

Fruit Production Recommendations 2010-2011

Ontario Ministry of Agriculture, Food & Rural Affairs

Chapter 5: Berry Crops



Raspberry Calendar

Read the product label and follow all safety precautions.

Always consult the product label for suggested water volumes. Otherwise, use enough water to ensure thorough spray coverage. Where the product rate is listed in amount per 1,000 L and if a water volume is not provided on the label, use enough water to wet the foliage to the near-drip point.

Products are listed according to insecticide and fungicide family groups. Use products from different groups to help prevent development of pest resistance. For resistance management refer to *Pest Resistance to Insecticides, Fungicides, Miticides*, page 23.

For preharvest interval, re-entry period, maximum number of applications and chemical group, see Table 5-14. *Products Used on Raspberries*, page 112.

Diseases and Insects	Products	Rate	Comments
Delayed dormant to green tip			
Spur blight Cane blight	Lime sulphur	35 L/1,000 L water	This spray reduces overwintering inoculum and is the first step in a good disease control program. Spray enough water to drip off the plants. Do not use lime sulphur later than 1/4-inch green.
Prebloom (until blossoms open)			
Anthracnose Spur blight	Ferbam 76 WDG Tanos 50 DF	2.5 kg/1,000 L water 840 g/ha	Protect new growth. Apply when new canes are 25–30 cm tall and again just before first bloom.
Powdery mildew	Senator 70 WP	500 g/1,000 L water or 1.1 kg/ha	In problem areas, spray when mildew is first observed. Repeat in 7–10 days. For resistance management, use a maximum of two applications per season.
Raspberry sawfly	Diazinon 50 W	1.0 kg/1,000 L water	These green bristly larvae feed between the veins on new growth causing long holes and shredding. Apply when damage appears, but before first bloom. Diazinon also controls aphids and raspberry fruitworm.
Raspberry fruitworm	Malathion 25 W Diazinon 50 W	4.5 kg/1,000 L water 1.0 kg/1,000 L water	These small brown beetles feed on new growth and blossom clusters. Larvae infest the fruit cup. Spray to control adults when damage appears but before first bloom. Repeat in 7–10 days where there is a history of injury.

Diseases and Insects	Products	Rate	Comments
Obliquebanded leafroller	Delegate WG Foray 48BA or Bioprotec CAF or Dipel 2X DF	200 g/ha 1.4–2.8 L/ha 1.4–2.8 L/ha 550–1,125 g/ha	Leafrollers are not usually a problem in Ontario. Susceptible varieties include Chilliwack, Chilcotin, Tulameen and other varieties from the Pacific Northwest. Dipel, Foray and Bioprotec: Spray when larvae are very small and repeat at 3–7 day intervals, to a maximum of four applications. Acidify spray mix to below pH 7.0 and apply on cloudy days or evening. See <i>Biopesticides and reduced risk products for insect control</i> , page 17, and notes on <i>Bacillus thuringiensis var. kurstaki</i> , page 17.
Clipper weevil	Malathion 25 W	4.5 kg/1,000 L water	Shake blossom clusters over a tray or dish and look for small weevils and clipped buds. Spray if adults or damage are easily observed. This pest is more common where strawberries are grown nearby.
Two-spotted spider mite	Apollo SC	500 mL/ha	Apollo: Apollo kills mite eggs and very young nymphs, but not older nymphs and adults. Apply when monitoring indicates mites are developing, mostly in the egg stage. Use a maximum of one application per season. Thorough spray coverage of the lower leaf surface is required. Beneficial mites can be introduced to prevent mite build-up.
Bloom			
DO NOT APPLY INSECTICIDES WHILE RASPBERRIES AND BLACKBERRIES ARE IN BLOOM. SEE BEE POISONING ON PAGE 214.			
Botrytis grey mould	Rovral Supra Captan 80 WDG or Maestro 80 DF Elevate 50 WDG Lance 50 WDG Pristine WG Switch 62.5 WG Serenade ASO	2.0 kg/ha 2.5 kg/ha 2.5 kg/ha 1.7 kg/ha 560 g/ha 1.3–1.6 kg/ha 775 g/ha 4.0–15.0 L/ha	Bloom is the most important time to control botrytis grey mould. Begin at 5–10% bloom and if the weather is wet, repeat every seven days. Choose fungicides from different fungicide groups to reduce the development of resistant strains. Captan or Maestro: Also control spur blight. The rate for Supra Captan 80 WDG and Maestro 80 DF on blackberry is 2.25 kg/ha. Pristine and Lance: Both include active ingredients in the same group. Do not alternate Pristine with Lance. Serenade ASO: Provides suppression, rather than control of botrytis grey mould. Expect best results from multiple applications or when used in rotation with other products. See notes on <i>Bacillus subtilis</i> (<i>Serenade ASO</i> , <i>Serenade MAX</i>), page 14.
Green fruit			
Anthraxnose Spur blight Cane botrytis	Tanos 50 DF	840 g/ha	Ensure spray coverage of primocanes in the row. Keep rows narrow by mowing primocanes as they emerge at the row edges. Captan and Maestro used at this timing will also control spur blight.
Obliquebanded leafroller	Foray 48BA or Bioprotec CAF or Dipel 2X DF Delegate WG	1.4–2.8 L/ha 1.4–2.8 L/ha 550–1,125 g/ha 200 g/ha	Leafrollers are not usually a problem in Ontario. Susceptible varieties include Chilliwack, Chilcotin, Tulameen and other varieties from the Pacific Northwest. Dipel, Foray and Bioprotec: Spray when larvae are very small and repeat at 3–7 day intervals, to a maximum of four applications. Acidify spray mix to below pH 7.0 and apply on cloudy days or evening. See <i>Biopesticides and reduced risk products for insect control</i> , page 17, and notes on <i>Bacillus thuringiensis var. kurstaki</i> , page 17.
Japanese beetle	Sevin XLR	5.25 L/ha	Apply when adults appear and repeat as necessary at 7–10 day intervals. The preharvest interval is 11 days.
Rose chafers	Malathion 25 W	4.5 kg/1,000 L water	Spray when adults are active.

