - 20 cm band that is applied to the seed piece prior to being covered with soil. Use a minimum volume of application of 50L of water per hectare.

[7]Do not apply more than 500 g fluopyram/ha per year, regardless of formulation or method of application (soil or foliar). When VELUM PRIME is applied as a soil application use another mode of action for the first foliar fungicide application.

[8]Hazard ratings are derived from www.sagepesticides.qc.ca and only consider dose; not exposure. Actual risk is a combination of both.

HERBICIDES

SEE NOTES AND PRODUCT LABELS FOR DETAILS ON HERBICIDES

Weed Control Ratings:
E - Excellent
G - Good
F - Fair
P - Poor

	Chemical Name	Product Name (s)	Formulation	Product/ha	Weed Control Rating: annual broad leaves: chickweed	hempnettle	lambsquarters	mustard family	pigweeds	ragweeds	smartweed family	wild buckwheat	wild radish	annual grasses: barnyard grass	foxtail	crabgrass	Perennials: quackgrass	Canada thistle	sow thistle	goldenrod	field mint	Potato tolerance	Acute Hazard rating Mammals[2]	Reentry Time (hrs)	Pre-Harvest Interval (days)
BEFORE PLANTING	EPTC	Eptam 8E	EC	4.25 - 8.5 L/ha	F	-	F	P	F	F	F	P	P	G	G	G	F	P	P	-	-	E	HH	12	
	glyphosate	Roundup Weathermax / Ultra 2	SN	0.5 -2.33 L	+	+	+	+	+	+	+	+	+	+	+	+	G	P	E	+	+	P	MH	12	
		Roundup Weathermax / Ultra 2	SN	1.67 - 4.67 L	+	+	+	+	+	+	+	+	+	+	+	+	E	E	E	+	+	P	MH		
	glyphosate + an approved surfactant	Roundup Weathermax / Ultra 2 + an approved surfactant	SN SURF	As per label when using high water volumes as per surfactant label	+	+	+	+	+	+	+	+	+	+	+	+	E	P	E	+	+	P	MH	-	
	s-metolachlor	Dual Magnum (915g/L)	EC	1.25-1.75L/ha	P	P	-	-	-	-	-	P	-	G	G	G	P	-	P	P	P	G	HH	24	
PLANTING TO EMERGENCE	dimethenamid-P	Outlook	EC	0.756 - 0.963 L/ha					F					E	E	E						G	HH		
	linuron	Lorox L (480g/L) or Linuron 480 FL (480g/L)	SU	2.3 - 4.6L/ha	G	G	E	E	G	G	E	E	F	F	F	F	P	-	P	P	P	F	MH	24	
		Lorox (50%)DF	DF	2.2 - 4.3 kg/ha																					
		Linuron 400FL(400g/L)	SU	2.5 - 5.2 L/ha																					
	Linuron + s-metolachlor	Lorox L (480 g/L) or Lorox DF (50%) + Dual II Magnum	SU DF EC	1.8 - 2.3 L/ha 1.75 - 2.25 kg/ha + 1.25 - 1.75 L/ha	G	G	E	E	E	G	E	G	G	E	E	E	P	P	P	P	P	E	MH	-	
	metribuzin	Sencor 75DF	DF	0.55 - 1.5 kg/ha	G	E	E	E	E	E	E	G	E	G	G	G	P	-	P	-	P	G	MH	12	
		Sencor Solupak 75 DF	DF	0.55 - 1.5 kg/ha																					
		Sencor 480F	SU	0.84 - 2.2 L/ha																					
		Metrix	SC	0.85-2.25L/ha																					
		TriCor 75DF	DF	0.75 - 1.5 kg/ha																					
	metribuzin + s-metolachlor	Sencor 75DF	DF	0.75 - 1.5 kg/ha or	G	E	E	E	E	E	E	G	G	E	G	G	P	-	P	-	P	G	MH	-	
		Sencor 480 F	SU	1.1 - 2.25 L/ha +																					
		+Dual II Magnum	EC	1.25 - 1.75 L/ha																					
		Tiedown - TriCor	DF	0.75 - 1.5 kg/ha +																					
		+ UPI S-Met	EC	1.25-1.75 L/ha																					
		Boundary LQD	EC	1.85 - 2.5 L/ha																					60
	metribuzin + linuron	Sencor 75DF	DF	0.55 - 1.1 kg/ha	G	E	E	E	E	E	E	E	E	G	G	G	P	-	P	-	P	G	MH	-	
		or Sencor Solupak 75DF	DF	0.55 - 1.1 kg/ha																					
		or Sencor 480F	SU	0.85 - 1.75 L/ha +																					
		+ linuron 480	SU	1.6 - 3.75 L/ha																					
	sulfentrazone + metribuzin	Sencor STZ - STZ	SC	157-219 ml/ha	-	-	E	-	E	F	-	E	-	-	-	-	-	-	-	-	-	P		12	60
		+Sencor 75DF	DF	600-800 g/ha																					
BEFORE EMERGENCE (GROUND CRACK)	metribuzin	Sencor 75DF	DF	0.55 - 1.5 kg/ha	G	E	E	E	E	E	E	G	G	G	-	-	F	-	P	-	-	G	MH	12	
		Sencor Solupak 75DF	DF	0.55 - 1.5 kg/ha																					
		Sencor 480F	SU	0.85 - 2.25 L/ha																					
	glufosinate ammonium	Ignite	SN	2.7 - 5.0 L/ha	+	E	E	E	E	E	E	E	F	E	E	E	-	-	-	-	F	G	LH	12	
	glufosinate ammonium + metribuzin	Ignite	SN	2.7 - 5.0 L/ha	+	E	E	E	E	E	E	E	E	E	E	E	E	-	-	-	F	G	MH	12	
		Sencor 75DF	DF	0.75 kg/ha																					
		Sencor 480F	SN	1.1 L/ha																					
	glyphosate	Roundup Weathermax / Ultra 2[1]	SN	0.5 - 2.33 L	G	E	E	E	E	E	E	E	E	E	E	E	G	-	-	+	+	F	MH	12	
		Roundup Weathermax / Ultra 2[1]	SN	1.67 -4.67 L	G	E	E	E	E	E	E	E	E	E	E	E	E	-	-	E	G	F	MH	12	

LEGEND

* A dash (-) in the weed control rating indicates lack of information. Do not use a herbicide more than once or apply an additional herbicide during the growing season unless split or combination treatments are registered. A plus (+) in the weed control rating indicates weeds will be controlled if emerged.

[1] Apply after weeds emerged but before potatoes emerge.

[2] Hazard ratings are derived from www.sagepesticides.qc.ca and only consider dose; not exposure. Actual risk is a combination of both.

NOTE: FOR ADDITIONAL INFORMATION AND CAUTIONS ON HERBICIDE USE, REFER TO "Ontario Ministry of Agriculture and Food
- Guide to Weed Control," Publication 75 and product labels.

HERBICIDES (pg 2)

