

Highbush Blueberry Management Schedule

A guide to insect, mite and disease management in highbush blueberries in Nova Scotia



2019



Highbush Blueberry Insect & Disease Management Schedule for Nova Scotia

Nova Scotia Guide to Pest Management in Highbush Blueberry 2019 [High1-19]

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LIABILITY STATEMENT

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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 minimal residues on the fruit exist.

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HIGHBUSH BLUEBERRY INSECT & DISEASE MANAGEMENT SCHEDULE

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 through the use of 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.

¹General Re-entry

²Hand-pruning
⁴PPE Require for Certain Activities

³Hand-harvest
⁵U-pick Harvest

New Planting

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 ¹	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	Several species. Specimens should be identified to help determine appropriate action. Cultural tips: <ol style="list-style-type: none"> 1) Delay planting for 2 years after removing sod or pasture crop. 2) Eliminate grasses 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.

¹ Proper identification of insects and plant diseases is essential for an effective IPM program.

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Established Planting

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	REI	PHI	Note
Dormant						
Scale	M	Lime Sulfur + Dormant oil	50L + 12.5 L in 1000 L; 25L + 6.5 L in 500 L; 5L + 1.25 L 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 and timing of other products.
		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	For Vegol Crop Oil - Do not apply to wet foliage.
Early Spring to Green Tip						
Mummy berry (<i>Monilinia</i>)	3	Funginex DC	1.7 L/ha	48 hrs	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.
		Topas	500 mL/ha	12 hrs		Use no more than 2 consecutive applications to prevent resistance.
		Tilt 250 E	500 mL/ha	12 hrs ¹ / 5 days ^{2,3}	60 days	Tank mix Group 3 fungicides with a compatible Group M fungicide.
		Jade	500 mL/ha	12 hrs ¹ / 5 days ^{2,3}	60 days	

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
	3	Mission 418 EC	300 mL/ha	5 days	60 days	Use no more than 2 consecutive applications to prevent resistance. Tank mix Group 3 fungicides with a compatible Group M fungicide.
		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	
		Proline 480SC	315-420 mL/ha	24 hrs	7 days	
		Quash	180 g/ha	12 hrs ¹ / 72 hrs ²	7 days	
		Propi Super 25EC	500 mL/ha	12 hrs	60 days	First application at or near flower bud swelling; second application at leaf bud swelling.
	3+9	Inspire Super	558-836 mL/ha	12 hrs	1 day	
	3+11	Quilt	1.0 L/ha in minimum 200 L water/ha	12 hrs	30 days	
	29	Allegro 500F	2.24 L/ha in 300- 1000L water/ha	24 hrs	30 days	Suppression only.
	44	Serenade Opti	2.0-3.3 kg/ha	When dry	0 days	Biofungicide. Suppression only.
	NC	Actinovate SP	425-840 g/ha	1 hr	-	Biofungicide. Suppression only.
	P5	Regalia Maxx	0.125 - 0.25% v/v in 400-800 L water/ha	When dry	0 days	Biofungicide. Suppression only.

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
	19	Diplomat 5SC NEW 2019	463-926 ml/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 on a 7-21 day interval if disease pressures persist.
Phytophthora Root Rot	4	Ridomil Gold 480 SL	37 mL/ 100m row	12 hrs	80 days	Apply prior to bud break.
	33	Aliette WDG	5.6 kg/ha in 300-1000 L water/ha	24 hrs	1 day	For spring applications, apply the first spray when there is 7 cm of new growth continuing on a 14-21 day interval. Do not exceed 22.4 kg product/ha or 4 applications per year for all uses.
Green Tip						
Anthracnose & Phomopsis canker	M	Bravo 500	7.2 L/ha	48 hrs	54 days	Also registered for Alternaria fruit rot. Make 3 applications - one at green tip, another at pink bud and another at petal fall.
		Bravo ZN	7.2 L/ha			
		Echo 90DF	4 kg/ha			
		Echo 720	5 L/ha			
	3	Quash	180 g/ha	12 hrs ¹ / 72 hrs ²	7 days	Suppression only. Phomopsis only.
	3+9	Inspire Super	1.2-1.5 L/ha	12 hrs	1 day	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 on a 7-14 day schedule. Use shorter interval 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 first application during early bloom.	