Diseases and Insects	Products	Rate	Comments
Leafhoppers	Malathion 25 W Admire 240 F	4.5 kg/1,000 L water 175 mL/ha	Potato leafhopper can be a problem when nearby hay fields are mowed. New plantings are especially susceptible. Monitor for small green nymphs on lower leaf surface. Leafhoppers feed on primocane leaves and cause new growth to turn yellow and curl under. Spray when nymphs are present and symptoms are evident. Admire: Do not apply prebloom, during bloom, or when bees are actively foraging. Apply in 300 L water as a foliar spray. May provide suppression rather than control.
Raspberry cane borer Red-necked caneborer	Admire 240 F	467 mL/ha	Raspberry cane borer makes two rings of puncture marks around the top of the cane, causing the primocane to wilt. Spray to control beetles when damage is first observed. Red-necked cane borer attacks the lower primocane causing canes to break off 2–3 feet above the ground later in the season. If there is a history of this pest, spray when beetles are active. Admire: Do not apply prebloom, during bloom, or when bees are actively foraging. Apply in 300 L water as a foliar spray. May provide suppression rather than control.
White grubs (larvae of European chafer)	Admire 240 F	1.2 L/ha	Control in young plantings where populations are high. Apply just prior to egg hatch (shortly after adults are active) to damp soil in the plant row and in the alleys, in 200 L water/ha. Move the product into the root zone with 5–10 mm irrigation within 24 hours of application. Use a maximum of 1 application per year.
Preharvest			
Botrytis grey mould	Rovral Supra Captan 80 WDG or Maestro 80 DF Elevate 50 WDG Lance 50 WDG Pristine WG Switch 62.5 WG Serenade ASO	2.0 kg/ha 2.5 kg/ha 2.5 kg/ha 1.7 kg/ha 560 g/ha 1.3–1.6 kg/ha 775 g/ha 4.0–15 L/ha	Although bloom is the most important time to control botrytis grey mould, preharvest sprays are required if the weather is wet. Choose fungicides from different fungicide groups to reduce the development of resistant strains. Captan or Maestro: Also control spur blight. The rate for Supra Captan 80 WDG and Maestro 80 DF on blackberry is 2.25 kg/ha. Pristine and Lance: Both include active ingredients in the same group. Do not alternate Pristine with Lance. Serenade ASO: Provides suppression, rather than control, of botrytis grey mould. Expect best results from multiple applications or when used in rotation with other products. See notes on <i>Bacillus subtilis</i> (Serenade ASO, Serenade MAX), page 14.
Postharvest			
Anthraxnose Spur blight Cane botrytis	Tanos 50 DF	840 g/ha	Apply once or twice after harvest, to protect primocanes. Ensure spray coverage of primocanes in the row. Narrow rows and good weed control will reduce disease pressure in the row by allowing air flow and faster drying.
Leafhoppers	Malathion 25 W Surround WP	4.5 kg/1,000 L water 25.0 kg/ha	Surround: Apply at 7–14 day intervals when leafhoppers are first detected by monitoring. Use 12.5–25 kg per 500 L of water. For early applications, use 25 kg per 500 L of water. Once a base coat is established, rate can be reduced for follow-up applications to 12.5 kg per 500 L of water. Surround is not recommended when fruit is present or during bloom. See notes on <i>Kaolin Clay</i> (Surround WP), page 17.
Powdery mildew	Senator 70 WP	1.1 kg/ha or 500 g/1,000 L water	Repeat in 14 days if disease becomes evident on new growth. For resistance management, use a maximum of two applications per season.