FOR DETAILS ON HERBICIDES
SEE NOTES AND PRODUCT LABELS

Weed Control Ratings:
E - Excellent
G - Good
F - Fair
P - Poor

					Weed Control Rating																				
					annual broad leaves									annual grasses			Perennials								
SOON AFTER EMERGENCE CHECK NOTES FOR PRECAUTIONS	**Chemical Name**	**Product Name (s)**	**Formulation**	**Product/ha**	chickweed	hempnettle	lambsquarters	mustard family	pigweeds	ragweeds	smartweed family	wild buckwheat	wild radish	barnyard grass	foxtail	crabgrass	quackgrass	Canada thistle	sow thistle	goldenrod	field mint	Potato tolerance	Acute Hazard rating Mammals[2]	Reentry Time (hrs)	Pre-Harvest Interval (days)
	metribuzin	Sencor 75DF	DF	0.55 - 1.5 kg/ha	G	E	E	E	E	E	E	G	E	G	-	-	F	-	P			F	VLH	#	
		Sencor Solupak 75DF	DF	0.55 - 1.5 kg/ha																					
		Sencor 480F	SU	1.2 - 2.2 L/ha																					
POST-EMERGENCE	clethodim (annual grass 2 -6 leaf)	Arrow/X-Factor	EC + SURF	0.19 L/ha + 0.5% v/v	P	P	P	P	P	P	P	P	P	E	E	E	F	P	P	P	P	E	VLH	#	60
	clethodim (quackgrass 3-5 leaf)	Arrow/X-Factor	EC + SURF	0.38 L/ha + 1.0% v/v	P	P	P	P	P	P	P	P	P	E	E	E	E	P	P	P	P	E	VLH	#	60
	clethodim (annual grass 2 -6 leaf)	Clethodim 250	EC + SURF	0.19 L/ha + 0.5% v/v																					
	clethodim (annual grass 2 -6 leaf)	Select/Amigo	EC + SURF	0.19 L/ha + 0.5% v/v	P	P	P	P	P	P	P	P	P	E	E	E	F	P	P	P	P	E	VLH	#	60
	clethodim (quackgrass 3-5 leaf)	Select/Amigo	EC + SURF	0.38 L/ha + 1.0% v/v	P	P	P	P	P	P	P	P	P	E	E	E	E	P	P	P	P	E	VLH	#	60
	clethodim (quackgrass 3-5 leaf)	Clethodim 250	EC + SURF	0.38 L/ha + 1.0% v/v	P	P	P	P	P	P	P	P	P	E	E	E	E	P	P	P	P	E	VLH	#	60
	fenoxaprop-p-ethyl	Excel Super[1]	EC	0.67 L/ha	P	P	P	P	P	P	P	P	P	E	E	E	P	P	P	P	P	E	VLH	#	35
	fluazifop-p-butyl	Venture L	EC	1.0L/ha	P	P	P	P	P	P	P	P	P	E	E	G	F	P	P	P	P	E	VLH	#	45
	fluazifop-p-butyl Quackgrass(3-5 leaf)	Venture L	EC	2.0 L/ha	P	P	P	P	P	P	P	P	P	E	E	G	E	P	P	P	P	E	VLH	#	45
	rimsulfuron + Surf	Prism + Surf	DF + SURF	60 g/ha + 2L/1000L	G	-	F	G	G	-	-	-	E	E	E	E	G	-	-	E	-	G	LH	4	30
		Rimsulfuron 25 + Surf	WDG + SURF	60 g/ha + 2L/1000L	G	-	F	G	G	-	-	-	E	E	E	E	G	-	-	E	-	G	LH	4	30
	sethoxydim + Merge or Assist (Annual Grasses 2-5 leaf)	Poast Ultra + Merge or Assist	EC Surf Surf	0.47 L/ha+ 1 L/ha 1 L/ha	P	P	P	P	P	P	P	P	P	E	E	E	P	P	P	P	P	E	VLH	#	80
	sethoxydim + Merge or Assist (wild oats and volunteer cereals)	Poast Ultra + Merge or Assist	EC Surf Surf	0.32 L/ha + 1 L/ha 1L/ha	P	P	P	P	P	P	P	P	P	E	E	E	F	P	P	P	P	E	VLH	#	80
	sethoxydim + Merge or Assist (Quackgrass 1-3 Leaf)	Poast Ultra + Merge or Assist	EC Surf Surf	1.1 L/ha + 1 - 2 L/ha 1-2 L/ha	P	P	P	P	P	P	P	P	P	E	E	E	E	P	P	P	P	E	VLH	#	80
UP TO 60 DAYS BEFORE HARVEST	EPTC at lay-by	Eptam 8E	EC	4.2 - 5.6 L/ha	F	-	G	P	F	F	F	P	P	G	G	G	F	P	P	-	-	E	VLH	#	60

LEGEND

* A dash (-) in the weed control rating indicates lack of information. Do not use a herbicide more than once or apply an additional herbicide during the growing season unless split or combination treatments are registered.

[1] Do not tank mix with other herbicides

[2] Hazard ratings are derived from www.sagepesticides.qc.ca and only consider dose; not exposure. Actual risk is a combination of both.

NOTE: FOR ADDITIONAL INFORMATION AND CAUTIONS ON HERBICIDE USE, REFER TO "Ontario Ministry of Agriculture and Food
- Guide to Weed Control," Publication 75 and product labels.

NOTES ON HERBICIDES

All herbicides are known by a chemical name. Agricultural chemical companies use trade names for their products, but, by law, they must include on the label the accepted chemical name for the herbicide and the actual amount of that herbicide in the product. Supply companies sell products with different concentrations for the same herbicide and over the years some have changed the concentration of active herbicide in a product. Suggested rates in these notes specify the amount of herbicide product required per hectare.

CLETHODIM sold as **SELECT** or **ARROW** contains 240 g/L of clethodim. **SELECT** should be used at all times in a tank-mix with the adjuvant **AMIGO**. **ARROW** should be used at all times in a tank-mix with the adjuvant **X-ACT**. Clethodim is a systemic postemergence herbicide with uptake primarily through the leaves. Potatoes are tolerant to clethodim at all growth stages. Thorough coverage of the leaf foliage is necessary for consistent grass control. Do not apply if rainfall is expected within 1 hour of application.The time for complete control is normally 7 to 21 days depending on growing conditions and crop competition. Apply Select or Arrow when the annual grasses are in the 2 to 5 leaf stage and for optimum control when quackgrass is in the 3 to 5 leaf stage.

EPTC, sold as **Eptam 8E**, contains 800 g emulsifiable concentrate (EC) of EPTC per litre. It is applied under low pressure 200 kPa in 110-340 litres of water per hectare. Also available in granular formulations, it is used for potatoes as a pre-planting, pre-emergence or post-emergence treatment for many weeds, including annual grasses, quackgrass and nutsedge. A few broadleaf weeds, such as wild radish and wild mustard are not controlled. For control of annual grasses apply and incorporate EPTC either pre-planting or at lay-by. For control of dense stands of nutsedge and quackgrass apply and incorporate EPTC pre-planting. The underground quackgrass rhizomes must be cut up thoroughly so that four or less nodes remain on a stem. This is best done with discs set to cut 15 to 20 cm deep.

EPTC must be incorporated into the soil immediately to prevent loss of the herbicide. Once trapped into the soil, the vapour which forms when EPTC comes into contact with moisture acts to destroy germinating weed seeds and quackgrass rhizomes if the rhizomes are cut into short lengths of 7.5 cm or less. The soil must be in good tilth and have a dry surface. EPTC sprayed on wet soils vaporizes quickly into the air and is lost. It is less active in cold soils than in warm soils. It is difficult to incorporate into stoney soil. Whenever possible, application and incorporation should be done in the same operation

EPTC is incorporated using power driven cultivation equipment set to cut to a depth of 5 to 8 cm, or tandem discs set to cut to a depth of 10 to 15 cm, operated at 6.4 to 9.7 kilometres per hour, or a Danish type cultivator, with tines set on 15 to 20 cm centers, set 10 cm deep, operated at 10 to 13 km/hr. and followed by a spike tooth harrow or some other leveling device which extends beyond the ends of the discs or cultivator.

An overspray with a pre-emergence or post-emergence herbicide to control germinating annual broadleaf weeds is usually required to control some weeds tolerant to EPTC.

FENOXAPROP ETHYL, sold as **Excel** Super contains 80.5 g of fenoxaprop-p-ethyl per litre of Excel Super.

Fenoxaprop-p-ethyl is applied post-emergence to the potatoes for control of annual grasses in the 1 to 6 leaf stage. It will control green and yellow foxtail, barnyard grass, crabgrass, old witch grass, fall panicum and volunteer corn. Fenoxaprop-p-ethyl does not control broadleaf weeds, sedges, quackgrass or other perennial grasses. Second flushes of annual grasses will not be controlled since fenoxaprop-p-ethyl is not residual.

Apply Excel Super in at least 100 litres of water per hectare. Thorough coverage of the foliage is essential for effective grass control. Application through flat fan nozzles at a 45 degree angle forward will result in the best spray coverage. Do not apply if rain is expected within 1 hour of application.

As fenoxaprop-p-ethyl controls only annual grass weeds, it is important to control broadleaf weeds with another herbicide. A time interval of four days before or after fenaxaprop-p-ethyl application is required before any other pesticide is applied.

FLUAZIFOP-P-BUTYL, sold as **Venture L** contains 125 g fluazifop-p-butyl per litre. It is applied post-emergence to the potatoes and weeds and will give control of many annual grasses and also quackgrass. It does not control broadleaf weeds or sedges such as nutsedge. Growth of grasses stops soon after application but destruction of the whole plant may take several weeks. For annual grass control, apply when the annual grasses have 2-5 leaves. For quackgrass control, apply when the quackgrass has 3 to 5 leaves on each shoot. Do not apply if rainfall is expected within 2 hours of application.

GLYPHOSATE, sold as **Roundup Weathermax or Roundup Ultra 2** containing 540 g of acid equivalent of glyphosate per litre present as potassium salt, or **TOUCHDOWN iQ** containing 360 g of acid equivalent of glyphosate per litre present as diammonium salt, for perennial weed control prior to planting potatoes. Apply glyphosate in the spring or fall for quack (couch) grass control. The quackgrass must be at least 20 cm in height (3 to 4 leaf stage). Tillage prior to application will reduce control of quackgrass.

Weed control with glyphosate is reduced if dirty water is used for application. Where tillage is desired, delay for 5 to 7 days after application. Glyphosate has no soil activity. Therefore, it will not injure crops planted in the treated area. Roundup Wheathermax or Roundup Ultra, when used after weed emergence but before ground crack and potato emergence will control emerged weeds. Emerged potato plants will be injured and reduced yield may result.

