

# Strawberry Calendars

## Management Practices to Reduce Pesticide Use

Use these techniques to suppress pest populations.

Diseases & Insects	Management Practice	Comments
<b>Between plantings</b>		
White grubs Wireworms	Crop rotation	Consider cultivated row crops such as snap beans, white beans, cabbage, broccoli, brussels sprouts and cauliflower. Avoid preferred hosts such as corn, grasses, cereal species and potato.
Root lesion nematode White grubs Root weevils Wireworms Annual and perennial weeds Two-spotted spider mite	Summer fallowing	Cultivate to 10 cm depth, frequently enough to kill young weeds and discourage weed growth. Avoid this practice on sloping land prone to erosion. Sow oats or spring wheat in September as a cover crop to minimize soil erosion by wind and water. Do not use cereal rye, because this encourages nematodes. For more details on preplant weed control, consult OMAFRA <i>Publication 75, Guide to Weed Control</i> . See <i>Site Preparation</i> and <i>Special Methods of Weed Control</i> sections.
<b>Before planting</b>		
Verticillium Red stele Leather rot Black root rot	Site selection Crop rotation	Select a site with good soil drainage. Avoid heavy, poorly drained soils. Avoid sites with a history of red stele and verticillium. Avoid growing susceptible crops before planting strawberries. Susceptible crops that favour build-up of verticillium in the soil include potato, tomato, peppers, eggplant and alfalfa.
Botrytis fruit rot Leaf scorch Leaf spot Leaf blight	Site selection	Select a planting site with good air drainage. Expose plants to direct sunlight and plant rows parallel to the direction of the prevailing winds to promote fast drying of foliage and fruit.
Root weevil Cyclamen mite	Isolation	Isolate new plantings from older infested plantings to provide a physical barrier to reduce land migration of these pests.
Red stele Verticillium	Cultivar selection	Choose varieties that have some resistance to the red stele fungus <i>Phytophthora fragariae</i> and verticillium. See Table 8-24. <i>Strawberry Variety Disease Ratings</i> , on page 188, for more information. Use only plants that have been grown under the guidelines of an accredited plant propagation program.
<b>Harvesting years, late April to early May</b>		
Plant bugs Spittle bug Two-spotted spider mite Botrytis fruit rot Leather rot	Weed control	Broadleaf weeds provide alternate hosts and encourage the build-up of plant bugs and two-spotted spider mites. Grassy fencerows or volunteer grass in the planting provide alternate hosts for build up of spittlebugs. Weeds keep relative humidity high and prolong leaf wetness, which encourages fruit rots.
<b>Harvesting year, mid to late May</b>		
Leather rot	Straw mulch	Apply straw mulch between the rows, thick enough to prevent soil from splashing onto berries.
Botrytis fruit rot Leather rot Black root rot	Fertilization	Avoid excessive fertilization that can encourage too much foliar growth, creating a dense, humid canopy.
<b>Preharvest to harvest</b>		
Botrytis fruit rot Leather rot Black root rot Verticillium Red stele	Irrigation scheduling	Irrigate for short periods to allow foliage and fruit to dry out before nightfall. Do not apply too much water at one time. Avoid creating puddles.

Diseases & Insects	Management Practice	Comments
<b>Renovation</b>		
Two-spotted spider mite Powdery mildew	Mowing	Mow off strawberry leaves to eliminate the food source for these pests and reduce the population.
Botrytis fruit rot Leather rot	Narrowing rows	Narrow the width of matted row to 30 cm to decrease plant density and encourage airflow and quick drying of the crop canopy. Incorporate plant crop residues into the soil and rototill to destroy the main source of botrytis. If runnering is too vigorous, narrow the rows again in October using a coultter.
Black root rot	Subsoiling	Subsoiling in late July or August reduces compaction and improves soil drainage.

## Strawberry Calendar (Non-Bearing)

Consult the product label for suggested water volumes. Otherwise, use enough water to ensure thorough spray coverage.

