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EXTENSION AND ADVISORY TEAM

GUIDE TO INSECT & DISEASE MANAGEMENT IN Highbush BLUEBERRY

Nova Scotia Guide to Insect & Disease Management in Highbush Blueberry
[HB Blue1-23]



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LIABILITY STATEMENT

Recommendations in this guide are given for general information only and do not give the user the right to use a product in a manner not in accordance with the pesticide label or Pest Control Products Act. Perennia, by funding and printing this publication, and the editors/authors, do not offer any warranty or guarantee and do not assume any liability for crop loss, animal loss, health, safety, or environmental hazard caused by the use of any pesticide, advice, or recommendation in this schedule. Pesticides used in this schedule are products labeled for the target and crop. This information was retrieved from the Pest Management Regulatory online of Registered Products Database. The list of products presented in this schedule is intended to be complete, based on products known to be available in the region, but in no way is guaranteed to be complete. Some of the products listed may not be available. Trade names are given as a convenience to producers and are neither an endorsement of the product nor a suggestion that similar products are not available or effective.

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Important Note on Funginex

The US equivalent of Funginex has been removed from the US market and all minimum residue levels have been removed for the active ingredient of Funginex, “triflorine”. In Canada, this product is still legal to use. However, fruit that has been treated with Funginex will not be suitable for export to the US as the potential for minimum residues on the fruit exists.

Blueberry Site Selection & Preparation

Preparation for blueberry planting must be done several years in advance. Select a site with good air and water drainage. Take a soil sample and have it analyzed. Soils should have high soil acidity (low pH) and high organic matter content. Sandy loam soils are best with a pH of 4.5 – 5.2. Organic levels can be increased using cover crops and the addition of peat moss. If the land was in sod, check for white grubs (see note under New Planting).

Nematode levels should also be checked. Sampling can be done almost anytime except in the winter when the ground is frozen. The highest populations tend to be found in June and mid-September to mid-October. Sample as you would a normal soil sample. Using a soil auger, take at least 10 -15 sub-samples from a maximum of 2.5 ha. Samples should be taken 20-25 cm deep => remove and discard the top 2 cm if the soil is bare. Mix the sub-samples well and put 0.5-1.0 L of soil in a plastic bag and refrigerate at 5-10° C. Contact Perennia Food and Agriculture Inc. for assistance in finding laboratories that do nematode analysis.

PESTICIDE EMERGENCY CONTACT INFORMATION

Poison Control Centres		
Nova Scotia	800.565.8161 or 902.470.8161	IWK, Halifax, NS
New Brunswick	911	Ask for Poison Information
Prince Edward Island	800.565.8161 or 902.470.8161	IWK, Halifax, NS
Newfoundland	709.722.1110	Dr. Charles A. Janeway Child Health Care Centre, St. John's, NF

Environmental Emergencies (Pesticide Spills)	
Transport Canada Regional Operations Centre (24 hours)	
Nova Scotia	800.565.1633
New Brunswick	800.565.1633
Prince Edward Island	800.565.1633
Newfoundland	800.563.9089

ABBREVIATIONS & CONVERSIONS

Formulation and Measurement Abbreviations			
FORMULATIONS		MEASUREMENTS	
DF	Dry flowable	mL	millilitre
EC, E	Emulsifiable concentrate	kPa	kilopascal
L	Liquid	kg	kilogram
Sn / Su	Suspension	g	gram
WP/W	Wettable powder	L	litre
		BIU	Billions of International Units
		ppm	parts per million (1000 ppb)
		ppb	parts per billion (1/1000 ppm)

Helpful Conversions ¹	
kPa X 0.14 = pounds per square inch (psi)	millilitres X 0.035 = fluid ounces
hectares X 2.47 = acres	litres X 35 = fluid ounces
kilograms X 2.2 = pounds	litres X 0.22 = imperial gallons
kilograms per hectare X 0.89 = pounds per acre	litres per hectare X 14.17 = fluid ounces per acre
kilograms per hectare X 0.40 = kilograms per acre	litres per hectare X 0.40 = litres per acre
	degree-days C X 1.8 = degree-days F

¹ Pesticide Units of Measurement

It is not recommended to convert label rates to imperial units because there is a high probability of mathematical and rounding errors. Present day pesticides are formulated to be more effective in smaller amounts. Therefore, even small conversion errors can lead to the use of incorrect rates (either too high or too low). Use metric – you will be glad you did!

New Planting Products

Rates of product are for mature plants. Unless the label states otherwise, use 700-1000 L of water per hectare, or use enough water to obtain good coverage of the foliage and wood.

Insect / Disease ²	Product	Note
<i>Godronia</i> canker	Physical removal / cultural	Prune out and burn infected wood. Jersey, Earliblue and Bluecrop are highly susceptible; Berkeley, Blueray, Burlington, Rubel and Coville are moderately susceptible while Rancocas is quite resistant.
Phomopsis Canker	Physical removal / cultural	Weymouth, Earliblue and Berkeley are particularly susceptible varieties. Coville and Jersey are also damaged by Phomopsis.
White grubs (Several species)	Cultural	<p>Several species. Specimens should be identified to help determine appropriate action. Cultural tips:</p> <ol style="list-style-type: none"> 1) Delay planting for 2 years after removing sod or pasture crops. 2) Eliminate grass between rows and especially around bushes. 3) Monitor white grubs in grassy areas outside plantings, e.g. Lawns, parking lots. Treat these areas with approved products if grubs reach 5/900 cm² (5/ft²). Grubs need to be properly identified. There are very few products that can be used in Nova Scotia. 4) There are no products approved for use within plantings. Therefore, proper site preparation and clean cultivation are the only options. 5) Monitor plants for signs of stress such as stunted growth, reduced vigor, and poor root systems. If these symptoms occur, check the soil for white grubs.

