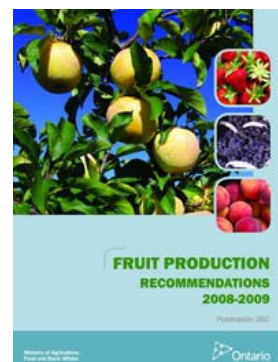


Fruit Production Recommendations 2008-2009

Ontario Ministry of Agriculture, Food and Rural Affairs

Chapter 5: Berry Crops

Blueberry Calendar



Consult the product label for suggested water volumes. For mature highbush blueberries, use 700–1,000 L of water per ha unless otherwise noted on the label.

Products are listed according to insecticide and fungicide family groups. Use products from different family groups to prevent pest resistance.

Diseases and Insects	Materials	Amount/ha	Comments
Dormant (late winter)			
Scale insects Lecanium scale	<ul style="list-style-type: none"> • Guardsman Dormant Oil Spray • Lime Sulphur plus Dormant Oil Spray 	20 L oil/1,000 L water 50 L Lime Sulphur plus 12.50 L oil/1,000 L water	Apply when plants are dormant. Spray to the point of run-off, cover completely. Do not use within 10 days of Bravo, Captan or Maestro, or phytotoxicity may result. Do not use within 48 hours of freezing temperatures.
Early Spring, prior to bud break			
Phytophthora root rot	<ul style="list-style-type: none"> • Ridomil Gold 480 SL 	Banded: 37 mL/100 m	If phytophthora root rot has been identified, apply 37 mL/100 m of row to the soil surface in a 1 m band centered over the row. Apply in at least 2,000 L of water per ha.
Bud swell to pink bud			
Mummy berry (<i>Monilinia</i>)	<ul style="list-style-type: none"> • Funginex DC • Topas 250 E or Mission 418 EC 	1.70 L 500 mL 300 mL	Cultivate before bud break to bury overwintering inoculum. Monitor for trumpet-shaped structures erupting from mummified berries on the ground. Spray to prevent primary infection of blueberry shoots. Make the first application when the flower buds swell and spray once or twice more at 10–14 day intervals until first bloom. Funginex: Do not spray after pink bud stage. Topas or Mission: Maximum two applications per season.
Leaf tiers	<ul style="list-style-type: none"> • Decis 5 EC 	150 mL	Damage occurs very early. If leaf tier was a problem in the past, spray at the bud cluster stage as flower buds begin to swell and pink tissue becomes visible.

Diseases and Insects	Materials	Amount/ha	Comments
Green tip			
Phomopsis stem canker Anthracnose fruit rot	<ul style="list-style-type: none"> • Cabrio EG • Pristine WG • Pristine WG • Bravo 500 	1.00 kg 1.30 kg* 1.60 kg* 7.20 L	Apply fungicides at this time to prevent twig blights and reduce overwintering inoculum. *Pristine: Use 1.3 kg/ha for anthracnose fruit rot and 1.6 kg/ha for phomopsis stem canker. Pristine and Cabrio: Both include active ingredients in the same fungicide family. Maximum two consecutive applications, then alternate with fungicides from different families. Bravo: Will also control alternaria fruit rot.
Pink bud			
Anthracnose fruit rot Phomopsis stem canker	<ul style="list-style-type: none"> • Cabrio EG • Pristine WG • Pristine WG • Bravo 500 	1.00 kg 1.30 kg* 1.60 kg* 7.20 L	Apply fungicides at this time to prevent twig blights. *Pristine: Use 1.3 kg/ha for anthracnose fruit rot and 1.6 kg/ha for phomopsis stem canker. Pristine and Cabrio: Both include active ingredients in the same fungicide family. Maximum two consecutive applications then alternate with fungicides from different families. Bravo: Will also control alternaria fruit rot.
DO NOT APPLY INSECTICIDES WHILE BLUEBERRIES ARE IN BLOOM. SEE BEE POISONING ON PAGE 192.			
First bloom			
Anthracnose fruit rot	<ul style="list-style-type: none"> • Cabrio EG • Pristine WG • Switch 62.5 WG 	1.00 kg 1.30 kg 775 g	Pristine and Cabrio: Both include active ingredients in the same fungicide family. Maximum two consecutive applications then alternate with fungicides from different families.
Botrytis twig and blossom blight Botrytis fruit rot (grey mould)	<ul style="list-style-type: none"> • Supra Captan 80 WDG or Maestro 80 DF • Ferbam 76 WDG • Elevate 50 WDG • Lance WDG • Pristine WG • Switch 62.5 WG • Serenade Max 	2.25 kg 2.25 kg 3.75 kg 1.70 kg 560 g 1.30 kg 775 g 3.00 kg	Fungicides for botrytis blights are more important when wet weather occurs. Repeat at 7–10 day intervals through bloom if weather is wet. Choose fungicides from different families to reduce the development of resistant strains. Ferbam: Do not use later than mid-bloom. Serenade Max: Provides suppression, rather than control, of <i>botrytis</i> blossom blight and fruit rot. Expect best results from multiple applications or when used in rotation with other products.
Petal fall			