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
						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	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 petal fall.
	33	Aliette WDG	5.6 kg/ha in 300-1000 L water/ha	24 hrs	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 on 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.
	NC	Botector	1 kg in 500-2000 L water/ha	4 hrs	0 days	Anthracnose only. Suppression only. Compatibility restrictions.
	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.
Pink Bud						
Anthracnose /Phomopsis canker	Refer to Green Tip					

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
Leafroller/ Winter Moth	3	Decis 5 EC	150 mL in 1200-1500 L water/ha	12 hrs	14 days	
	5	Delegate	200 g/ha	12 hrs When dry	3 days	
		Entrust	267-364 mL/ha			
		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. Minimum reapplication 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	
	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	285 g/ha	12 hrs	1 day	
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	M	Maestro 80 DF	2.25 kg	72 hrs	2 days	Do not use within 14 days of oil. Do not tank-mix or in sequential application with Exirel.
		Captan 80 WDG				

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
grey mold		Ferbam 76 WDG	3.75 kg	12 hrs	40 days	Do not apply later than mid-bloom.
	3+9	Inspire Super	1.2-1.5 L/ha	12 hrs	1 day	No more than two applications before rotating to another fungicide group.
	7	Cantus WDG	560 g/ha	12 hrs	0 days	Use once and then rotate to a different fungicide group. Suppression only.
		Kenja 400 SC	0.987-1.24 L/ha		7 days	
		Sercadis	250-660 mL/ha		0 days	
	7+9	Luna Tranquility	1200 mL/ha	12 hrs	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+11	Pristine WG	1.3-1.6 kg/ha	24 hrs	0 days	Begin applications prior to disease development and continue on a 7 to 14 day schedule. Use a shorter interval and/or higher rates when disease pressure is high.
	9	Scala SC	2 L/ha	12 hrs	0 days	
	9+12	Switch 62.5 WG	775 to 975 g/ha	12 hrs	1 day	Apply first during early bloom. Second application may 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.
	17	Elevate 50 WDG	1.70 kg	4 hrs	1 day	
19	Diplomat 5SC	463-926 mL/ha	When dry	0 days	Suppression. Begin as a preventative application when conditions favour disease development and continue on a	

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
						7-10 day interval as needed.
	44	Serenade Opti	3.0-6.0 kg/ha	When dry	0 days	Biopesticide. Suppression only. Begin applications at first sign of the disease or when conditions favour disease development. Repeat as necessary on a 7-10 day interval.
	46	Timorex Gold	1.5-2.0 L/ha	4 hrs	2 days	Do not tank-mix with Supra Captan, Maestro, or Sulphur products.
	NC	Botector	1 kg in 500-2000 L water/ha	4 hrs	0 days	Suppression only.
	P5	Regalia Maxx	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.
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</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.					
	1	Malathion 85 E	550 mL/ha or 1000 mL/ha	48 hrs	1 day	Lower rate for Cherry fruitworm. Higher rate for Cranberry fruitworm.
		Sevin XLR	4.00 L/ha in 1200-1400 L water/ha	5-9 days	2 days	Cranberry fruitworm only.

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
<i>vaccinii</i>)	4	Assail 70 WP Aceta 70 WP	160 g/ha in minimum 187 L water/ha	12-48 hrs	7 days	Begin application when egg hatch begins.
	11	Bioprotec CAF	1.4-2.8 L/ha	12 hrs	0 days	
		Dipel 2X DF	1.68 kg/ha			
	15	Rimon 10 EC	1.35-2 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		7 days	
	28	Altacor	215-285 g/ha	12 hrs	1 day	Do not apply more often that 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	1A	Sevin XLR	4 L/ha	5 days ¹ / 9 days ^{2,3}	2 days	Residual activity is 5-7 days.
	1B	Lagon 480 E	825 mL	12 hrs ¹ /12 days ³	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				
		Imidan 70-WP	1.6 kg	3 days ^{1,4} /15 days ⁵	15 days	Residual activity 10-12 days.
		Malathion 85 E	550 mL/ha	48 hrs	1 day	Residual activity 5-7 days.
	4	Assail 70 WP Aceta 70 WP	136-160 g/ha	12 hrs ¹ / 48 hrs ²	7 days	Maximum of two products from group 4A per season.
		Admire 240 Flowable	230-350 mL/ha	24 hrs	3 days	
4D	Sivanto Prime	0.75-1.0 L/ha	12 hrs	3 days	Toxic to certain beneficial insects. Rotate	

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
						with insecticides outside of Group 4.
	5	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 on 7 day intervals, use a shorter interval during rainy periods. Apply to one side of every row.
	23	Movento 240 SC	365-435 mL/ha in 200-3000 L water/ha	12 hrs	7 days	Allow for 7 days between applications.
	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	M	Maestro 80 DF	2.25 kg	72 hrs	2 days	Do not use within 14 days of oil or as a tank-mix or sequential application with products such as Exirel or Timorex Gold.
		Captan 80 WDG				
	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	Cantus 70 WDG	0.56 kg	12 hrs	0 days	Suppression only (Sercadis). Use once, then rotate to a different fungicide group.
		Kenja 400 SC	0.987-1.24 L/ha		7 days	
		Sercadis	250-666 mL/ha		0 days	
	7+9	Luna Tranquility	1.2 L/ha	12 hrs	1 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 on 7-14 day schedule. Use shorter interval and/or	