² Proper identification of insects and plant diseases is essential for an effective IPM program.

Established Planting Products

Rates of product are for mature plants. Unless the label states otherwise, use 700-1000 L of water per hectare, or use enough water to obtain good coverage of the foliage and wood.

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
DORMANT						
Scale	M	Lime Sulfur + Dormant oil	36.7L + 12.5L in 1000 L; 18.3L + 6.25L in 500 L; 3.7L + 1.25L in 100 L	48 hrs	dormant	Apply once per season when plants are dormant (January-March). Spray to runoff.
	NC	Superior 70 Oil	20-30 L/ha in 1000-1500 L water/ha	12 hrs	dormant	Lecanium scale only. Observe product restrictions, with particular attention to weather conditions needed, timing of other products, and maximum number of applications per year.
		Purespray Green Spray Oil 13E	20L in 1000 L water	12 hrs	dormant	
		Vegol Crop Oil	2% v/v in 700-1900 L water/ha	12 hrs	0 days	
EARLY SPRING TO GREEN TIP						
Mummy berry (<i>Monilinia</i>)	3	Funginex DC	1.7-3.0 L/ha	12 hours/6 days (hand set irrigation)	60 days	The maximum residue limit is zero (0) in the US. Funginex may still be used in Canada; however, treated blueberries are not suitable for shipment to the US since they may contain Funginex residues. Do not use after Pink Bud.
		Tilt 250 E	500 mL/ha	12 hrs ¹ /5 days ^{2,3}	60 days	Use no more than 2 consecutive applications to prevent resistance.
		Propiconazole 250E	500 mL/ha	12 hrs ¹ /5 days ^{2,3}	60 days	Tank mix Group 3 fungicides with a compatible Group M fungicide.

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Mummy berry (<i>Monilinia</i>) (cont.)	3	Jade	500 mL/ha	12 hrs ¹ / 5 days ^{2,3}	60 days	Apply the first application at or near flower bud swelling; make second application at leaf bud swelling. Maximum 2 applications per year.
		Mission 418 EC	300 mL/ha	12 hrs ¹ / 5 days ^{2,3}	60 days	
		IPCO Pivot 418 EC	300 mL/ha	12 hrs ¹ / 5 days ^{2,3}	60 days	
		Bumper 432 EC	300 mL/ha	12 hrs ¹ / 5 days ^{2,3}	60 days	
		Fitness 432 EC	300 mL/ha	12 hrs ¹ / 5 days ^{2,3}	60 days	
		Indar	140 g/ha	12 hrs	30 days	Maximum 4 applications per year. Do not use spray adjuvants.
		Proline 480SC	315-420 mL/ha	24 hrs	7 days	Maximum 2 applications per year.
		Quash	180 g/ha	12 hrs ¹ / 72 hrs ²	7 days	Maximum 3 applications per season. Do not make more than 2 sequential applications. Min water volume of 200 l/ha.
		Metconazole 50 WDG	180 g/ha	12 hrs/ 3 days (thinning, training, tying)	7 days	Can also be used for suppression of Phomopsis twig blight and fruit rot.
		Propi Super 25EC	500 mL/ha	12 hrs ¹ / 5 days ^{2,3}	60 days	First application at or near flower bud swelling; second application at leaf bud swelling.

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Mummy berry (<i>Monilinia</i>) (cont.)	3+9	Inspire Super	558-836 mL/ha	12 hrs	1 day	For Mummy berry, apply first application at or near flower bud swelling; make a second application at leaf bud swelling. A third application at pink bloom and a fourth application can be made 7 to 10 days later at early bloom. Maximum four applications per year. For <i>Monilinia</i> blight apply first application when flower bud scales first appear and make a second application 10 days later. Maximum two applications per year. If disease pressure is high, use the highest rate and shortest interval.
	3+11	Quilt	1.0 L/ha in minimum 200 L water/ha	12 hrs	30 days	Maximum 4 applications per year.
	7+3	Propulse	750 ml/ha	24 hours	7 days	Begin applications when 40 percent of the blossom buds have the bud scales separated. A second application of or another approved fungicide should be applied 7 to 10 days later.
	19	Diplomat 5SC	463-926 ml/ha 25-50 g a.i./ha	-	0 days	Apply as a foliar spray in sufficient water to provide thorough coverage of foliage (and fruit when present). Begin as a preventative application at green tip or when conditions favour disease development and continue a 7–21-day interval if disease pressures persist. Do not apply more than 150g a.i./ha/season.
	29	Allegro 500F	2.24 L/ha in 300-1000L water/ha	24 hrs	30 days	Suppression only. Maximum 2 applications per season.
	44	Serenade Max	3.5-6.0 kg/ha	When dry	0 days	Biofungicide. Suppression. Begin application prior to disease development.

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Mummy berry (<i>Monilinia</i>) (cont.)	P5	Regalia Maxx	0.125 - 0.25% v/v in 400-800 L water/ha	When dry	0 days	Biofungicide. Suppression only.
	BM02	Double Nickel LC	2.5-5.0 L/ha	-	0 days	Begin applications at bud break and repeat at 7–10-day intervals or as needed. Under moderate to high disease pressure, or when environmental conditions and plant stage are conducive to rapid disease development, use the high rate and apply more frequently (every 3-7 days).
	BM02	Serenade OPTI	2.0-3.3 kg/ha	When dry	0 days	Biofungicide. Suppression only.
	NC	Actinovate SP	425-840 g/ha	When dry	0 days	Biofungicide. Suppression only.
	NC	Dart NEW 2023	0.25% - 0.35% in 370-560 L water/ha	When dry	0 days	Start applications at bud break and apply at 5–8-day intervals. Spray to point of run-off. Maximum 7 applications per year/growth cycle. Direct Spray into the floral cup. Max 7 apps/year
Phytophthora Root Rot	4	Ridomil Gold 480 SL	37 mL/ 100m row	12 hrs	80 days	Apply prior to bud break. Maximum 1 application per season.
	P07	Aliette WDG	5.6 kg/ha in 300-1000 L water/ha	24 hrs (3 days for handset irrigation)	1 day	For spring applications, apply the first spray when there is 7 cm of new growth, continuing a 14 to 21 day interval. Do not exceed 22.4 kg product/ha or 4 applications per year for all uses.