LINURON* sold as **Lorox L** or **Linuron 480 FL** containing 480 g Linuron per litre or **Linuron 400 FL** with 400 g/L linuron, or **Lorox DF** containing 50% linuron. Apply linuron before potato sprouts emerge, never on the sprouts.

Abnormally heavy rainfall following application may cause crop injury. However, moisture is needed for good weed control action. Potato sets should be 5 cm below the treated soil.

The high rate usually controls annual grasses such as barnyard grass. Do not use on sand or coarse textured soils low in organic matter. Use the higher rate on clay.

Linuron formulated as soluble granular (DF) requires constant agitation to keep it in suspension.

METRIBUZIN sold as **Sencor Solupak 75DF**, and **Sencor DF** (dry flowable) 75% metribuzin, **Sencor 480F**, a liquid, contains 480 g/L. Metribuzin can be used pre-emergence or post-emergence on potatoes. The higher rate is usually required to control annual grasses and dense weed infestations. Also, the higher rate will retard the growth of quackgrass (use the lower rate for broadleaf weed control only). Moisture is needed shortly after a pre-emergence application for better weed control.

Do not use on Belleisle, Tobique, Sante or Tolaas cultivars. Use only pre-emergence on Shepody cultivars. Do not use on muck soil. Fall-seeded cover crops and certain vegetables such as cole crops, seeded the following spring are likely to be injured. Avoid overlaps that will increase dosages above the recommended. Read the manufacturer's label.

PRE-EMERGENCE APPLICATION (PLANTING TO GROUND CRACK) OF METRIBUZIN IS PREFERRED. However, where it is not possible to spray before crop emergence, metribuzin can be applied early post-emergence before weeds are 4 cm high and before first emerged potato tops are 7.5 cm high. This treatment may cause temporary yellowing and/or leaf burn, especially when the crop is under the stress of poor growing conditions such as cool, wet, cloudy weather. Under Atlantic Canada conditions, a few early post-emergence applications have occasionally reduced vine growth sufficiently to retard bulking and possibly to reduce yield. However, under these situations, the use of metribuzin early post-emergence to potatoes could be better than abandoning the crop to weeds such as barnyard grass which are difficult to control by cultivation.

Some of the limitations on early post-emergence applications are as follows:

a) Do not use when plants are under stress, such as cool, wet, cloudy weather or very dry soil conditions.

b) If insufficient metribuzin was used pre-emergence, it may be necessary to apply an additional early post-emergence treatment to control annual grass. In one season, do not apply more than a total of 1.1 kg active metribuzin per hectare.

c) Weed control with early post-emergence application is most effective when spray is applied before weeds are 4 cm high.

d) Do not apply metribuzin early post-emergence on Shepody, Tobique, Belleisle, Sante, Tolaas, red-skinned varieties or potatoes grown for early market.

e) Superior and Norchip are mid-season varieties which appear to be sensitive to metribuzin applied post-emergence.

RIMSULFURON sold as **PRISM** containing 25 % rimsulfuron, is a dry flowable formulation in water soluble bags. It is applied in a minimum of 100 l/ha of water and must be used within 24 hours as the herbicide will degrade in acidic or highly alkaline water. It must be applied with a non-ionic surfactant as recommended on the label. Mix **Prism** with at least one quarter of the water first and add the surfactant after the herbicide is thoroughly mixed. **Prism** is applied as a post-emergence treatment to control annual grasses in the 1 to 6 leaf stage and quackgrass in the 3 to 6 leaf stage. Control of some broad-leaf weeds is also obtained. Do not apply if rainfall expected within 2 hours of application.

SETHOXYDIM, sold as **Poast Ultra** contains 450 g of sethoxydim per litre. Sethoxydim is a postemergence, contact and systemic herbicide for control of certain grasses and uptake is primarily through leaves. Thorough coverage of the foliage is necessary for consistent grass control. Complete annual grass destruction takes 7 to 21 days depending on growing conditions and crop competition. Destruction of quackgrass may take 6 to 8 weeks.

Application is made at the 1 to 6 leaf stage of annual grasses and at the 3 leaf stage of quackgrass. A cultivation no sooner than 7 days after application of sethoxydim will improve grass control. Best results are obtained in water volumes of 50 to 200 litres per hectare. Do not use flood jet or hollow cone nozzles with this herbicide as level of grass control will be reduced. See product label of **Poast Ultra** for information on rate of application and mixes with surfactants **Merge** and **Assist**. Surfactants are required to be used with **Poast Ultra**. This herbicide does not control broadleaf weeds. Use an appropriate pre-emergence herbicide to control broadleaf weeds. Do not apply if rainfall is expected within 1 hour of application.

S-METOLACHLOR , sold as **Dual II Magnum** containing **915 g/L** emulsified concentrate (**EC**). It controls large and smooth crabgrass, witch grass, barnyard grass, fall panicum, green and yellow foxtail, yellow nutsedge, American nightshade and eastern black nightshade. For control of yellow nutsedge apply pre-plant incorporated (ppi) (see label) or for annual grasses either ppi or pre-emergence. Use the higher rate wherever annual grasses or yellow nutsedge predominates or densities of weeds are expected to be high. Do not apply to potatoes at ground crack or if potatoes have emerged. Rainfall within 10 hours is required for maximum activity of the pre-emergence application. Residual activity will normally be retained for 10 - 14 weeks. Winter cereals may be planted 4 - 5 months after s-metolachlor application. See the product label for registered tank mix combinations. Do not use s-metolachlor on muck soils or coarse textured soils low in organic matter. Do not use on the variety Superior.

INSECTICIDES

Please see insecticide notes and /or your Extension Specialist.

S - Spray
B - Band

I - In Furrow
BR - Broadcast

PL - Apply at Planting
ST - Seed Treatment

Chemical or Biological	Product	Formulation	Product/ha	Days to Harvest	GREEN PEACH APHID	COMMON POTATO APHID	BUCKTHORN APHID	COLORADO POTATO BEETLE	FLEA BEETLE	WIREWORMS	EUROPEAN CORN BORER	TARNISHED PLANT BUG	LEAFHOPPERS	APPLICATION METHOD	ACUTE HAZARD RATING[2] MAMMALS	ACUTE HAZARD RATING[2] FISH	Re-entry time
Anthranilic diamides																	
Chlorantraniliprole	CORAGEN	SU	0.250 - 0.375 ml	14				*			*			S	LH	EH	12 hours
Cyantraniliprole	VERIMARK	SU	0.75 - 1 L	PL				*	*					I	LH	EH	12 hours
Benzoylphenyl																	
Novaluron	RIMON 10 EC	EC	0.410 - 0.820 L	14				*			*			S	LH	EH	12 hours
Butenolides																	
Flupyradifurone	SIVANTO PRIME	SU	0.5 - 1 L	7	*	*		*					*	S	LH	LH	12 hours
Carbamate																	
Carbaryl	SEVIN XLR	SU	1.25 - 6.4 L	7				*	*		*	*	*	S	MH	EH	24 hours
Methomyl	LANNATE SP	SP	0.54 kg	3	*	*	*		*				*	S	HH	EH	24hours
Oxamyl	VYDATE L	EC	2.3 - 3.0 L	7	*	*		*	*			*	*	S	EH	HH	24 hours
Chloronicotinyl[1]																	
Acetamiprid	ASSAIL 70 WP	WP	0.04 - 0.086 kg	7	*	*	*	*						S	MH	LH	12 hours
Clothianidin	TITAN ST	SU	20.8 ml / 100kg of seed	PL/I	*	*	*	*		*				ST	LH	LH	N/A
	CLUTCH 50 WDG	WDG	0.266 - 0.448 kg	PL	*	*	*	*						PL/I	LH	LH	N/A
	CLUTCH 50 WDG	WDG	0.07 - 0.105 kg	14	*	*	*	*						S	LH	LH	12 hours
Imidacloprid	ADMIRE 240F	FLOW	0.85 - 1.3 L	PL	*	*	*	*	*				*	PL/I	LH	LH	N/A
	ADMIRE 240F	FLOW	26-39 ml / 100 kg of seed	PL	*	*	*	*	*				*	ST	LH LH	LH	N/A
	ADMIRE 240F	FLOW	0.2 L	7	*	*	*	*					*	S	LH	LH	24 hours
	ALIAS 240 SC	SC	0.85-1.3 L	PL	*	*	*	*	*				*	I	LH	LH	N/A
	ALIAS 240 SC	SC	26-39 ml / 100 kg of seed	PL	*	*	*	*	*				*	ST	LH LH	LH	N/A
	ALIAS 240 SC	SC	0.2 L	7	*	*	*	*					*	S	LH	LH	24 hours
Imidaclorprid + Deltamethrin	CONCEPT		0.65 L	7	*	*	*	*	*		*	*	*	S	MH	EH	12 hours
Thiamethoxam	ACTARA 240 SC	SC	0.378-0.489 ml	PL	*	*	*	*					*	PL/I	LH	LH	12 hours
	ACTARA 240 SC	SC	0.378-0.489 ml	7	*	*	*	*					*	S	LH	LH	12 hours
Thiamthoxam + Cyantraniliprole	MINECTO DUO	WG	0.44 - 0.7 kg	PL	*	*	*	*	*				*	I	LH	EH	12 hours
Naturalyte																	
Spinetoram	DELEGATE	WG	0.16 - 0.24 kg	7				*			*			S	MH	HH	12 hours
Spinosad	SUCCESS	SC	0.083-0.166 ml	7				*			*			S	LH	LH	12 hours
	ENTRUST	SC	0.167 - 0.334 L	7				*			*			S	LH	LH	12 hours
Organophosphate																	
Chlorpyrifos	LORSBAN NT	EC	1.0 L	7				*	*			*		S	HH	EH	24 hours
	LORSBAN 50W	WP	1.125-2.25 kg	7					*			*		S	HH	EH	24 hours
	PYRIFOS 15 G	G	11.2 kg	PL						*				PL/I	HH	EH	24 hours
	WARHAWK 480EC	EC	1.0 L	7				*	*			*		S	HH	EH	24 hours
	PYRINEX 480EC	EC	1.0 L	7				*	*			*		S	HH	EH	24 hours