Diseases and Insects	Materials	Amount/ha	Comments
Cherry fruitworm Cranberry fruitworm	<ul style="list-style-type: none"> Malathion 25 W Sevin XLR Dipel 2X DF 	2.25 kg 4.00 L 1.68 kg	<p>Moths lay eggs on developing fruit and larvae tunnel into fruit. Use pheromone traps to monitor moth activity and to time the spray more accurately.</p> <p>Sevin or Malathion: Apply 5–7 days after trap catches peak. A second insecticide is required if trap catches remain elevated seven days after application.</p> <p>Dipel: Spray at peak trap catch and continue at 3–7 day intervals, to a maximum of four applications. Dipel is less effective than other products and unstable in bright sunlight. Apply on a cloudy day or in the evening.</p> <p>Malathion: Also controls aphids.</p>
Anthraxnose fruit rot	<ul style="list-style-type: none"> Cabrio EG Pristine WG Switch 62.5 WG Bravo 500 	1.00 kg 1.30 kg 775 g 7.20 L	<p>Most fruit infections occur in the bloom to green fruit stage. Infected fruit soften near harvest time and orange spore masses develop on the fruit.</p> <p>Alternate with fungicides from different families.</p> <p>Pristine and Cabrio: Both include active ingredients in the same fungicide family. Make no more than two consecutive applications, then alternate with fungicides from different families.</p> <p>Bravo: Also controls alternaria fruit rot. Bravo may cause fruit injury if applied to green fruit.</p>
Phomopsis stem canker	<ul style="list-style-type: none"> Cabrio EG Pristine WG Bravo 500 	1.00 kg 1.60 kg 7.20 L	<p>Pristine and Cabrio: Both include active ingredients in the same fungicide family. Make no more than two consecutive applications, and then alternate with fungicides from different families.</p> <p>Bravo: Also controls alternaria fruit rot. Bravo may cause fruit injury if applied to green fruit.</p>
European chafer larvae Japanese beetle larvae	<ul style="list-style-type: none"> Admire 240 F or Alias 240 WG 	1.20 L 1.20 L	<p>Do not apply during bloom. Apply just prior to egg hatch (shortly after adults are active) to damp soil around bushes and to grass covered areas around blueberry field. Apply in 200 L water per ha. Move the product into the root zone with 5–10 mm irrigation within 24 hours of application but avoid over watering. Maximum one application per season, at petal fall, fruit ripening or after harvest.</p>
Fruit ripening			
Botrytis fruit rot (grey mould)	<ul style="list-style-type: none"> Supra Captan 80 WDG or Maestro 80 DF Elevate 50 WDG Lance WDG 	2.25 kg 2.25 kg 1.70 kg 560 g 775 g	<p>Spray at 7–10 day intervals if <i>botrytis</i> grey mould was not well controlled during bloom. Choose fungicides from different chemical families to reduce the development of resistant strains.</p> <p>Serenade Max: Provides suppression, rather than control of <i>botrytis</i> fruit rot. Expect best results from multiple applications or when used in rotation with other products.</p>

Diseases and Insects	Materials	Amount/ha	Comments
	<ul style="list-style-type: none"> • Switch 62.5 WG • Serenade Max 	3.00 kg	
Anthracnose fruit rot	<ul style="list-style-type: none"> • Switch 62.5 WG 	775 g	Most infections take place during bloom. Fungicides at this time are not necessary if good control was achieved earlier.
European chafer larvae Japanese beetle larvae	<ul style="list-style-type: none"> • Admire 240 F or Alias 240 WG 	1.20 L 1.20 L	Do not apply during bloom. Apply just prior to egg hatch (shortly after adults are active) to damp soil around bushes and to grass covered areas around blueberry field. Apply in 200 L water per ha. Move the product into the root zone with 5–10 mm irrigation within 24 hours of application but avoid over watering. Maximum one application per season, at petal fall, fruit ripening or after harvest.
Blueberry maggot	<ul style="list-style-type: none"> • Imidan 50 WP • Cygon 480 (highbush) 830 mL (lowbush) 580 mL • Lagon 480 E (highbush) 825 mL (lowbush) 600 mL • Malathion 25 W • Sevin XLR • GF-120 NF 	2.25 kg 4.00 L 1.50 L	<p>Monitor for blueberry maggot using yellow sticky traps.</p> <p>Ontario is considered free from blueberry maggot, except for regulated areas. Growers in regulated areas (including Wainfleet and Charlotteville townships) should spray for this pest. Growers outside regulated areas should consider border sprays and practice best management practices to prevent infestation. For more information, see <i>Blueberry Maggot</i> at ontario.ca/crops.</p> <p>Apply the first spray when first blueberry maggots are trapped or when berries begin to turn blue, about July 5–15, depending on the area and season. Apply a second spray about 5–12 days later, depending on the product. Protection is needed as long as adults are active. Imidan and Cygon provide 10–12 days protection under normal conditions. Residual activity of Sevin and Malathion is much shorter.</p> <p>Cygon, Lagon: Maximum two applications per season. Do not use on crops destined for USA markets.</p> <p>Imidan: Maximum two applications per season.</p> <p>GF-120 NF: This is a bait formulation that requires large droplet size (4–6 mm); specialized application equipment may be needed. Begin applications when first blueberry maggot flies are trapped or 2–3 weeks before fruit begins to ripen. Repeat application at least every 7 days. GF-120 will lose effectiveness if exposed to rain or overhead irrigation.</p>

Blueberry maggot is a regulated pest; infestations must be reported to the Canadian Food Inspection Agency.