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
						higher rates when disease pressure is high.
	9	Scala SC	2 L/ha	12 hrs	0 days	
	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	4 hrs	1 day	
	19	Diplomat 5SC	463-926 mL/ha	When dry	0 days	Suppression. Begin as a preventative application when conditions favour disease development and continue on a 7-10 day interval as needed.
	44	Serenade OPTI	1.7-3.3 kg/ha	When dry	0 days	Suppression only. For best results, use multiple applications or rotate with other products.
	46	Timorex Gold	1.5-2.0 L/ha	4 hrs	2 days	Do not tank mix or alternate with Supra Captan, Maestro, or sulphur products.
	NC	Botector	1 kg in 500-2000 L water/ha	4 hrs	0 days	Suppression only.
	P5	Regalia Maxx	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.
Leafroller	5	Delegate	100-200 g/ha	12 hrs	3 days	Reapply as necessary on a 7-10 day schedule. Toxic to bees exposed to direct treatment, drift or residues on blooming plants.
		Entrust	267-364 mL/ha	When dry		
		Success	145-182 mL/ha			
	11	Bioprotec CAF	1.4-2.8 L/ha	12 hrs	0 days	

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
						feeding.
	11	Dipel 2X DF	525-1125 g/ha	12 hrs	0 days	Spray when and where pests are actively feeding.
	18	Confirm 240 F	1.0 L/ha	12 hrs	14 days	Active on eggs and young larvae
		Intrepid	0.5 L/ha		3 days	
	28	Altacor	285 g/ha	12 hrs	1 day	See label for tank-mix and compatibility restrictions.
		Exirel	0.5-1.0 L/ha		3 days	
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.					
	1	Imidan WP	1.6 kg/ha in 1000 L water/ha	3-15 days	15 days	
	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	1 day	
		Success	165-220 mL/ha			
	28	Exirel	1.0-1.5 L/ha	12 hrs	3 days	See label for tank-mix and compatibility restrictions.
Anthracnose	Most infections take place during bloom. Fungicides at this time are not necessary if good control was achieved earlier.					
	3	Quash	180 g/ha	12-72 hrs	7 days	
	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	Max. 4 applications/season.
	9+12	Switch 62.5 WG	775-975 g/ha	12 hrs	1 day	
	11	Cabrio EG	1 kg/ha	12-24 hrs	1 day	Do not tank-mix or make sequential applications with Exirel.

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Insect / Disease	Group	Product	Rate / ha	REI	PHI	Note
	P5	Regalia Maxx	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.
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	Lagon 480E	830 mL/ha in up to 1000 L water/ha	12 hrs	21 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*
		Cygon 480				
	5	Entrust SC	334-440 mL/ha		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 the pest populations.

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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
<i>Phytophthora</i> 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 on a 14 day interval. Use sufficient volume of water for good coverage. Max 4 applications/season. Also for control of Septoria Leaf Spot (<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. There is a 12 hour REI and a 7 day PHI. Allow 7 days between applications and do not apply more than 1.833 L/ha per year. 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. 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.
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.
Japanese Beetle	Imidan WP or Imidan 50 WP (Pesticide Group 1B) can be used to control Japanese Beetle. Restricted entry interval of 3 days and a Pick Your Own (PYO) REI of 15 days. Pre-harvest interval of 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.

¹General Re-entry

²Hand-pruning

³Hand-harvest

⁴PPE Require for Certain Activities

⁵U-pick Harvest

Brown marmorated stink bug	Not found in Nova Scotia but has been found in Ontario and Quebec.
Bacterial blight	M1 - Cueva 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.
Valdensinia leaf spot (<i>Valdensinia heterodoxa</i>)	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. 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. 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.
Blueberry leaf-tier (<i>Croesia curvalana</i>)	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. 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.
Leafhopper	Sharp nosed leafhoppers are a vector of blueberry stunt phytoplasma, which causes blueberry stunt disease. Control of leafhopper 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 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.

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⁵U-pick Harvest³Hand-harvest⁴PPE Require for Certain Activities

PESTICIDE EMERGENCY CONTACT INFORMATION

Poison Control Centres		
Nova Scotia	800.565.8161 or 902.428.8161	IWK, Halifax, NS
New Brunswick	911	Ask for Poison Information
Prince Edward Island	800.565.8161 or 902.428.8161	IWK, Halifax, NS
Newfoundland	709.722.1110	Dr. Charles A. Janeway Child Health Care Centre, St. John's, NF

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

ABBREVIATIONS & CONVERSIONS

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

Helpful Conversions ²	
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

² 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!