NOTE: Because of Colorado Potato Beetle resistance to insecticides and to prevent the development of resistance in other pests, AVOID REPEAT APPLICATIONS OF INSECTICIDES

[1]To avoid development of Colorado Potato Beetle resistance, do not use Admire, Assail, Alias or Actara as a foliar spray if Admire, Alias, Actara, Clutch OR Titan in-furrow or seed treatment has been used.

[2] Hazard ratings are derived from www.sagepesticides.qc.ca and only consider dose; not exposure. Actual risk is a combination of both.

INSECTICIDES PG2

Please see insecticide notes and /or your Extension Specialist.

S - Spray
B - Band

I - In Furrow
BR - Broadcast

PL - Apply at Planting
ST - Seed Treatment
* - Registered
- - Information not available

Chemical or Biological	Product	Formulation	Product/ha	Days to Harvest	GREEN PEACH APHID	COMMON POTATO APHID	BUCKTHORN APHID	COLORADO POTATO BEETLE	FLEA BEETLE	WIREWORMS	EUROPEAN CORN BORER	TARNISHED PLANT BUG	LEAFHOPPERS	APPLICATION METHOD	ACUTE HAZARD RATING[1] MAMMALS	ACUTE HAZARD RATING[1] FISH	Re-entry time
Organophosphates cont...																	
dimethoate	CYGON 480EC	EC	0.55 - 1 L	7	*	*	*						*	S	LH	MH	48 hours
	LAGON 480E	EC	0.55 - 1.1 L	7	*	*	*					*	*	S		MH	48 hours
malathion	MALATHION 50EC	EC	1.5 - 2.25 L	3	*	*	*							S	LH	EH	-
	MALATHION 500E	EC	1.5 - 2.25 L	3	*	*	*	*					*	S	LH	EH	-
	MALATHION 85E	EC	1.0 L	3	*	*	*						*	S	LH	EH	-
naled	DIBROM	EC	1.1 L	4				*	*				*	S	HH	EH	48 hours
phorate	THIMET 20G	GR	11 - 19.8 KG	PL						*				B/I	EH	EH	48 hours
phosmet	IMIDAN 50WP	WP	2.25 kg	7		*		*	*				*	S	HH	EH	5 days
Pyridine Azomethine																	
pymetrozine	FUFILL 50 WG	WG	193 g +Surf	14	*	*	*							S	HH	LH	12 hours
Pyridine Carboxamide																	
Flonicamid	BELEAF	SG	0.12 - 0.16 kg	7	*	*	*							S	LH	LH	12 hours
Sulfoxamides																	
sulfoxaflor	CLOSER	SC	0.05 - 0.15 L	7	*	*	*							S	LH	LH	12 hours
Synthetic pyrethroid																	
Bifenthrin	CAPTURE 240	SC	0.925 - 1.404 L	21						*				I	MH	EH	12 hours
cypermethrin	RIPCORD 400	EC	0.065 - 0.125 L	7				*	*			*	*	S	HH	EH	24 hours
	UP CYDE 2.5EC	EC	0.14 - 0.2 L	7				*	*			*	*	S	HH	EH	24 hours
	MAKO	EC	0.065 - 0.125 L	7				*	*			*	*	S	HH	EH	24 hours
deltamethrin	DECIS 5EC	EC	0.1-0.25 L	1		*	*	*	*		*	*	*	S	MH	EH	24 hours
	CONCEPT	SU	0.650 L	7	*	*	*	*	*		*	*	*	S	MH	EH	12 hours
	POLECI 2.5EC	EC	0.2-0.5 L	1		*	*	*	*		*	*	*	S	MH	EH	24 hours
Lambda-cyhalothrin	MATADOR 120EC	EC	0.083 - 0.125 L	7				*	*		*	*	*	S	HH	EH	24 hours
	SILENCER 120 EC	EC	0.083 - 0.125 L	7				*	*		*	*	*	S	HH	EH	24 hours
permethrin	PERM UP	EC	0.18 - 0.26 L	1										S	LH	EH	24 hours
	POUNCE	EC	0.19-0.25 L	1				*	*		*	*	*	S	LH	EH	when dry
	AMBUSH 500EC	EC	0.14 - 0.20 L	1				*	*		*	*	*	S	LH	EH	when dry
	BIO-ENVIRONMENTAL PERMETHRIN	SC	0.185 L	1				*	*			*	*	S	LH	EH	-
Tetramic acid																	
Spirotetramat	MOVENTO 240	SC	0.22 - 0.365 L	7	*	*	*							S	HH	MH	12 hours
Botanical																	
Kaolin	SURROUND	WP	6.25 - 12.5 kg	0								*		S	LH	LH	when dry

Because of Colorado Potato Beetle resistance to insecticides and to prevent the development of resistance in other pests, AVOID REPEAT APPLICATIONS OF INSECTICIDES FROM THE SAME CHEMICAL GROUP.

[1]Hazard ratings are derived from www.sagepesticides.qc.ca and only consider dose; not exposure. Actual risk is a combination of both.

INSECT CONTROL

The management of insect pests on potatoes continues to rely on synthetic insecticides but their continued usefulness can only be insured by the concurrent use of cultural and alternative control methods.

Scouting

Monitor each field once or twice a week to identify the insect pests present and determine the relative abundance of their different life stages. Note the growth stage of the crop. Keep in mind that the previous crop, cropping practices and the type of vegetation surrounding the field affect the presence and the development of the insects. Information on the changes in the abundance of insect pests in your region can be obtained from a variety of pest forecasting and monitoring services offered by government extension specialists and private consultants.

Use all the information gathered to develop an insect control program for the season or to respond to a specific pest outbreak.

Alternative Control Methods

A number of non-insecticidal control methods are now available. These methods are environmentally friendly and help prolong the effective life of insecticides if they are used consistently, year after year. These methods are most effective against the Colorado potato beetle but many will help reduce the abundance of other insects.

Field rotation. Rotate fields frequently and isolate fields whenever possible. This will delay field colonization by overwintered adults and reduces their abundance in the crop. Increasing the distance between last year's potato field and this year's potato field will increase the level of beetle control.

Plastic-lined trenches. Install trenches around potato fields adjacent to Colorado potato beetle overwintering sites or field planted to potatoes the previous year. On the average, trenches reduce the abundance of overwintered adult beetles on the crop by 50%. This will also reduce the number of egg masses in the potato field.

Propane burner. Very effective at reducing the abundance of overwintered adult Colorado potato beetles on short plants up to 4" in height. Also reduces the viability of egg masses. More than one pass per season may reduce yield.

Resistance Management

Insecticide resistance is present in many populations of Colorado potato beetles in the Atlantic region. It is recommended that a few simple steps be followed to manage the problem with the Colorado potato beetle and prevent the development of insecticide resistance.

1. Reduce the number of insecticide applications by using alternative control methods.
2. Apply an insecticide only if the abundance of an insect pest has reached a level where it can cause an economic yield loss.
3. Rotate to an insecticide of a different chemical class after each application of a particular insecticide. If using an insecticide at planting - Make sure any subsequent foliar applications are of a different chemical class of insecticides.
4. Use the right nozzles on a recently calibrated sprayer to insure that the insecticide is applied to the target pest on the crop with minimal drift to the environment. Consider banding rather than treating the whole area.
5. Apply only at the recommended rate for the pest.
6. All insecticides listed in this guide will control some potato insect pests, however, differences in their respective modes of action, persistence, sensitivity to temperature and pest specificacy must be considered when choosing a chemical.