Diseases and Insects	Materials	Amount/ha	Comments
<b>Early June</b>			
Strawberry leafroller	• Malathion 25 W	4.25 kg	
<b>One month after planting and again once or twice at 2 week intervals</b>			
Leaf blight Leaf scorch Leaf spot	• Copper 53 W • Equal 65 WP • Supra Captan 80 WDG or Maestro 80 DF	3.80 kg 1.75 kg 4.25 kg 4.25 kg	To control leaf spot, ensure good coverage of the lower leaf surface. Copper, Captan and Maestro are labelled for leaf spot only. Spray susceptible varieties such as Bounty, Kent, Veestar, Tristar, Micmac and Tribute. Spray copper alone. For instructions on mixing copper sprays see <i>Use of Copper Products on Fruit Crops</i> , on page 66. Equal may injure plants under cold weather conditions.
<b>July to mid-August</b>			
Potato leafhopper	• Malathion 25 W	4.25 kg	Check underside of leaves and spray when nymphs are present. Repeated applications may be necessary.
Powdery mildew	• Nova 40 W	340 g	Begin applications on susceptible varieties (Annapolis, Jewel, Veestar) when disease first appears or when conditions (warm humid weather) favour development. Alternate with other fungicides.
<b>Fall</b>			
Red stele	• Ridomil Gold 480 EC • Aliette WDG	1.00 L 5.60 kg	Reduce the risk of resistance by spraying only where red stele has been observed. <b>Ridomil Gold:</b> Make one application in early September and a second treatment in late October but no later than October 31. Apply in sufficient water (2,500 L/ha) to ensure movement into the root zone. <b>Aliette:</b> Make up to four applications per season, two in spring and two in fall. Apply as a foliar spray in spring when plants start active growth. Apply at 30–60 day intervals. Make fall applications when soil conditions favour disease development (e.g., high soil moisture, cool temperatures).

## Strawberry Calendar (Fruiting Years)

Consult the product label for suggested water volumes. Otherwise, use enough water to ensure thorough spray coverage.

Diseases and Insects	Materials	Amount/ha	Comments
<b>When new growth appears</b>			
Botrytis grey mould	• Bravo 500	3.50 L	Bravo reduces disease inoculum and prevents infection of dying leaves. Repeat application in ten days.
<b>When flower buds are visible in the crown</b>			
Leaf blight Leaf scorch Leaf spot	• Copper 53 W • Equal 65 WP • Supra Captan 80 WDG or Maestro 80 DF	3.80 kg 1.75 kg 4.25 kg 4.25 kg	To control leaf spot, ensure good coverage of the lower leaf surface. Spray susceptible cultivars such as Bounty, Kent, Veestar, Micmac, Tristar and Tribute. <b>Captan, Maestro and Copper</b> are labelled for leaf spot, but not leaf scorch. <b>Copper 53 W:</b> For instructions on mixing copper sprays, see <i>Use of Copper Products on Fruit Crops</i> on page 66. Don't tank mix. <b>Equal</b> may injure plants under cold weather conditions.
Cyclamen mite	• Thiodan 50 WP or Thionex 50 W or Thiodan 4 EC	4.00 kg 4.00 kg 5.00 L	Apply one of these chemicals in 4,000–8,000 L of water/ha as a drench over the plant row.
<b>As flower buds extend from crown</b>			
Strawberry clipper weevil	• Furadan 480 F • Ripcord 400 EC • Matador 120 EC	1.10 L 175 mL 104 mL	Check edges of fields for clipped buds. Apply insecticide when first injury is detected. Spray again if new injury is detected seven days after the first spray. <b>Furadan:</b> Do not use later than prebloom because of its toxicity to pollinating and beneficial insects. Maximum one application Furadan per season. Furadan can cause extensive burning of sepals surrounding fruit on certain varieties (e.g. Annapolis, and Cavendish).
<b>First bloom</b>			
<b>INSECTICIDES ARE VERY TOXIC TO BEES. DO NOT SPRAY WHEN BEES ARE WORKING. SPRAY IN THE EVENING. SEE BEE POISONING ON PAGE 79.</b>			
Plant bugs	• Cygon 480 Ag • Ripcord 400 EC • Decis 5 EC • Matador 120 EC • Thiodan 50 WP	2.75 L 250 mL 200 mL 104 mL 2.00 kg	<b>Ripcord, Matador</b> or <b>Decis</b> also control clipper weevil. <b>Thiodan, Ripcord, Matador</b> or <b>Decis</b> also control spittlebug.
Botrytis grey mould	• Rovral • Elevate 50 WDG • Supra Captan 80 WDG or Maestro 80 DF • Folpan 80 WDG • Ronilan EG • Lance WDG • Scala SC	2.00 kg 1.70 kg 4.25 kg 4.25 kg 2.50 kg 2.00 kg 560 g 2.00 L	Keep all flower parts protected with fungicide during bloom. Typically 2–3 sprays during bloom will give good control. Shorten intervals to 3–5 days during wet weather. Use Rovral, Ronilan, Elevate, Lance or Scala when disease pressure is high. Choose fungicides from different chemical families and use them in rotation. See Table 4-8. <i>Fungicide/Bactericide Groupings Based on Sites of Action</i> , on page 59.
Anthracoise	• Cabrio EG	1.00 kg	Make no more than two consecutive applications and then alternate with fungicides from different families. See Table 4-8. <i>Fungicide/Bactericide Groupings Based on Sites of Action</i> , on page 59. Bloom is the best time to control this disease. Warm wet weather during bloom favours the development of anthracnose.