Diseases and Insects	Products	Rate	Comments
Two-spotted spider mite	Agri-Mek 1.9% EC Pyramite or Nexter	1.0 L/ha 600 g/ha 600 g/ha	Check lower leaf surface for mites and webbing. Thorough spray coverage of the lower leaf surface is required. Beneficial mites can be introduced to prevent mite build-up. Agri-Mek or Pyramite or Nexter: Do not use before harvest. Alternate miticides between years.
White grubs (larvae of European chafer)	Admire 240 F	1.2 L/ha	Control in young plantings where populations are high Do not apply during bloom. Apply to damp soil in the plant row and in the alleys, in 200 L water/ha. Move the product into the root zone with 5–10 mm irrigation within 24 hours of application.
Special Sprays: Early spring and/or fall			
Raspberry crown borer	Diazinon 500 E or Diazinon 50 W Guthion 50 WSB or Sniper	1.0 L/1,000 L water 1.0 kg/1,000 L water 2.25 kg/ha 2.25 kg/ha	If more than 5% of the crowns are infested, spray lower portions of canes and the crown area. Treat infested plantings at least two years in a row. Diazinon: Apply diazinon in 4,000–5,000 L of water per ha as a drench to crowns and base of plants. Apply in spring to control young larvae before they tunnel into crowns. Apply when new growth is about 10 cm above ground. Do not apply after first bloom. Guthion or Sniper: Apply in mid-September to mid-October to control young larvae. Apply in 1,600 L of water per ha.
Phytophthora root rot	Ridomil Gold 480 SL	37 mL/100 m of row (Apply in a drench spray to the soil surface in a 1 m band centered over the row).	Ridomil: In new, non-bearing plantings, apply as a soil drench after planting and again in mid to late October (before the ground is frozen). In established plantings, apply Ridomil Gold in the fall only. Do not apply in the spring before harvest. Use at least 2,500 L of water per ha.
	Aliette WDG	5.50 kg/ha	Aliette: Aliette WDG is best as a preventive treatment. Use a maximum of four applications per year: two in the spring and two in the fall. Spring application: Apply after bud break at 7 cm of new growth and again 3–4 weeks later. Do not apply within 60 days of harvest. Fall application: Apply when conditions favour disease development (high soil moisture and cool temperatures) and repeat if necessary 3–4 weeks later. The last application should be made at least 30 days before leaf drop. Precautions: Crop phytotoxicity is possible when Aliette is mixed with copper. Care should be taken if mixing Aliette with nitrogen-based foliar fertilizer. Incompatibility with some suspension concentrate formulations can occur.

Table 5-14. Products Used on Raspberries

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 the application of 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	Registration number	Common name	Group	Preharvest interval	Minimum re-entry	Maximum number applications per season (on label)
Products used to control or suppress insects and mites						
Admire 240 F	24094	imidacloprid	4	14 days/4 days ¹	24 hours	1/3 ²
Agri-Mek 1.9% EC	24551	abamectin	6	Use after harvest		2
Apollo SC	21035	clofentezine	10	15 days	12 hours	1
Bioprotec CAF	26854	<i>Bacillus thuringiensis</i>	11	1 day		
Delegate WG	28778	spinetoram	5	1 day	12 hours	3
Diazinon 500 E	11889	diazinon	1B	Use only before bloom		
Diazinon 50 W	19756	diazinon	1B	Use only before bloom		
Dipel 2X DF	26508	<i>Bacillus thuringiensis</i>	11	1 day		
Foray 48BA	24978	<i>Bacillus thuringiensis</i>	11	1 day		
Guthion 50 WSB	21374	azinphosmethyl	1B	Use after harvest	7 days	1
Malathion 25 W	14656	malathion	1B	1 day		
Nexter	25135	pyridaben	21	Use after harvest	24 hours	2
Pyramite	25135	pyridaben	21	Use after harvest	24 hours	2
Sevin XLR	27876	carbaryl	1A	11 days		
Sniper	23323	azinphosmethyl	1B	Use after harvest	7 days	1
Surround WP	27469	kaolin		1 day		
Vydate L	17995	oxamyl	1A	Use after harvest	72 hours	1
Products used to control or suppress diseases						
Aliette WDG	24458	fosetyl al	U	60 days		4
Elevate 50 WDG	25900	fenhexamid	17	1 day	4 hours	4
Ferbam 76 WDG	20136	ferbam	M	Use only before bloom		3