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PESTICIDE INFORMATION SUMMARY

Read product labels for re-entry intervals, precautions, and other product specific details.

TRADE NAMES	COMMON NAME	DAYS TO HARVEST*	TOXICITY*			
			TO PRED MITES	TO BEES	TO APPLICATOR	
					ORAL	DERMAL
Insect/Mite Control						
Actara 25WG	thiamethoxam	3	-	high	low	low
Admire 240 Flowable	imidacloprid	3	low	mod	low	low
Altacor	chlorantraniliprole	1	-	mod	low	low
Assail	acetamiprid	7	-	mod	low	low
Bioprotec	<i>Bacillus thuringiensis</i>	0	low	low	low	low
Confirm 240 F	tebufenozide	14	low	low	low	low
Cygon 480-AG	dimethoate	21	low	high	low	low
Decis	deltamethrin	14	high	high	low	low
Delegate	spinetoram	3	low	high	low	low
Dipel 2X DF	<i>Bacillus thuringiensis</i>	0	low	low	low	low
Entrust/ Success 480SC	spinosad	3	low	high	low	low
Exirel	cyantraniliprole	3	-	high	low	low
GF-120 NF Naturalyte Fruit Fly Bait	spinosad	-	low	high	low	low
Imidan	phosmet	15	mod	high	mod	low
Intrepid	methoxyfenozide	7	-	low	low	low
Lagon	dimethoate	15	high	mod	mod	mod
Malathion	malathion	1	low	high	low	low
Movento	spirotetramat	7	mod	high	mod	mod
Purespray Green Spray Oil 13E	mineral oil	-	low	-	low	low
Pyganic EC 1.4 II	pyrethrins	-	low	high	low	low
Rimon	novaluron	8	low	mod	mod	mod
Sevin	carbaryl	2	mod	high	mod	mod
Sivanto Prime	flupyradifurone	3	low	mod	high	low
Superior 70 Oil	mineral oil	-	low	-	low	low
Vegol Crop Oil	mineral oil	0	low	-	low	low
Disease Control						
Actinovate SP	<i>Streptomyces lydicus</i>	-	low	low	low	low
Aliette WDG	fosetyl-al	1	low	low	low	low
Allegro	fluazinam	30	low	low	low	low
Botector	<i>Aureobasidium pullulans</i>	0	low	low	low	low
Bravo/Echo	chlorothalonil	54	low	low	low	low

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90DF/Echo 720						
Bumper 432 EC	propiconazole	60	low	low	low	low
Cabrio	pyraclostrobin	29	low	low	low	low
Cantus	boscalid	0	low	low	low	low
Captan, Maestro	captan	2	low	mod	low	low
Confine Extra	mono- and di-potassium salts or phosphorous acid	1	low	low	low	low
Cueva	copper	1	?	?	low	low
Diplomat	Polyoxin D Zinc salt		low	low	low	low
Elevate	fenhexamid	1	low	low	low	low
Ferbam	ferbam	40	low	low	low	low
Fitness	propiconazole	60	low	low	low	low
Funginex	triforine	60	low	low	low	low
Indar	fenbuconazole	30	-	low	low	low
Inspire Super	difenoconazole + cyprodinil	1	low	low	low	low
Jade	propiconazole	60	low	low	low	low
Kenja 400SC	isofetamid	7	low	low	low	low
Lime Sulphur	calcium polysulphide	-	high	mod	mod	low
Luna Tranquility	fluopyram + pyrimethanil	0	low	low	low	low
Phostrol	mono- and dibasic sodium, potassium and ammonium phosphates	0	low	low	low	low
Pristine	boscalid, pyraclostrobin	0	low	low	low	low
Proline 480SC	prothioconazole	7	-	low	low	low
Quash	metconazole	7	low	low	low	low
Quilt	propiconazole + azoxystrobin	30	low	low	low	low
Regalia Maxx	extract of <i>Reynoutria sachalinensis</i>	0	low	low	low	low
Ridomil Gold 480 EC	metalaxyl-M	80	-	low	low	low
Scala SC	pyrimethanil	0	low	low	low	low
Sercadis	fluxapyroxad	0	low	low	low	low
Serenade OPTI	<i>Bacillus subtilis</i>	0	low	low	low	low
Switch	cyprodinil, fludioxonil	1	-	low	low	low
Tilt 250 E	propiconazole	60	low	low	low	mod
Timorex Gold	tea tree oil	2	low	low	low	low
Topas, Mission, Propi Super	propiconazole	60	low	low	low	low

* Days to harvest intervals and toxicity ratings are provided as a guide only. Always refer to the label.

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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. For a very informative self-paced course on insect resistance management, have a look at the free online NCGA course on the Dow AgroSciences web site at <http://209.98.16.17/index.html?org=dow>.

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.**

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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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