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
GREEN TIP						
Anthracnose & Phomopsis canker	3	Quash	188 g/ha	12 hrs ¹ / 72 hrs ²	8 days	Suppression only. Phomopsis only.
	3+9	Inspire Super	1.2-1.5 L/ha	12 hrs	1 day	Make the first application during early bloom. A second application may be made 7 to 10 days later. A third application can be made if conditions remain favourable for disease development. If disease pressure is high, use the highest rate and shortest interval. No more than two applications before rotating to another fungicide group.
	7+11	Pristine WG	1.3-1.6 kg/ha	When dry ¹ / 24 hrs ³	0 days	Begin applications prior to disease development and continue a 7–14-day schedule. Use shorter intervals and/or higher rates when disease pressure is high.
	9+12	Switch 62.5 WG	775 to 975 g/ha	12 hrs	1 day	Make the first application during early bloom. A second application may be made 7 to 10 days later. A third application can be made if conditions remain favorable for disease development.
	11	Cabrio EG	1.0 kg/ha	12 hrs ¹ / 24 hrs ³	1 day	Do not apply more than 2 consecutive applications. Do not tank-mix or make sequential applications with Exirel.
	29	Allegro 500F	2.24 L in 300-1000 L water/ha	24 hrs	30 days	Suppression only. Begin applications at bud break and repeat applications every 7-10 days until petals fall.
	M5	Bravo ZN	7.2 L/ha	12 hrs (3 days for handset irrigation)	54 days	Also registered for Alternaria fruit rot. Apply two applications between green tip and petal fall. After petal fall, a protective schedule using a different registered product may be necessary to ensure continued control of fruit rot.
		Echo 90DF	4 kg/ha			
Echo 720		5 L/ha				

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Anthracnose & Phomopsis canker <i>(cont.)</i>	PO7	Aliette WDG	5.6 kg/ha in 300-1000 L water/ha	12 hrs (3 days for handset irrigation)	1 day	Control of Anthracnose fruit rot. Suppression only of Phomopsis canker. Begin foliar sprays in the spring at approximately the pink bud stage and continue a 14–21-day interval. Do not exceed 22.4 kg product/ha or 4 applications per year for all uses.
		Confine Extra	4-5 L/ha	12 hrs	1 day	Anthracnose only. Suppression only.
	P5	Regalia Maxx	0.125 - 0.25% v/v in 400-800 L water/ha	When dry	0 days	Biofungicide. Suppression only. Initiate preventative applications at green tip. Repeat applications at 7- to 10-day intervals depending upon crop growth and disease pressure. Also registered for suppression of botrytis and alternaria.
	NC	Botector	1 kg in 500-2000 L water/ha	4 hrs	0 days	Anthracnose only. Suppression only. Compatibility restrictions.
Powdery Mildew	P5	Regalia Rx NEW USE 2023	5-10 L/ha	When dry	0 days	Biofungicide. Suppression only. Initiate applications at bud break and repeat applications at 7–10-day interval. Do not exceed a concentration of 1.0% v/v.

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
PINK BUD						
Anthracnose/ Phomopsis canker	Refer to Green Tip					
Powdery Mildew <i>(Microsphaera vaccinii-blueberry)</i>	3	Nova	340 g/ha	12 hrs	6 days (1 day for mechanical harvesting)	Apply at the first sign of disease development and repeat in 7-14 days. Pre-bloom, bloom, and immediately after bloom are the most critical times for the control of powdery mildew.
Leafroller/ Winter Moth	3	Decis 5 EC	150 mL in 1200-1500 L water/ha	12 hrs	14 days	Do not apply more than 3 times per year.
	5	Delegate	100-200 g/ha	12 hrs	3 days	Monitor insect populations to determine application timing. Apply at egg hatch or to small larvae.
		Entrust	267-364 mL/ha	When dry		
		Success	145-182 mL/ha			
	11	Bioprotec 3P	0.72-1.45 kg/ha in minimum 600 L water/ha	-	1 day	Foliar application. Apply at first signs of infestation when larvae are small. Repeat applications as necessary to maintain control at minimum interval of 7 days.
	18	Confirm 240F	1.0 L/ha	12 hrs	14 days	Leafrollers. Begin applications at early egg hatch for each generation. Make the first application before webbing and sheltering begins. Make a second application in 10 to 14 days to ensure complete coverage of rapidly expanding fruits or foliage.
		Intrepid	0.5 L/ha	12 hrs	7 days	Apply to overwintering larvae as soon as they start feeding in the spring or at the beginning of egg hatch for the summer generation. Repeat applications after 7-14 days if required based on population monitoring.
28	Exirel	500-1000 mL/ha	12 hrs	3 days	Begin applications when treatment thresholds have been reached. Thorough coverage is essential for optimum control.	
	Altacor	215-285 g/ha	12 hrs	1 day		