Product name	Registration number	Common name	Group	Preharvest interval	Minimum re-entry	Maximum number applications per season (on label)
Lance 50 WDG	27495	boscalid	7	0 days	4 hours	4
Lime Sulphur	16465	calcium polysulphide	M	Do not use after 1/4 inch green		
Maestro 80 DF	26408	captan	M	2 days	72 hours	
Pristine WG	27985	boscalid + pyraclostrobin	7+11	0 days	24 hours ³	4
Ridomil Gold 480 SL	28474	metalaxyl-M and S	4	Use after harvest	12 hours	1
Rovral	15213	iprodione	2	1 day	12 hours	8
Senator 70 WP	25343	thiophanate-methyl	1	1 day		
Serenade ASO	28626	<i>Bacillus subtilis</i>	44	0 days		
Supra Captan 80 WDG	24613	captan	M	2 days	72 hours	
Switch 62.5 WG	28189	cyprodinil + fludioxonil	9+12	1 day	12 hours	3
Tanos 50 DF	27435	cymoxanil + famoxadone	11+27	0 days	24 hours	6
<p>A blank cell indicates the information is not specified on the product label.</p> <p>¹ 14 days for soil drench, 4 days for foliar spray.</p> <p>² 1 soil drench, 3 foliar applications.</p> <p>³ For hand harvest, otherwise, when dry.</p>						

Notes on Raspberry Diseases and Insects

For information on the activity of fungicides on raspberry diseases, see Table 5-15. *Activity of Fungicides on Raspberry Diseases*, on this page.

For information on the activity of insecticides on raspberry pests, see Table 5-16. *Activity of Insecticides on Raspberry Pests and Bees*, page 114.

Table 5-15. Activity of Fungicides on Raspberry 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	Anthraco- nose (Elsinoe)	Spur blight	Cane botrytis	Botrytis fruit rot	Raspberry leaf spot	Late leaf rust	Powdery mildew	Phytophthora root rot	Crown gall
M	Lime Sulphur	+	+	+	0	+	+*		0	0
M	Ferbam 76 WDG	+	+	+	NA		+*		0	0
M	Maestro 80 DF	++	++	+	++	+ to ++	0		0	0
M	Supra Captan 80 WDG	++	++	+	++	+ to +++	0		0	0
1	Senator 70 WP	++	++	+	0 to +	++	0	++	0	0
2	Rovral			+	++		0		0	0
4	Ridomil Gold 480 SL	0	0	0	0	0	0	0	+++	0
7	Lance WDG		0		+++		0		0	0
7&11	Pristine WG	+++	+++	+++	+++	+++	+++	+++	0	0
9&12	Switch 62.5 WG			+++	+++			+	0	0
11&27	Tanos DF	++	++	+	+					
17	Elevate 50 WDG		+	+++	+++		0		0	0
U	Aliette WDG	0	0	0	0	0	0	0	++	0
44	Serenade ASO				+			++		

0 = No control; + = Poor to fair control; ++ = Good control, some limitations; +++ = Excellent control, few if any limitations.

Blank cell = Information is unavailable; NA = Not used at the timing for this pest.

* Delayed dormant timing.

Table 5-16. Activity of Insecticides on Raspberry Pests and Bees

Ratings in shaded cells indicate the pest is listed on the product label for control or suppression. Use insecticides only for insects listed on the product label for the crop and for the insect. Additional information is provided in this table to assist the grower in choosing the best insecticide for control of pests listed on the product label.

Group	Insecticide	Raspberry sawfly	Raspberry fruitworm (beetle)	Leafrollers	Clipper weevil	Leafhoppers	Spider mites	Inchworms and loopers	Rose chafer	Raspberry cane borer	Raspberry crown borer (larvae)	Bee toxicity
1B	Diazinon* (various formulations)	+++	+++	++	+	+	0	NA	NA	++	+++	HT
1B	Guthion or Sniper**	NA	NA	NA	NA	NA	NA	NA	NA	NA	+++	HT
1B	Malathion 25 W	+++	+++	++	++	++	0	++	++	++		HT
4	Admire 240 F		++		++	++			++	++		HT
5	Delegate WG			+++			0	++				HT
6	Agri-Mek 1.9% EC***	0	0	0	0	0	+++	0	0	0	0	HT
10	Apollo SC	0	0	0	0	0	++	0	0	0	0	S
11	Dipel 2X DF	0	0	++	0	0	0	+	0	0	0	S
11	Foray 48BA	0	0	++	0	0	0	+	0	0	0	S
21	Pyramite***	0	0	0	0	0	+++	0	0	0	0	HT
21	Nexter***	0	0	0	0	0	+++	0	0	0	0	HT
-	Surround WP					++	+					I

* Not for use after bloom.

** For use in September to October only.

*** For post harvest use only.

Bee toxicity: HT = highly toxic; MT = moderately toxic; S = relatively safe or non-toxic; I = irritant.

0 = No control; + = Poor to fair control; ++ = Good control, some limitations; +++ = Excellent control, few if any limitations.

NA = Not used at the timing for this pest.

Blank cell = Information is unavailable.

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