NOTES ON INSECTICIDES

Many of the insecticides used on potatoes are highly poisonous to man, animals, fish and beneficial insects. Poisoning of the applicator can occur by swallowing, inhaling or by skin contact. FOLLOW ALL PRECAUTIONS STATED ON THE PRODUCT LABEL. It is against the law not to comply with the label instructions of a pesticide under the Pest Control Products Act of Canada. Contamination of fisheries waters by pesticides is also against the law under the Fisheries Act of Canada.

Anthranilic Diamides

Coragen provides extended residual control of Colorado potato beetle and European corn borer (ECB) in potatoes. It is from the Group 28, Anthranilic diamide class of pesticides. Effective at multiple stages of the life cycle, Coragen provides excellent crop protection. The rapid cessation of feeding, residual activity and the rainfast properties of Coragen deliver rapid and long-lasting plant protection under a range of growing conditions.

Benzoylphenyl

Rimon is an insect growth regulator and is effective against Colorado potato beetle and European corn borer (ECB). Its primary mode of action is by disrupting cuticle formation and deposition occurring when insects change from one developmental stage to another resulting in death at molting. Rimon has no effect on adult stages of insects. Scout for ECB to monitor egg laying and egg hatch to determine application timing.
This product may be toxic to bee colonies exposed to direct treatment, drift or residues on flowering crops or weeds.

Carbamates

Non systemic carbamates generally remain effective for 7 - 10 days.

Carbaryl has low toxicity to man and animals but is highly toxic to bees. It is effective against beetles for 3-4 days under favourable conditions (the XLR formulation may be wash-off resistant for as much as 7 - 10 days). It does not control aphids. Repeated applications usually cause an increase in aphid populations, since it kills aphid predators.

Methomyl has low toxicity to man and animals
but is highly toxic to bees. Foliar applications are effective against aphids and flea beetles through contact and some systemic action. Effective insect control lasts less than 7 days.

Oxamyl has moderate toxicity to humans. It is effective against the beetles and the aphids through contact and systemic action.

Pirimicarb has low toxicity to humans. It is very effective any time against aphids, acting through contact and vapour action.

Chlorinated hydrocarbons

Endosulfan is moderately toxic to humans. It is effective against beetles and the buckthorn aphid. Low temperatures decrease its effectiveness, especially against the buckthorn aphid.

Chloronicotinyls

Nicotinyls affect the nervous system of insects by blocking a specific type of receptor on the post-synapse.

Acetamiprid is effective against the Colorado potato beetle and aphids.

Clothianidin is a broad spectrum effective insecticide providing protection against wide range of pests including Colorado potato beetle, aphids, flea beetles, leaf hoppers and wireworm suppression.

Imidacloprid is effective against the Colorado potato beetle, the flea beetle, leaf hoppers and aphids. Both products have low toxicity to humans and animals but when used as a foliar spray are highly toxic to bees.

Thiamethoxam is a subclass of the chloronicotinyls family. It is effective against the Colorado potato beetle, aphids and leafhoppers. Like other products in this chemical group is has low toxicity to humans and animals and when used as a foliar spray is highly toxic to bees

Naturalyte

Unique mode of action associated with insect nervous system and acts through contact and ingestion. It is not systemic in the plant.

Spinosad is effective against Colorado potato beetle and European Corn Borer. It has very low toxicity to humans, animals and beneficial insects but highly toxic to bees. Maximum application per season is 249 ml/ha. Target Colorado potato beetle at egg hatch and small larval stages.

Organophosphates

Non-systemic organophosphates remain effective for 7-14 days.

Chlorpyrifos has low toxicity to humans. It works through contact, ingestion and vapour action against the beetles. It does not control aphids. Pyrifos 15 G applied in furrow at planting time is only registered for wireworm control.

Diazinon has low toxicity to human and animals but is highly toxic to bees. It works through contact, systemic and ingestion action against aphids, Colorado potato beetles, and potato flea beetles.

Dimethoate has low toxicity to humans. It is effective against the potato and the buckthorn aphids by contact and systemic action.

Malathion has low toxicity to man and animals but is highly toxic to bees. It is registered for use against aphids and, most formulations, the Colorado potato beetle.

Methamidophos is highly toxic to humans. It is effective against both species of beetles and all three species of aphids by contact and local systemic action. It will control large populations of aphids late in the season. It provides a quick, initial knockdown as well as residual control.

Naled is moderately toxic to humans. It is a fast acting insecticide that gives good control of the beetle. Do not apply above 32°C.

Phorate is highly toxic to humans. It is effective against all pests. It does not persist long enough to control the second peak of flea beetles and its control of aphids is variable.

Phosmet has low toxicity to humans. It is a contact and stomach poison that is effective against the beetles.

Pyridine Azomethines

Pymethrozine mode of action is of a neural inhibition of feeding behavior.

Pymetrozine is very selective for activity against the Green Peach, Potato, Foxglove and Buckthorn aphid. Aphids stop feeding after exposure by contact or ingestion. Aphids do not feed again and subsequently die after several days due to starvation or dessication. A reduced risk product for humans and animals. Thorough spray coverage of plant foliage is essential for optimum control. The use of an adjuvant such as Agrol 90, Agsurf, LI 700 or Sylgard 309 is recommended to improve the performance of Fulfill under drought stress conditions.

Synthetic Pyrethroids

In contrast to carbamates and organophosphates the toxicity of pyrethroids decreases as temperature rises. Whenever possible synthetic pyrethroids should be applied at temperatures below 24°C. They are generally toxic to bees and other beneficial insects but most are of low mammalian toxicity. These insecticides are extremely toxic to fish, shellfish and aquatic organisms which are food for fish and waterfowl. Careless use can seriously harm sport and commercial fisheries and wildlife.

Although pyrethroids are generally poor potato aphicides, they may reduce probing by colonizing aphids which may protect the plants from infestation and virus spread as long as the residual dose is sufficient, even if it is no longer lethal. Being virtually insoluble in water, they offer excellent resistance to leaching out during rain. They should not be used on muck soils.

Allow a minimum of 24 hours before evaluating the efficacy of a pyrethroid spray to permit enough time for the insects to return to the plant and feed some more after the knockdown effect.

Cypermethrin is effective against the Colorado potato beetles by contact and stomach action.

Deltamethrin is effective against the Colorado potato beetles as a contact and stomach poison. Effective against the common potato aphid and the buckthorn aphid at higher rates.

Cyhalothrin-lambda is effective against Colorado potato beetles by contact and stomach action.

Permethrin is effective against the Colorado potato beetles. Thorough coverage of plants is important and the higher rate is required for heavy infestations. It is a contact and stomach poison.

Tetramic Acid

Movento (Spirotetramat) has low toxicity to humans and animals. Spirotetramat provides excellent, long-term control of immature and adult female stages of aphids, Psyllid, Whitefly. Following a foliar application Spirotetramat rapidly moves into leaf vascular tissue and is carried up and down the plant system to protect leaf and root tissue. Spirotetramat's residual activity continues to protect new plant growth. Most effective when applied as a preventative or early threshold treatment – prior to the establishment of a highly damaging pest population. Spirotetramat must be applied with a non-ionic adjuvant (such as Agral 90) at 0.2% volume to volume.

Bacteria

Some varieties of the bacterium *Bacillus thuringiensis* are active against the larvae of the Colorado potato beetle. For optimum results, apply early in the season against small actively feeding larvae. Repeat the application twice at intervals of 5-7 days or after a heavy rainfall. The bacteria are not fast acting. Larval death occurs only 1 - 5 days later but the larvae stop feeding after eating foliage sprayed with the bacteria. These products are not very effective against large larvae and will not kill adults and other insect species.
Bacillus thuringiensis **(Novodor)** is effective against the Colorado potato beetle larvae by stomach action. The higher rate is required for heavy infestations.