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Mummy berry (<i>Monilinia</i>)	Refer to Green Tip					
BLOOM						
WARNING – Spraying pesticides during bloom is hazardous to bees. Spray in the evening or when bees are not working.						
Botrytis twig and blossom blight, Botrytis grey mold	3+9	Inspire Super	1.0-1.5 L/ha	12 hrs	1 day	Begin applications during early bloom or prior to disease onset when conditions are conducive for disease. Apply on a 10-to-21-day schedule. If disease pressure is high, use the highest rate and shortest interval. DO NOT apply more than two applications per crop per season.
	7	Cantus WDG	560 g/ha	12 hrs	0 days	Begin applications prior to disease development.
		Kenja 400 SC	0.987-1.24 L/ha	12 hrs	7 days	Use once and then rotate to a different fungicide group. Suppression only.
		Sercadis	250-660 mL/ha		0 days	Begin applications preventatively. First application at early flowering. Continue as needed, on a 7–14-day interval. Shorter intervals when high disease pressure.
	7+9	Luna Tranquility	1200 mL/ha	12 hrs	0 days	Begin applications prior to disease development and continue a 7-to-14-day schedule. Use a shorter interval and/or higher rates when disease pressure is high.
	7+11	Pristine WG	1.3-1.6 kg/ha	24 hrs	0 days	
	7+12	A20560	0.8-1.0 L/ha	12 hrs	1 day	Make the first application during early bloom.
	9	Scala SC	2 L/ha	12 hrs	0 days	Apply maximum of 2 applications per growing season.
Switch 62.5 WG		775 to 975 g/ha	12 hrs	1 day	Apply first during early bloom. Second application 7-10 days later. Third application if conditions remain favorable for disease development. One of the actives in this product is persistent and may carryover. It is recommended that any products containing the active ingredient fludioxonil not be used in areas treated with this product during the previous season.	

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Botrytis twig and blossom blight, Botrytis grey mold (cont.)	17	Elevate 50 WDG	1.70 kg/ha	12 hrs	1 day	Avoid application of more than 2 consecutive sprays. Maximum 4 applications per season and a minimum re-applications interval of 7 days.
	19	Diplomat 5SC	463-926 mL/ha 25-50 g a.i./ha	When dry	0 days	Suppression. Begin as a preventative application when conditions favour disease development and continue a 7–21-day interval as needed. Do not apply more than 150g a.i./ha/season.
	46	Botector	1 kg in 500-2000 L water/ha	4 hrs	0 days	Suppression only.
	M4	Maestro 80 WSP	2.25 kg in 1000 L water/ha	12 hrs ¹ / 5 days ³ / 6 days (hand set irrigation)	2 days	Do not use within 14 days of oil. Do not tank-mix or use in sequential application with Exirel.
		Captan 80 WSP				
	P5	Regalia Maxx	0.125-0.25% v/v in 400-800 L water/ha	When dry	0 days	Suppression only. For best results, use multiple applications or rotate with other products.
	BM01	Timorex Gold	1.5-2.0 L/ha	4 hrs/when dry	2 days	Do not tank-mix with Supra Captan, Maestro, or Sulphur products.
	BM02	Double Nickel LC	2.5-5.0 L/ha	-	0 days	Begin preventative applications before disease appears, repeat on 3–10-day intervals or as needed. Under situations where disease pressure is likely to be high, use the high rate and apply more frequently (every 3-7 days).
		Serenade Max	3.0-6.0 kg/ha	When dry	0 days	Biopesticide. Suppression only. Begin applications at the first sign of the disease or when conditions favour disease development. Repeat as necessary on a 7–10-day interval.
		Serenade Opti	1.7-3.3 kg/ha (Grey mold) 0.6-1.7 kg/ha (Bacterial blight)	When dry	0 days	

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Powdery Mildew (<i>Microsphaera vaccinii-blueberry</i>)	3	Nova	340 g/ha	12 hrs	6 days (1 day for mechanical harvesting)	Apply at the first sign of disease development and repeat in 7-14 days. Pre-bloom, bloom, and immediately after bloom are the most critical times for the control of powdery mildew.
Anthracnose & Phomopsis canker	Refer to Green Tip. Spray from Bloom through to Petal Fall. Do not apply Bravo beyond Petal Fall.					
	3+11	Quilt	1 L/ha	12 hrs	30 days	Do not tank-mix or make sequential applications with Exirel.
POST-BLOOM						
Scale	23	Movento 240 SC	365-585 mL/ha in 200-3000 L water/ha	12 hrs	7 days	Suppression only. Lecanium scale only. Apply at egg hatch.
GREEN FRUIT TO FRUIT RIPENING						
Cherry fruitworm (<i>Grapholita packardi</i>) & Cranberry fruitworm (<i>Acrobasis vaccinii</i>)	The National Identification Service reported in 2015 that Cherry fruitworm, <i>Grapholita packardi</i> , has been reported in New Brunswick (prior to this it was not believed to be in the Maritimes. Therefore, monitoring and proper identification of all specimens is highly recommended.					
	1A	Sevin XLR	4 L/ha in 1200-1400 L water/ha	5 days ¹ / 9 days ^{2,3}	2 days	Cranberry fruitworm only. Residual activity is 5-7 days.
	1B	Malathion 85E	1000-2500 mL/ha	12 hrs	3 days	Maximum 3 applications per year.
	4	Assail 70 WP Aceta 70 WP	160 g/ha in minimum 187 L water/ha	12 hrs	1 day 7 days	Begin application when egg hatch begins.