Diseases and Insects	Materials	Amount/ha	Comments
<b>7 to 10 days after first bloom</b>			
Plant bugs	<ul style="list-style-type: none"> <li>• Ripcord 400 EC</li> <li>• Decis 5 EC</li> <li>• Matador 120 EC</li> <li>• Thiodan 50 WP</li> </ul>	250 mL 200 mL 104 mL 2.00 kg	Check for plant bug nymphs. Shake blossom and fruit clusters into a dish.
Botrytis grey mould	<ul style="list-style-type: none"> <li>• Rovral</li> <li>• Elevate 50 WDG</li> <li>• Supra Captan 80 WDG or Maestro 80 DF</li> <li>• Folpan 80 WDG</li> <li>• Ronilan E G</li> <li>• Lance WDG</li> <li>• Scala SC</li> </ul>	2.00 kg 1.70 kg 4.25 kg 4.25 kg 2.50 kg 2.00 kg 560 g 2.00 L	Shorten intervals to three to five days if wet weather persists. Use Rovral, Ronilan, Elevate, Lance or Scala when disease pressure is high. Alternate with fungicides from different families. See Table 4-8. <i>Fungicide/Bactericide Groupings Based on Sites of Action</i> , on page 59.
Anthracnose	<ul style="list-style-type: none"> <li>• Cabrio EG</li> </ul>	1.00 kg	Make no more than two consecutive applications and then alternate with fungicides from different families. See Table 4-8. <i>Fungicide/Bactericide Groupings Based on Sites of Action</i> , on page 59. Warm wet weather during bloom favours the development of anthracnose.
<b>Preharvest</b>			
Slugs	<ul style="list-style-type: none"> <li>• Sluggo</li> </ul>	25.00 kg	Apply 50 kg/ha if population is very high. Apply when infestation begins. Reapply as bait is consumed or at least every two weeks if slugs and snails continue to be a problem.
Two-spotted spider mite	<ul style="list-style-type: none"> <li>• Pyramite</li> <li>• Kelthane 50 W</li> <li>• Apollo SC</li> </ul>	600 g 2.00 kg 500 mL	Use high water volumes to ensure good coverage of the underside of leaves. To discourage resistance, alternate products from year to year and do not apply any product more than once each year. <b>Apollo:</b> 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.
Botrytis grey mould	<ul style="list-style-type: none"> <li>• Rovral</li> <li>• Elevate 50 WDG</li> <li>• Supra Captan 80 WDG or Maestro 80 DF</li> <li>• Folpan 80 WDG</li> <li>• Ronilan EG</li> <li>• Lance WDG</li> <li>• Scala SC</li> </ul>	2.00 kg 1.70 kg 4.25 kg 4.25 kg 2.50 kg 2.00 kg 560 g 2.00 L	If irrigation is necessary, water early in the day to allow plants to dry off before nightfall.
Anthracnose	<ul style="list-style-type: none"> <li>• Cabrio EG</li> </ul>	1.00 kg	Make no more than two consecutive applications and then alternate with fungicides from different families. Warm wet weather during bloom favours the development of anthracnose.
<b>Renovation (after mowing)</b>			
Cyclamen mite	<ul style="list-style-type: none"> <li>• Thiodan 50 WP or Thionex 50 W or Thiodan 4 EC</li> </ul>	4.00 kg 4.00 kg 5.0 L	Apply one of these chemicals in 5,000–8,000 L of water/ha as a drench over the plant row.