FOLIAR FUNGICIDES

Fungicide Group Code	FUNGICIDE	PRODUCT RATE / HA				DAYS TO HARVEST	HAZARD RATING[1]		AQUATIC BUFFER ZONE[2]
		LATE BLIGHT	EARLY BLIGHT	BROWN SPOT	SCHLOERTINIA (WHITE MOLD)		HUMANS	FISH	
	Azoxystrobin								
11	Quadris F	0.8 L	0.5 - 0.8 L			1	MH	HH	15 M
11	Azoshy SC	0.8L	0.5 - 0.8 L			1	MH	HH	15 M
	Azoxystrobin + Difenaconazole								
11, 3	Quadris Top		1 L	0.566 - 1L	1L	1	MH	HH	15M
	Ametoctradin + Dimethomorph								
40, 45	Zampro	0.8 - 1.0 L				4	LH	EH	15 M
	Bacillus Amyloliquifaciens								
44	Double Nickel LC		2.5 - 10 L		1 - 12.5 L	0	LH	LH	15 M
	Bacillus Mycoides Isolate								
P6	LifeGard WG[3]	0.33 g	0.33 g			0	-	-	15 M
	Bacillus Subtilis								
44	Serenade Opti	1.1 - 2.2 kg	1.1 - 2.2 kg			0	MH	LH	15 M
	Benzavindiflupyr + Difenaconazole								
3, 7	Aprovia Top		0.967 L	0.643 - 0.967 L		14	MH	EH	15 M
	Boscalid								
7	Cantus		0.175 - 0.315 kg			30	LH	MH	15 M
	Chlorothalonil								
M	Bravo Zn	1.2 - 2.4 L	1.6-2.4 L	1.6-2.4 L		1	HH	EH	15 M
M	Echo 90DF	0.7 - 1.3 kg	0.9 - 1.3 kg			1	HH	EH	15 M
M	Echo 720	0.8 - 1.7 L	1.1L	1.1L		1	HH	EH	15 M
	Copper								
M1	Parasol WG	1.1 - 2.5 kg + 1.75 - 2.25 kg mancozeb	1.1 - 2.5 kg + 1.75 - 2.25 kg mancozeb			2	HH	EH	40 M
M	Parasol Flowable	0.80 - 1.80 L + 1.75 - 2.25 kg mancozeb				2	HH	EH	40 M
M	Kocide 2000	0.8 - 1.6 Kg + 1.7 5- 2.25 kg mancozeb	0.8 - 1.6 Kg + 1.7 5- 2.25 kg mancozeb			1	HH	EH	40 M

[1]Hazard ratings are derived from www.sagepesticides.qc.ca and only consider dose; not exposure. Actual risk is a combination of both. When products are tank-mixed, hazard rating is deferred to the highest rating.

[2]Some new labels have restriction re: buffer zones around riparian areas. Please refer to product labels

[3]LifeGard only provides suppression of Early Blight and Late Blight.

PLEASE CONSULT LABELS FOR MAXIMUM APPLICATIONS PER SEASON, MAXIMUM APPLICATIONS PER DAY, RE-ENTRY INTERVALS AND OTHER IMPORTANT CONSIDERATIONS.

FOLIAR FUNGICIDES PAGE 2

Fungicide Group Code	FUNGICIDE	PRODUCT RATE / HA				DAYS TO HARVEST	HAZARD RATING[1]		AQUATIC BUFFER ZONE[2]
		LATE BLIGHT	EARLY BLIGHT	BROWN SPOT	SCHLOERTINIA (WHITE MOLD)		HUMANS	FISH	
21	Ranman 400 SC	0.1 - 0.2 L				7	HH	LH	15 M
21	Torrent 400 SC	0.1 - 0.2 L				7	HH	LH	15 M
	Cymoxanil								
27	Curzate 60 DF	225 g + 1.35 - 1.6 kg mancozeb				8	LH	LH	15 M
	Cymoxanil + Famoxadone								
27, 11	Tanos 50 DF	0.56 - 0.84 kg	0.56 - 0.84 kg			14	LH	EH	15 M
	Dimethomorph		0.1 - 0.2 L						
40	Forum	0.45 L				4	LH	MH	15 M
	Fenamidone								
11	Reason 500 SC	200 ml + chlorothalonil or mancozeb	200 ml + chlorothalonil or mancozeb			14	LH	HH	15 M
	Fluazinam								
29	Allegro 500 F	0.4 L			0.4 - .6 L	14	HH	EH	15 M
	Fluopicolide								
43	Presidio	0.22 - 0.292 L				7	LH	HH	15 M
	Fluopyram + Pyrimethanil								
7, 9	Luna Tranquility		0.6 L	0.6 L	0.8 L	7	LH	MH	15 M
	Fuoxastrobin								
11	Evito 480 SC	0.278 L				7	LH	HH	15 M
	Fluxapyroxad								
7	Sercadis		0.167 - 0.333 L		0.333 L	7	LH	HH	15 M
	Mancozeb								
M	Dithane DG Rainshield NT	1.1 - 2.25 kg	1.1 - 2.25 kg			1	MH	EH	15 M
M	Manzate Pro-Stick	1.1 - 2.25 kg	1.1 - 2.25 kg			1	MH	EH	15 M
M	Penncozeb 80 WP	1.1 - 2.25 kg	1.1 - 2.25 kg			1	MH	EH	15 M
M	Penncozeb 75 DF Raincoat	1.1 - 2.25 kg	1.1 - 2.25 kg			1	MH	EH	15 M
	Mancozeb + Chlorathalonil								
M	Elixir	1.68 - 2.24 kg				1	HH	EH	20 M
	Mandipropamid								
40	Revus	0.4 - 0.6 L				14	LH	MH	15 M

[1] Hazard ratings are derived from www.sagepesticides.qc.ca and only consider dose; not exposure. Actual risk is a combination of both. When products are tank-mixed, hazard rating is deferred to the highest rating.

[2] Some new labels have restriction re: buffer zones around riparian areas. Please refer to product labels

PLEASE CONSULT LABELS FOR MAXIMUM APPLICATIONS PER SEASON, MAXIMUM APPLICATIONS PER DAY, RE-ENTRY INTERVALS AND OTHER IMPORTANT CONSIDERATIONS.

FOLIAR FUNGICIDES PAGE 3

Fungicide Group Code	FUNGICIDE	PRODUCT RATE / HA				DAYS TO HARVEST	HAZARD RATING[1]		AQUATIC BUFFER ZONE[2]
		LATE BLIGHT	EARLY BLIGHT	BROWN SPOT	SCHLOERTINIA (WHITE MOLD)		HUMANS	FISH	
	Metalaxyl								
4	Ridomil Gold MZ	2.5 kg	2.5 kg			3	HH	EH	15M
	Metconazole								
3	Quash		0.175 kg - 0.280 kg		0.280 kg	1	MH	MH	15M
	Metiram								
M	Polyram DF	1.1 - 2.25 kg	1.1 - 2.25 kg			1	HH	HH	15M
	Oxathiapiprolin + Mandipropamid								
40, 49	Orondis Ultra	0.4 - 0.6 L				14	LH	HH	15M
49	Orondis B (as part of co-pack)	0.12 - 0.35 L				14			15M
	Penthiopyrad								
7	Vertisan		1 - 1.75 L			7	LH	HH	15M
	Phosphorus Acid								
33	Confine Extra	5 - 10 L				0	LH	LH	15M
33	Phostrol	2.9 - 11.6 L				0	LH	LH	15M
	Propamocarb + Chlorathalonil								
U, M	Tattoo C	2.7 L				7	HH	LH	15M
	Pyraclostrobin								
11	Headline 250 EC	0.45 - 0.67 L	0.45 - 0.67 L			3	HH	EH	15M
	Pyraclostrobin + Metiram								
11, M	Cabrio Plus	2.25 - 3.35 kg	2.25 - 3.35 kg			3	HH	EH	15M
	Pyrimethanil								
9	Scala 400 SC		0.75 + 1.6 - 2.4 L chlorathalonil			7	LH	MH	15M
	Zoxamide								
M, 22	Gavel 75 DF	1.75 - 2.25 kg	1.75 - 2.25 kg			3	HH	HH	15M

[1] Hazard ratings are derived from www.sagepesticides.qc.ca and only consider dose; not exposure. Actual risk is a combination of both. When products are tank-mixed, hazard rating is deferred to the highest rating.

[2] Some new labels have restriction re: buffer zones around riparian areas. Please refer to product labels

PLEASE CONSULT LABELS FOR MAXIMUM APPLICATIONS PER SEASON, MAXIMUM APPLICATIONS PER DAY, RE-ENTRY INTERVALS AND OTHER IMPORTANT CONSIDERATIONS.

NOTES ON FUNGICIDES

Fungicides are grouped by their chemical family. In order to reduce the risk of resistance, it is very important to rotate chemical families throughout the season when applying fungicides. In recent years, many fungicides come off patent and more generic products are available to growers. Some companies combine active ingredients in one fungicide. Additionally, there have been new fungicide registrations with novel technology. With all the choice available to growers, it is more important than ever to be aware of the active ingredient you are applying, and which chemical group it belongs to.

GROUP 11 fungicides should be rotated with fungicides from other chemical groups. These fungicides include **Quadris, Azoshy, Quadris Top, Reason, Tanos, Evito** and **Headline**. Refer to the label for product specific number of applications, number of subsequent applications, total active ingredient per acre, and other considerations.