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Cherry fruitworm (<i>Grapholita packardii</i>) & Cranberry fruitworm (<i>Acrobasis vaccinii</i>) (cont.)	4+15	Cormoran	1.4 L/ha	12 hrs	8 days	Maximum 3 applications per year. DO NOT apply more than once every 10 to 14 days.
	11	Bioprotec CAF	1.4-2.8 L/ha	12 hrs	0 days	Maximum 4 applications per year.
		Dipel 2X DF	1.68 kg/ha	12 hrs	0 days	
	15	Rimon 10 EC	1.35-2.0 L/ha in 374-1122 L water/ha	12 hrs	8 days	Apply on a 10–14-day interval with a maximum of 3 applications per year.
	18	Confirm 240 F	1.2 L/ha	12 hrs	14 days	Cranberry fruitworm only. Apply at first upswing of trap captures and reapply in 10-14 days.
		Intrepid	0.5 L/ha	12 hrs	7 days	
	28	Altacor	215-285 g/ha	12 hrs	1 day	Do not apply more often than once every 7 days. Do not exceed 645 g/ha or 3 applications per season.
		Exirel	0.5-1.0 L/ha	12 hrs	3 days	See label for tank-mix restrictions.
Blueberry fruit fly (<i>Rhagoletis mendax</i>) a.k.a. Blueberry maggot fly	1B	Lagon 480 E	830 mL	12 hrs ¹ / 9 days³	21 days	Do not use on crops destined for US markets due to a very low limit for residual dimethoate. Residual activity 10-12 days.
		Cygon 480-AG	830 mL	12 hrs	21 days	
		Imidan WP	1.6 kg in 1000 L water/ha	6 days ^{1,4} / 17 days ^{3,5}	15 days	Toxic to bees. Do not apply during bloom period.
		Malathion 85 E	550 mL in 1000 L water/ha	48 hrs	1 day	Residual activity 5-7 days.
	4	Assail 70 WP	136-160 g/ha	12 hrs ¹ / 48 hrs ²	7 days	Maximum of two products from group 4A per season.
		Aceta 70 WP	136-160 g/ha			
	4A	Admire 240 Flowable	230-350 mL/ha	12 hrs	3 days	Maximum of two products from group 4A per season. Toxic to certain beneficial insects. Rotate with insecticides outside of Group 4.
	4D	Sivanto Prime	0.75-1.0 L/ha	12 hrs	3 days	

¹General Re-entry ²Hand-pruning ³Hand-harvest ⁴PPE Required for Certain Activities ⁵U-pick Harvest

*Red text indicates label changes and products that are new to this guide in 2023.

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Blueberry fruit fly <i>(Rhagoletis mendax)</i> a.k.a. Blueberry maggot fly <i>(cont.)</i>	4+15	Cormoran	1.2-1.4 L/ha/	12 hrs	8 days	Maximum 3 applications per year. DO NOT apply more than once every 10 to 14 days.
	5	Entrust	219-440 ml/ha	When dry	1 day	Use the maximum rate when insect pressure is high. Use a maximum of three applications per season
		GF-120 Fruit Fly Bait	1.0-1.5 L	12 hrs	-	OMRI listed product. Begin applications as soon as traps indicate flies are present. Repeat 7-day intervals, use a shorter interval during rainy periods. Apply to one side of every row.
		Movento 240 SC	365-435 mL/ha in 200-3000 L water/ha	12 hrs	7 days	Allow for 7 days between applications.
		Success <i>NEW USE 2023</i>	110-220 mL/ha	12 hrs	1 day	Apply based on presence of adult pests (flies). Maximum 3 applications per season. Use maximum rate when insect pressure is high.
	28	Exirel	1000-1500 mL/ha	12 hrs	3 days	Suppression only. Begin applications when treatment thresholds have been reached. For blueberry maggot, begin applications when populations are low. If blueberry maggot populations are high, use a registered insecticide with a different mode of action to reduce the pest populations before applying Exirel.
Botrytis twig and blossom blight, Botrytis grey mold	3+9	Inspire Super	1.0-1.5 L/ha	12 hrs	1 day	No more than two consecutive applications before rotating with a different fungicide group.
	7	Cantus WDG	560 g/ha	12 hrs	0 days	Begin applications prior to disease development.
		Kenja 400 SC	0.987-1.24 L/ha	12 hrs	7 days	Suppression only (Sercadis). Use once, then rotate to a different fungicide group.
		Sercadis	250-666 mL/ha	12 hrs	0 days	
	7+9	Luna Tranquility	1.2 L/ha	12 hrs	0 day	Apply prior to harvest to improve postharvest disease control.
	7+11	Pristine WG	1.3-1.6 kg/ha	24 hrs	0 days	Begin applications prior to disease development and continue a 7–14-day schedule. Use shorter interval and/or higher rates when disease pressure is high.
	9	Scala SC	2 L/ha	12 hrs	0 days	Begin applications preventatively.

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Botrytis twig and blossom blight, Botrytis grey mold (cont.)	9+12	Switch 62.5 WG	775-975 g/ha	12 hrs	1 day	One of the actives in this product is persistent and may carryover. It is recommended that any products containing the active ingredient fludioxonil not be used in areas treated with this product during the previous season.
	17	Elevate 50 WDG	1.70 kg/ha	12 hrs	1 day	Begin applications at 10% bloom stage.
	19	Diplomat 5SC	463-926 mL/ha	When dry	0 days	Suppression. Begin as a preventative application when conditions favour disease development and continue a 7–21-day interval as needed.
	46	Botector	1 kg in 500-2000 L water/ha	4 hrs	0 days	Suppression only.
	BM01	Timorex Gold	1.5-2.0 L/ha	4 hrs/when dry	2 days	Do not tank mix or alternate with Supra Captan, Maestro, or sulphur products.
	BM02	Serenade OPTI	1.7-3.3 kg/ha (Botrytis grey mould) 0.6-1.7 kg/ha (Bacterial blight)	When dry	0 days	Suppression only. For best results, use multiple applications or rotate with other products.
	M4	Captan 80 WDG	2.25 kg in 1000 L water/ha	12 hrs ¹ / 5 days ³ / 6 days (hand set irrigation)	2 days 1 day	Do not use within 14 days of oil or as a tank-mix or sequential application with products such as Exirel or Timorex Gold.
	P5	Regalia Maxx	0.125 - 0.25% v/v in 400-800 L water/ha	When dry	0 days	Suppression only. For best results, use multiple applications or rotate with other products.