Blueberry maggot can spread to new areas in soil, harvest containers, or when infested fruit is purchased from another region and dumped on your farm.

Use best management practices to prevent spread of blueberry maggot to new areas.

See ontario.ca/crops.

TABLE 5-9. Products Used on Blueberries

Use this table as a guide but refer to product label for specific information.

The **preharvest interval** is the number of days between the last spray and first harvest.

The **re-entry period** is the minimum interval that must be observed between application of the pesticide and work in the treated crop without protective equipment. If no re-entry period is stated on the label, assume the spray solution must be dry before re-entry can occur.

The **maximum number of applications** is the labelled maximum number for the growing season and may be higher than what is recommended for resistance management or for the preservation of beneficial insects.

Product name	Common name	Group	Preharvest interval	Minimum re-entry	Maximum # applications per season
Admire 240 F	imidacloprid	neonicotinoid	14 days	24 hours	1
Alias 240 WG	imidacloprid	neonicotinoid	14 days	24 hours	1
Bravo 500	chlorothalonil	chloronitrile	54 days	48 hours	3
Cabrio EG	pyraclostrobin	strobilurin	29 days	29 days for hand harvest, when dried for other activities	4
Cygon 480	dimethoate	organophosphate	15 days		2
Decis 5 EC	deltamethrin	pyrethroid	14 days		
Dipel 2X DF	<i>Bacillus thuringiensis</i>	B.t. microbial	1 day		4
Elevate 50 WDG	fenhexamid	hydroxylaniline	1 day	4 hours	4
Ferbam 76 WDG	ferbam	dithiocarbamate	40 days		
Funginex DC	triforine	piperazine	60 days	48 hours	3
GF-120 NF	spinosad	spinosyn	0		5

Product name	Common name	Group	Preharvest interval	Minimum re-entry	Maximum # applications per season
Guardsman Dormant Oil Spray	mineral oil				1
Imidan 50 WP	phosmet	organophosphate	15 days		2
Lagon 480 E	dimethoate	organophosphate	15 days		2
Lance WDG	boscalid	anilide	0 days	4 hours	4
Lime Sulphur plus Dormant Oil Spray	calcium polysulphide	inorganic			1
Maestro 80 DF	captan	phthalimide	2 days	72 hours	
Malathion 25 W	malathion	organophosphate	1 day		
Mission 418 EC	propiconazole	triazole (DMI)	60 days	72 hours	2
Pristine WG	boscalid + pyraclostrobin	anilide carboxamide + QoI	0 days	29 days for hand harvest, when dried for other activities	4
Ridomil Gold 480 SL	metalaxyl M and S isomer	phenyl amide	80 days	12 hours	1
Serenade Max	<i>Bacillus subtilis</i>	B.t. microbial	0 days		
Sevin XLR	carbaryl	carbamate	2 days		
Supra Captan 80 WDG	captan	phthalimide	2 days	72 hours	
Switch 62.5 WG	cyprodinil + fludioxonil	anilinopyrimidine + phenyl pyrroles	1 days	12 hours	3
Topas 250 E	propiconazole	triazole (DMI)	60 days	72 hours	2

TABLE 5-10. Activity of Fungicides on Blueberry Diseases

Ratings in shaded cells indicate the disease is listed on the product label for control or suppression. Use fungicides only for diseases listed on the product label for the crop and for the disease. Additional information is provided in this table to assist the grower in choosing the best fungicide for control of diseases listed on the product label.

Fungicide group	Product	Mummy berry (shoot blight)	Phomopsis stem canker	Anthraco nose fruit rot	Botrytis fruit rot	Alternaria fruit rot	Phytophthora root rot
M2	Ferbam 76 WDG	+			+	+	0
M2	Maestro 80 DF	+	++	++	+ to ++	+	0
M2	Supra Captan 80 WDG	+	++	++	+ to ++	+	0
M4	Bravo 500	0	++	+	+ to ++	+	0
3	Funginex 190 EC	+++	++	0	0	0	0
3	Mission 418 EC	+++	+	0	0	0	0
3	Topas 250 E	+++	+	++	0	0	0
4	Ridomil Gold 480 SL	0	0	0	0	0	+++
7	Lance WDG	0			+++		0
7&11	Pristine WG	++	+++	+++	+++	++	0
9&12	Switch 62.5 WG	++	+	+++	+++	+++	0
11	Cabrio EG	+	+++	+++	+ to ++	++	0
17	Elevate 50 WDG	0	0	0	+++	0	0

Use fungicides only for control of diseases listed on the product label.
 0 = No control; + = Poor to fair control; ++ = Good control, some limitations; +++ = Excellent control, few if any limitations.
 Blank cell: Effect unknown.