COPPER fungicides can be applied without a mancozeb product at topkill with a topkiller; or after topkill and prior to harvest. Refer to the **Parasol WG, Parasol Flowable,** and **Kocide** labels for proper copper rates for this application timing.

REVUS AND ORONDIS ULTRA contain the same active ingredient (mandipropamid). If Revus has been used as a seed piece treatment, the total active ingredient per acre must be subtracted from the maximum amount of mandipropamid allowed per acre per season (243 g mandipropamid per acre per season). Where Revus has been used as a seed piece treatment, the first foliar fungicide may not contain a Group 40 fungicide.

PHOSPHORUS ACID products also have recommendations for suppression of pink rot. Do not use Confine Extra on seed.

CHLORATHALONIL products also have label recommendations for control of botrytis gray mold. Please refer to label for rates to control Botrytis.

MAXIMUM RESIDUE LABELS (MRLs) have not been established for export for **Presidio**. Check with your potato buyer before using Presidio.

DIMETHOMORPH AND FENAMIDONE must be tank-mixed with a protectant, such as chlorothalonil or mancozeb. Refer to the product label for tank mix rates.

APROVIA AND APROVIA TOP contain the same active ingredient (benzovindiflupyr). If Aprovia is used as an in-furrow treatment, then only one foliar application of Aprovia Top is allowed.

METALAXYL products also have label recommendations for suppression of pink rot and Pythium leak. Experience has shown that metalaxyl-insensitive strains of Late Blight and Pink Rot may develop. Metalaxyl products should not be used when late blight is present in fields.

QUADRIS TOP also has label recommendations for suppression of black dot. Please refer to label for rates to suppress Black Dot.

LUNA TRANQUILITY also has label recommendations for control of black dot and white mold. Please refer to label for rates to control Black dot.

SERENADE OPTI also has label recommendations for suppression of Early Blight and White Mold. Please refer to label for rates to control these diseases.

SPROUT INHIBITORS

Sprout inhibitors provide a rather inexpensive means of keeping potatoes in good condition for the late fresh and processing markets.

Sprouts increase water loss from tubers and reduce the volume of saleable potatoes. Sprouting may cause color loss in processing potatoes.

When sprout inhibitors are used as directed, tuber residues are below tolerance levels and there are no harmful effects on humans.

	METHOD OF APPLICATION	COMMENTS
Maleic Hydrazide (Royal MH 60SG)	Applied at 3.39 kg active (5.65 kg product) per hectare in a minimum of 300 L/ha water with ground equipment. No storage restrictions for seed potatoes exist with Maleic Hydrazide treated potatoes.	Time of application is critical. **Follow label instructions carefully.**
(Royal MH 30 Xtra)	Applied at 2.86 L active (12.6 L product) per hectare in a minimum of 300 L/ha water with ground equipment.	Time of application is critical. **Follow label instructions carefully.**
Chlorpropham (CIPC) (Fog Application)	Applied in storage after curing and suberization are complete. Cannot be used in a storage containing seed potatoes. Seed cannot be safely stored in a treated storage within 3 years of treatment.	**In-storage application is available only from a manufacturer's representative.** Effectiveness can be reduced by dirty potatoes, poor air distribution and advanced physiological age. Consult your applicator.
Chlorpropham (Sprout-Nip E.C.)	Emulsifiable food grade formulation of chlorpropham used after storage. Mixed with water and misted on potatoes during the grading operation. Prepare a 1% emulsion by adding 1 litre of Sprout-Nip E.C. (350g active) to 35 litres water. Apply emulsion at 1.0 litres per tonne.	Used to control sprouting during retailing and home storage by the consumer. **Potatoes must be clean and all bruises and cuts healed.** Dirt may prevent chemical from reaching the potato eyes. **Follow label instructions carefully** in regards to application equipment, mixing directions and application rates.
3-decen-2-one (SmartBlock)	Preferred method of application is fogging. Apply 137.5 mL per tonne of potatoes. Reapply as necessary when tubers show visible signs of re-sprouting; however, do not apply more than 550 mL per tonne per season.	SmartBlock is effective only after sprouting has commenced (i.e. peeping). Potatoes can be removed from storage area and shipped within 24 hours after ventilation is resumed. **Follow label instructions carefully**. SmartBlock can be used as part of a program with other registered sprout control products.

Never use sprout inhibitors in a seed storage.
Never store treated potatoes in a seed storage.
Never use treated potatoes for seed.

POST HARVEST FUNGICIDES

These fungicides are effective only when the TOTAL SURFACE of each tuber is covered and recommended rates are used.

Confine
Confine is a post harvest treatment for russet – skinned potatoes and potatoes intended for processing for the suppression of Late Blight (Phytophthora infestans) and Pink Rot (Phytophthora erythroseptica) storage infection. Dilute Confine at a 1:4.3 ratio with water. Apply 2 litres of this solution as a spray to 1000 kg of potatoes prior to storage. Ensure complete and even coverage. Confine contains 45.8 % phosphorous acid.

Phostrol
Phostrol Fungicide controls late blight (Phytophthora infestans) and pink rot (Phytophthora erythroseptica) on stored potatoes. Apply 0.42 L in 2 L of water and apply to 1 tonne of potatoes. Apply directly to tubers and ensure complete and even coverage.

Rampart
Rampart Fungicide controls late blight (Phytophthora infestans) and pink rot (Phytophthora erythroseptica) on stored potatoes. A maximum of one application of RAMPART Fungicide per year may be made, either as a single spray or rinse to harvested potato tubers prior to storage or as a single application through the humidification system to potatoes in storage. Apply Rampart Fungicide as soon as possible after harvest. Application prior to storage of potato tubers: Dilute 190 mL of Rampart Fungicide in 1 litre of water. Apply 2 litres of this solution as a spray or rinse to 1000 kg of harvested potatotubers prior to storage.

Mertect SC
Apply Mertect (thiabendazole) as a mist spray on WHOLE potatoes going into storage to control the fungal diseases caused by Fusarium, Phoma, Rhizoctonia, and the diseases Silver Scurf and Skin Spot. Add 7.5 litres of Mertect to 170 litres of water. Apply this suspension at the rate of 2 litres per 1000 kg of potatoes. This treatment is effective only when the recommended rate is used. Improper use can result in development of resistant strains of fungal pathogens of potatoes.
Mertect SC can also be applied at the same application rate when potatoes are being moved, as fungal pathogens are present on grading equipment and mechanical injuries will create an entry point for fungal diseases.

CAUTION: **DO NOT** combine Mertect SC with chlorinated compounds. DO NOT use after sprout initiation. Some resistant strains of Fusarium Rot and Silver Scurf pathogens are now present in the region, reinforcing the need to use recommended rates and application methods.

Oxidate (Biosafe)
Oxidate is used for the control of Fusarium Tuber Rot, Silver Scurf and Bacterial Soft Rot. Applied to potatoes going into storage, mix 100ml of Oxidate per 10 L of water. Use 4.15 - 8.3 L of water per tonne of potatoes. Spray diluted solution on tuber to runoff to achieve full and even coverage. Additional applications to potatoes in storage can be made daily, as a direct injection into the humidification water.

Stadium
Stadium is a post-harvest fungicide for the control of post harvest storage diseases in potatoes and sweet potatoes. Not for use on seed potatoes. Final spray solution of Stadium and water should deliver an application rate of 2 L per metric tonne of potatoes. The use rate is 32.5 ml of Stadium per tonne of potatoes. Ensure proper coverage of the tubers. Tubers should be rotating along a conveyor line into storage, in a single layer to ensure proper coverage.

TOPKILLERS

Chemical Name	Product Name	Formulation	Product/ha	Acute Hazard Rating Mammals	Pre-Harvest Interval	Reentry Times (hrs)
Carfentrazone-ethyl	Aim EC	EC	233-350 ml/Ha (first application should be 350 ml/Ha)	LH	7	48
Diquat	Reglone 240 (240g/L)	SN	Heavy green vines: 3.5 L/Ha Medium vines, maturing: 1.7-2.3 L/Ha Split application: 1.25-2.3L/Ha + 1.25L/Ha 4-6 days later	MH	1	24
	Diquash (240g/l)	SN				
	Dessicash (240g/l)	SN				

GUIDELINES FOR CHEMICAL PESTICIDE SAFETY

Treat all pesticides (insecticides, herbicides, fungicides, etc.) as poisonous substances and handle them with great caution. They can kill.

1. Read each pesticide label carefully and follow the instructions. The instructions on a pesticide label serve to safeguard the health of the user as well as to ensure the pesticide is employed as efficiently and economically as possible. When in doubt, read the label.