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note	
Leafroller	5	Entrust	267-364 mL/ha	When dry	3 days	Reapply as necessary on a 7–10-day schedule. Toxic to bees exposed to direct treatment, drift, or residues on blooming plants.	
		Success	145-182 mL/ha				
	11	Bioprotec CAF	1.4-2.8 L/ha	12 hrs	0 days		Treat when larvae are young (early instar). Thorough coverage of all foliage is essential.
		Dipel 2X DF	525-1125 g/ha	12 hrs	0 days		
	18	Confirm 240 F	1.0 L/ha	12 hrs	14 days		Active on eggs and young larvae. Thorough coverage is essential for optimal control.
		Intrepid	0.5 L/ha	12 hrs	7 days		
	28	Altacor	215-285 g/ha	12 hrs	1 day		Thorough coverage is essential for optimal control.
Exirel		0.5-1.0 L/ha	12 hrs	3 days	See label for tank-mix and compatibility restrictions.		
Spotted wing Drosophila	Emergency registrations for additional products are added annually. Please watch for the release of the emergency registration list in the spring of every year. Information on emergency registrations can be found on the highbush blueberry page of the Perennia website.						
1B	Imidan WP	1.6 kg of product in 1000 L water/ha	6 days ^{1,4} / 17 days ^{3,5}	17 days ³ / 15 days (mechanical)	Begin when indicated by insect infestations and local or provincial spray programs. Toxic to bees. DO NOT apply during the crop blooming period.		
	Malathion 85E	1000-2500 mL/ha	12 hrs	2 days	Foliar application only. Use a minimum of 500 L of water per hectare. Use higher rates when pest populations are high. Maximum 3 applications per crop/year.		
3	UP-Cyde 2.5EC / Ship 250 EC	245-285 mL/ha	12 hrs	2 days	The timing of applications should be based on the presence of adult pests (flies). Allow a minimum of 7 days between treatments. Do not apply more than two treatments. Use sufficient water for thorough coverage. Toxic to bees. DO NOT apply during the crop blooming period.		
3	Mako	150-175 mL/ha	12 hrs	2 days	The timing of applications should be based on the presence of adult flies. Toxic to bees.		
5	Delegate	315-420 g/ha	12 hrs	1 day	Use higher rate and shorten interval between applications under high pest pressure.		
	Entrust	334-440 mL/ha	When dry				
	Success	165-220 mL/ha	When dry				

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
Spotted wing Drosophila (cont.)	28	Exirel	1.0-1.5 L/ha	12 hrs	3 days	See label for tank-mix and compatibility restrictions.
		Cyclanilprole 50SL	1.2-1.6 L/ha	12 hrs	1 day	Use degree day models to determine application timing. Repeat applications at 7-day intervals if required. Make a maximum of 3 applications per crop year. Toxic to bees.
Anthracnose	Most infections take place during bloom. Fungicides at this time are not necessary if good control was achieved earlier.					
	3	Quash	180 ml/ha	12 hrs	7 days	Do not make more than 3 applications per season. Do not make more than 2 sequential applications.
	3+9	Inspire Super	1.2-1.5 L/ha	12 hrs	1 day	No more than two consecutive applications before rotating with a different fungicide group.
	7+11	Pristine WG	1.3-1.6 kg/ha	24 hrs	0 days	Maximum 4 applications per season.
	9+12	Switch 62.5 WG	775-975 g/ha	12 hrs	1 day	Maximum 3 applications per year.
	11	Cabrio EG	1 kg/ha	12 hrs ¹ / 24 hrs ³	1 day	Do not tank-mix or make sequential applications with Exirel.
	P5	Regalia Maxx	0.125 - 0.25% v/v in 400-800 L water/ha	When dry	0 days	Suppression only. For best results, use multiple applications or rotate with other products.
NC	Botector	1kg in 500-2000 L water/ha	4 hrs	0 days	Suppression only.	

Insect / Disease	Group	Product	Rate / ha	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Note
POST-HARVEST						
Spotted wing drosophila	Emergency registrations for additional products are added annually. Please watch for the release of the emergency registration list in the spring of every year. Information on emergency registrations can be found on the highbush blueberry page of the Perennia website.					
	1B	Cygon 480 or	830 mL/ha in up to 1000 L water/ha	12 hrs	12 days	Apply post-harvest only, to control spotted wing drosophila (adults and larvae in fruit) that may otherwise infest adjacent crops. *Potentially harmful to bees*
		Lagon 480 E		12 days		
	5	Entrust SC	334-440 mL/ha	12 hrs	1 day	Application should be based on the presence of adult pests (flies) as determined by local monitoring.
28	Exirel	1000-1500 mL/ha	12 hrs	3 days	Begin applications when populations are low. Exirel targets the adult life stage of Spotted wing drosophila. If populations are high, use a registered insecticide with a different mode of action to reduce pest populations.	