2. Except where product labels read otherwise, nitrile gloves are recommended. Always refer to product label.

3. Always wear the recommended protective clothing and safety equipment. Pesticides may enter the user's body through the skin, the mouth or by inhalation. The protective equipment worn by the conscientious pesticide applier includes a respirator orgas mask, a wide-brimmed hat, goggles, a shirt with long sleeves over gloves, overalls with rubber bands around the cuff, and neoprene or rubber boots. Because fumigants are readily absorbed by neoprene, be sure to follow label instructions. Don't follow someone else's bad example. Wear the required safety equipment. It's for your own good.

4. Open, pour, weigh and mix pesticides in a safe manner and according to label instructions. Use the proper tools to open a container. Stand upwind of all opening, pouring and mixing operations, and in a well-ventilated area. Avoid splashing and spilling.

5. Learn to recognize the typical signs of poisoning and the correct first aid procedures. Keep a first aid kit handy. Some symptoms of acute poisoning are nausea, diarrhea, loss of muscle coordination, stomach cramps, mental confusion, etc.

6. If you feel ill during pesticide application, stop work and seek medical attention at once. Do not carry on because of the work schedule. Always save the pesticide container or the label to assist the medical aid person. Do not permit any person including yourself, to work alone when handling or applying pesticides.

7. Never use your mouth to siphon liquid materials or to blow out a clogged spray nozzle.

8. Keep people and animals away from contaminated equipment and areas until decontamination procedures are complete.

9. Be sure a good supply of lime, sawdust, or other absorbent is available on site to soak up a spilled pesticide.

10. Do not permit anyone unfamiliar with chemical safety practices to carry out cleaning or maintenance procedures. Appropriate protective equipment is necessary for cleaning and maintenance personnel.

11. Always dispose of irreparable faulty protective equipment and contaminated clothing.

12. Do not store pesticides near any food or drink. Store them in a locked, well-marked area and out of the reach of children.

13. Do not keep any food, drink, tobacco, cups or cutlery anywhere in the work areas or work clothes. Refrain from smoking, eating, or drinking while mixing or applying pesticides.

14. Dispose of empty pesticide containers by removal of caps and labels, triple rinse and return to your crop protectant dealer. **Triple Rinse:** Containers should be thoroughly rinsed at least three times with the rinsing being added to the spray mix. The landfill sites at Wellington and the Energy Waste Plant in Charlottetown will accept clean paper chemical bags. A permit is required and there is a charge of $25.00. Contact Debbie Johnson (368-5059) or Glenda Peters (368-5047) for a permit.

15. After handling pesticides, wash hands carefully before eating, drinking, smoking, or using the toilet.

16. Shower thoroughly, with special attention to hair and fingernails, after each pesticide application is complete. Change clothes daily or more often if any contamination occurs. Wash contaminated clothing separately from normal laundry.

17. Before mixing and applying pesticides, clear all livestock, pets and people from the area to be treated. Apply pesticides only at the correct time and under acceptable weather conditions.

18. Check the application equipment. Look for leaking hoses, or connections, plugged or worn nozzles, and examine the seals on the filter openings to make sure they will prevent pesticide spillage.

19. Mix the pesticide at the recommended rate, and apply at the specific dosage on the label. Carry only a sufficient quantity of the pesticide for the job at hand.

POISON INFORMATION CENTRES

The hospitals and telephone numbers listed below provide emergency information on potentially toxic substances 24 hours a day. If you suspect poisoning from exposure to a pesticide consult the label for immediate first aid instructions. Transport the person to the nearest hospital and take the label information with you.

Prince Edward Island
IWK Health Centre-Poison Information Centre
Telephone: 1-800-565-8161

Nova Scotia
IWK Grace Poison Information Centre
Telephone: 1-800-565-8161
or Halifax (902) 428-8161

New Brunswick
Telephone: 911 Ask for poison information

ENVIRONMENTAL EMERGENCIES
(Pesticide spills)

New Brunswick, Nova Scotia or Prince Edward Island
1-800-565-1633 (24 hours) or in Halifax (902) 426-6030

THINK SAFETY

DISINFECTION

Cleaning and disinfection of storages and potato handling equipment each year are essential elements of a potato disease management program to eliminate carryover of disease-causing bacterium. Warehouse and equipment disinfection programs are primarily to control bacterial ring rot (BRR) of potatoes, but can also reduce the potential for soft rot, silver scurf, and fusarium problems. An effective disinfection program is a three-step process that includes:

1 Removal of all loose debris, dirt, and trash from equipment and the warehouse.

2. A thorough cleaning of all surfaces! Cleaning is best accomplished using water, a pressure washer, and a detergent. The detergent helps to prepare a surface for subsequent disinfection.

3. A registered disinfectant, applied after cleaning and in a way that ensures the surface remains wet for a minimum of ten minutes.

Disinfection of set-cutters and planters between seed lots is important in reducing the potential for pathogen transfer between different seed lots. Sponge rollers on set-cutters should be removed, cleaned then soaked in a container of disinfectant. Used or borrowed equipment should be cleaned and disinfected before it arrives on the farm and before it is returned.

Transport trucks arriving on farms for loads of potatoes must be disinfected, before arrival on the farm. The possibility exists for such vehicles to carry potato debris from one location to another with the risk of disease spread.

Disinfectant

Chemical	Product	Concentration	Hazard	Caution
Dimethyl Benzyl Ammonium Chloride	General Storage Disinfectant Ag Services Inc.	6 ml/L water	VLH	avoid skin and eye contact an inhalation of mist

METRIC CONVERSION FACTORS FOR ENGLISH SYSTEM

Metric units ÷ Approximate conversion factor = Results in:

LINEAR			**TEMPERATURE**		
Millimeter (mm)	÷ 25	inch	Degrees Celsius (°C)	(9/5x°C)+32	degrees Fahrenheit
Centimetre (cm)	÷ 30	foot			
Metre (m)	÷ 0.9	yard	**PRESSURE**		
Kilometre (km)	÷ 1.6	mile	Kilopascal (kPa)	÷ 6.9	pounds per square inch
AREA			**POWER**		
Sq. centimetre (cm^2)	÷ 6.5	square inch	Watt (W)	÷ 746	horsepower
Sq. metre (m^2)	÷ 0.09	square inch	Kilowatt (kW)	÷0.75	horsepower
Hectare (ha)	÷ 0.40	acre			
			SPEED		
VOLUME			Metres per second (m/s)	÷ 0.30	feet per second
Cubic centimetre (cm^3)	÷ 16	cubic inch	Kilometres per hr. (km/h)	÷ 1.6	miles per hour
Cubic decimetre (dm^3)	÷ 29	cubic foot			
Cubic metre (m^3)	÷ 0.8	cubic yard	**AGRICULTURE**		
Millilitre (mL)	÷ 28	fluid ounce	Hectolitres/hec. (hl/ha)	÷ 0.90	bushels per acre
Litre (L)	÷ 0.57	pint	Litres per hec. (L/ha)	÷ 11.23	gallons per acre
Litre (L)	÷ 1.1	quart	Litres per hec. (L/ha)	÷ 2.8	quarts per acre
Litre (L)	÷ 4.5	gallon	Litres per hec. (L/ha)	÷ 1.4	pints per acre
Hectolitre (hL)	÷ 0.36	bushel	Milliliters/hec. (mL/ha)	÷ 70	fluid ounces per acre
Litres/sec./tonne	÷ 10.4	cubic feet/min./cwt.	Tonnes per hec. (t/ha)	÷ 2.24	tons per acre
			Kilograms per hec. (kg/ha)	÷ 1.12	pounds per acre
WEIGHT			Grams per hec. (g/ha)	÷ 70	ounces per acre
Gram (g)	÷ 28	ounce	Plants per hec. (plants/ha)	÷ 2.47	plants per acre
Kilogram (kg)	÷ 0.45	pound			
Tonne (t)	÷ 0.9	ton	**Examples:**		
Tonne (t)	÷ 0.0454	hundredweight (cwt)	3 km ÷ 1.6 = 1.9 miles		
			4 ha ÷ 0.4 = 10 acres		
			13.5 hl/ha ÷ 0.90 = 15 bushels per acre		

Every effort has been made to include all pesticide products, and to ensure information is complete and accurate. However, this guide is NOT intended to be an exhaustive list. Please consult with your pesticide representatives and sales staff and ALWAYS READ THE LABEL.

WARNING

Please note that we make no warranty or guarantee of any kind, expressed on implied, concerning the use of products listed in this publication. The user assumes all risk, whether recommendations are followed or not.

This publication is intended as a guide only.
For specific product information

ALWAYS REFER TO AND FOLLOW DIRECTIONS ON THE LABEL.

ATTENTION!!!

WEAR personal protective equipment **(PPE)** found on the pesticide label when mixing, loading and applying to reduce your pesticide exposure. PPE is important to decrease potential immediate and long term risk.