Potential or Occasional Pests

Insect / Disease / Other	Note
Birds	Observation has indicated that the best way to repel birds is to drive them away very early in the morning by using special noise-making shotgun shells. Other noise-making devices are apparently less effective. Some useful tips can be gleaned from the BC Bird IPM Plan at www.agf.gov.bc.ca/cropprot/birdipmplan.pdf
Phytophthora root rot	This disease has not been found in Nova Scotia. However, Ridomil Gold is registered for control should the disease appear here. Apply 37 mL of Ridomil Gold 480EC / 100 m of row to the soil surface in a one-meter-wide band centered over the row. Apply in the early spring prior to growth. Apply a minimum of 200 L of water / hectare. Do not apply more than once a year. Phostrol at 2.9-5.8 L/ha. Begin foliar sprays in the spring at approximately the pink bud stage and continue for a 14-day interval. Use sufficient volume of water for good coverage. Max 4 applications/season. Also, for control of LeafSpot (<i>Septoria spp.</i>).
Crown gall <i>Agrobacterium spp.</i>	Blueberries are susceptible to crown gall. This bacterium that causes the condition can attack crowns and roots causing galls to form. The organism can carry-over in soils for many years or can be introduced on infected planting stock. To reduce the risk of crown gall problems, purchase healthy plants from reputable nurseries. Also, avoid mechanical injury to the roots and over fertilization. Winter injury and feeding damage from soil inhabiting insects can also promote crown gall infections.
Aphids	Movento 240 SC can be used to control Aphids. Apply post bloom at 220-365 mL/ha. Allow 7 days between applications and do not apply more than 1.833 L/ha per year. REI: 12 hours. PHI: 7 days. Fulfill 50WG can be used at 193 g/ha (500-1000 L of water/ha). Apply pre-bloom and post-harvest application only. Maximum 2 applications per year. Do not apply within 85 days of harvest. Sivanto Prime can be used to control aphids. Apply at a rate of 500-750 mL/ha. Apply as a directed foliar spray to ensure thorough coverage. PHI: 3 days. Purespray Green Spray Oil 13E. Deter feeding by <i>aphids</i> , suppression of <i>spider mites</i> . Apply 10 L in 1000 L water (1% solution) otherwise phytotoxicity may result. Use sufficient spray volume (up to 1000 L/ha) to ensure thorough crop coverage. Begin when mites and/or aphids appear. Apply at 7 – 14-day intervals. Do not apply more than 8 summer spray applications per growing season. Apply Pyganic EC 1.4 II at a rate of 2.32-4.65 L/ha when pests are first observed. Do not reapply more often than every 7 days. Toxic to bees. REI: 12 hrs Cormoran: 750 mL/ha. Repeat applications if needed to maintain control, but DO NOT apply more than once every 10 to 14 days. Max 3 app/year. REI: 12 hrs. PHI: 8 days. Closer: 100-200 mL/ha: Use the maximum rate for high insect pressure and for longer residual control. Use sufficient water to ensure thorough coverage, usually 200 to 1000 litres of water per hectare. Reapplication interval of a minimum of 7 days if populations warrant. Use a maximum of 3 applications for aphids. Do not apply within 1 day to harvest. Do not apply more than 190 g ai/ha (800 mL product /ha) per growing season. REI: 12 hours

Insect / Disease / Other	Note
Weevils	Actara 25 WP can be used to control weevils. Apply at 210-280 g/ha. Maximum two applications per year. This product is highly toxic to bees, do not apply to blooming crops and wait at least 5 days before placing beehives in a treated field. PHI: 3 days
Japanese Beetle	Imidan WP or Imidan 50 WP (Pesticide Group 1B) can be used to control Japanese Beetle. REI: 3 days. PHI: 15 days. Apply Imidan WP at a rate of 1.6 kg/1000L water/ha. Apply Imidan 50 WP at a rate of 2.25 kg/1000L water/ha. Begin applications when adult Japanese beetles are first observed; 2 nd application may be required. Maximum 2 applications per season.
Brown marmorated stink bug	Not found in Nova Scotia but has been found in Ontario and Quebec.
Bacterial blight	<p>Cueva - M1 0.5-2% solution, applied 470-940 L/ha 4 hrs REI; 1 day PHI Apply at the start of flowering and continue every 7 to 10. Apply before fall rains and again during dormancy before spring.</p> <p>Copper Spray Fungicide - M Apply 2-4 kg in 500-1000 L/ha. Apply once before fall rains, once at 50% leaf fall and once at bud burst, then at 14 day intervals during wet weather. 48 hrs REI; 2-day PHI Maximum 6 applications per year.</p> <p>Pura-fi 420 - M01 For control of bacterial blight apply Pura-fi 420 as a foliar application at a rate of 180 – 200 ppm in 600-1200 L of water per hectare.</p>

Insect / Disease / Other	Note
<p>Valdensinia leaf spot (<i>Valdensinia heterodoxa</i>)</p>	<p>Apply PROLINE 480 SC Foliar Fungicide at the first sign of disease. After the initial application, one additional application may be made 10-14 days afterwards if conditions remain favourable for continued or increased disease development. Apply up to two (2) applications of PROLINE 480 SC per year. Apply at a rate of 400 mL/ha. Applications may be made by ground application equipment only. Apply with a non-ionic surfactant, AgSurf or Agral 90 at 0.125% v/v. REI: 24 hours. PHI: 7 days.</p> <p>Also good for the suppression of Septoria leaf spot.</p> <p>Quilt at 1.0 L/ha for suppression of Valdensinia leaf spot. Apply at the first sign of disease in the spout year. After the initial application, one additional application may be made 10-14 days afterwards if conditions remain favourable for continued or increased disease development. Use a minimum of 200 L per hectare of water or an appropriate water volume to provide full coverage. REI: 12 hours. PHI: 30 days.</p> <p>Propulse: <u>Suppression of Valdensinia leaf spot.</u> 1000 ml/ha. Apply at the first sign of disease. After the initial application, one additional application may be made 10-14 days afterwards if conditions remain favourable for continued or increased disease development. REI: 24 hours. PHI: 7 days.</p>
<p>Blueberry leaftier (<i>Croesia curvalana</i>)</p>	<p>Apply Decis 5 EC at a rate of 150mL/ha in 1200-1500L/ha of water. Also controls spanworm at a 125mL/ha rate, and other caterpillars such as winter moth and leafrollers if applied when insects or damage first appear prior to bloom.</p> <p>Apply Poleci 2.5 EC at a rate of 300mL/ha in 1200-1500L water/ha. Will also control spanworm at 250mL/ha. REI: 12 hours. PHI: 14 days.</p>
<p>Leafhopper</p>	<p>Sharp nosed leafhoppers are a vector of blueberry stunt phytoplasma, which causes blueberry stunt disease. Control of leafhoppers is important when blueberry stunt is a problem. Apply Pyganic EC 1.4 II at a rate of 2.32-4.65 L/ha when pests are first observed. Do not wait until plants are heavily infested. Reapply if needed. Do not use when bees or other beneficial insects are present. REI: 12 hrs</p> <p>Apply Admire 240 Flowable at a rate of 175 ml/ha. Do not make foliar applications following a soil application of a Group 4A insecticide. Maximum of two applications of products from group 4A per season.</p> <p>Closer: 200-400 mL/ha : Use the maximum rate for high insect pressure and for longer residual control. Use in sufficient water to ensure thorough coverage usually 200 to 1000 litres of water per hectare. Reapplication interval of a minimum of 7 days if populations warrant. Use a maximum of 2 applications for leaf hopper. Do not apply more than 190 g ai/ha (800 mL product /ha) per growing season. REI: 12 hours. PHI: 1 day. Suppression only for leafhoppers.</p>

Insect / Disease / Other	Note
<p>Spanworm</p>	<p>Confirm 240 F, Group 18 Begin applications when the first signs of feeding damage appear or when infestations reach threshold levels. Apply at 1.0 L/ha. REI: 12 hours. PHI: 14 days. Delegate Insecticide, Group 5 For the suppression of blueberry spanworm, apply 100-200 grams of product per hectare. Apply a maximum of 3 applications per year. Apply at a rate of 200 g/ha. PHI: 3 days</p>
<p>Armyworm cutworm</p>	<p>Confirm 240 F, Group 18 Begin applications when first signs of feeding damage appear or when infestations reach threshold levels. Apply at 1.0 L/ha. REI: 12 hours. PHI: 14 days.</p>
<p>Two-spotted spider mite</p> <p><i>NEW USE 2023</i></p>	<p>Kanemite 15 SC, Group 20B Begin applications when infestations reach threshold levels. Apply 2.07 L/ha. REI: 12 hours. PHI: 1 day.</p>

Label Definitions

DAYS TO HARVEST - Is the minimum number of days from the last application of the product to first harvest. This interval has been set to ensure that any residue of the pesticide left on the fruit at harvest is within an acceptable tolerance. Read the label and do not spray nearer to harvest, or later than the growth stage recommended.

TOXICITY TO BEES - Bees are important pollinators of highbush blueberries. If a pesticide must be applied during the bloom period, choose products with the least toxicity to bees. Spray in late evening or early morning when bees are not present. Spray deposit should be dry before bees begin foraging. If you have rented bees, notify the beekeeper that you intend to spray. Give enough advance notice so that the bees can be moved. Do not allow pesticide spray to drift onto hives. The presence of large numbers of dead bees at the hive entrance may be an indicator of pesticide poisoning.

TOXICITY TO APPLICATOR - Poisoning as a result of pesticide exposure can result from inhalation, ingestion (Oral), or absorption through the skin (Dermal). It is essential that protective clothing, respirator, and eye protection are worn when handling products listed as having a high or moderate toxicity. However, since pesticides may also have adverse effects after long term sublethal exposures it is recommended that protective equipment be worn when using all pesticides. Some of the wettable powder (W or WP) formulations recommended in this guide are now available in low exposure packaging (Instapak, Solupak) or low dust formulations such as dry flowable (DF) and wettable dry granule (WDG). Use of these products reduces inhalation exposure during handling.

RESISTANCE MANAGEMENT - The inappropriate use of some products leads to selection pressures within pest populations which gradually increase the number of more tolerant organisms within the population. Current disease concerns are for the development of resistance in the Botrytis blight fungus to Elevate, Senator and Lance (they are from different chemical families). To slow the development of resistance, use the products at appropriate rates and rotate with other fungicides from different chemical families or groups. Avoid application of more than two consecutive sprays of the same fungicide or a fungicide from the same chemical family. If additional protection or control is required, choose a product from a different chemical family. Refer to the labels for more detailed information on resistance management.

Insect resistance management is based on the same principles. Among the key strategies are 1) monitor insect populations, 2) use economic thresholds and treat only as a last resort, 3) rotate controls (chemical vs non-chemical options) and modes of action (different chemical families), and 4) use appropriate rates.

PESTICIDE POISONING - If you suspect poisoning from exposure to a pesticide, consult the label for immediate first-aid instructions. Transport the person to your nearest hospital or call 911. Take the label information or the sealed pesticide container with you since it supplies treatment information.

The Pest Control Products Act Number (P.C.P. No.) on the label will enable the attending physician to obtain specific treatment guidelines from the Poison Control Centre.

HOW TO REDUCE / AVOID PESTICIDE USE

By applying good management practices, growers can sometimes reduce or eliminate the need for some pesticides. Good management practices include:

- Learn to recognize blueberry pests and diseases.
- Monitoring is essential to establishing an effective IPM program.
- If new to implementing an IPM program, uncertainty and risk can be reduced or eliminated by using qualified supervision. Perennia can provide advice on who to contact and how to proceed.
- Learn the thresholds and trust them. Thresholds have been established based on cost/benefit analyses and years of experience. Minimum or threshold adjustments may be warranted in some cases but should be discussed with an IPM Specialist/Consultant before using. If economic or action thresholds do not exist for a particular pest, lobby for research that will help resolve this situation.
- Sanitation. Remove and destroy diseased stems and branches from the field. This is especially important for canker control.
- Know the product you are using. Some products are more effective under specific conditions, such as temperature, or are only effective when the target pest is at a specific stage of development. Read the label carefully.
- Choose the planting site carefully. Wet, poorly drained soils can lead to root problems.

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