Diseases and Insects	Materials	Amount/ha	Comments
<b>Renovation (after mowing, to new growth)</b>			
Two-spotted spider mite	<ul style="list-style-type: none"> <li>• Pyramite</li> <li>• Kelthane 50 W</li> <li>• Agri-Mek 1.9% EC</li> <li>• Apollo SC</li> </ul>	600 g 2.00 kg 1.00 L 500 mL	For best results, use high water volumes to ensure good coverage of the underside of leaves. To discourage resistance, alternate products from year to year and do not apply any product more than once each year. <b>Apollo:</b> Apollo kills mite eggs and very young nymphs, but not older nymphs and adults. Apply when monitoring indicates mites are beginning to hatch or are mostly in the egg stage. <b>Agri-Mek:</b> Use postharvest only.
Powdery mildew	<ul style="list-style-type: none"> <li>• Nova 40 W</li> </ul>	340 g	Begin applications on susceptible varieties (Annapolis, Jewel, Veestar) when disease first appears on new growth or when conditions (warm humid weather) favour development. Alternate with other fungicides.
<b>Fall</b>			
Botrytis grey mould	<ul style="list-style-type: none"> <li>• Bravo 500</li> </ul>	3.50 L	Bravo helps control botrytis by reducing disease inoculum. Apply late October.
Leaf blight Leaf scorch Leaf spot	<ul style="list-style-type: none"> <li>• Copper 53 W</li> <li>• Equal 65 WP</li> <li>• Supra Captan 80 WDG or Maestro 80 DF</li> </ul>	3.80 kg 1.75 kg 4.25 kg 4.25 kg	Spray susceptible varieties such as Bounty, Kent, Veestar, Micmac, Tristar and Tribute. Alternate fungicides to reduce the development of resistance. <b>Copper</b> is labelled only for leaf spot. Spray copper sprays alone. For instructions on mixing copper sprays see <i>Use of Copper Products on Fruit Crops</i> , on page 66. <b>Equal</b> may injure plants in cold weather.
Red stele	<ul style="list-style-type: none"> <li>• Ridomil Gold 480 EC</li> <li>• Aliette WDG</li> </ul>	1.00 L 5.60 kg	To reduce the chance of resistance, spray only where red stele has been observed. <b>Ridomil:</b> Do not apply later than October 31 or in the spring on established plants. Apply in sufficient water (2500 L/ha) to ensure movement into the root zone. <b>Aliette:</b> Make up to four applications per season, two in spring and two in fall. Apply in spring when plants start active growth. Apply at 30–60 day intervals. Do not apply within 30 days of harvest or after first bloom. Make postharvest applications when soil conditions favour disease development (e.g., high soil moisture and cool soil temperatures).

**TABLE 8-21. Products Used on Strawberries**

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 that 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 # of applications/season
Agri-Mek 1.9% EC	abamectin	avermectin	10 months		2
Aliette WDG	fosetyl al	phosphonate	30		4
Apollo SC	clofentezine	tetrazine	15		1
Bravo 500	chlorothalonil	chloronitrile	30	48 hours	3
Cabrio EG	pyraclostrobin	strobilurin	1	24 hours	5
Copper 53 W	tri-basic copper sulphate	inorganic	1		
Cygon 480-Ag	dimethoate	organophosphate	7		
Decis 5 EC	deltamethrin	synthetic pyrethroid	14		2
Elevate 50 WDG	fenhexamid	hydroxylaniline	1	4 hours	4
Equal 65 WP	dodine	guanidine	7		
Folpan 80 WDG	folpet	phthalimide	1		6
Furadan 480 F	carbofuran	carbamate	Use prebloom only	48 hours	1
Kelthane 50 W	dicofol	diphenylethane	7		1
Lance WDG	boscalid	anilide	0	4 hours	5
Maestro 80 DF	captan	phthalimide	2	48 hours	
Malathion 25 W	malathion	organophosphate	3		
Matador 120 EC	cyhalothrin lambda	synthetic pyrethroid	7	24 hours	3
Nova 40 W	myclobutanil	triazole (DMI)	3		6
Pyramite	pyridaben	pyridazinone	10	24 hours	2
Ridomil Gold 480 EC	metalaxyl-M	acylamine	Use post-harvest only		1* 2**
Ripcord 400 EC	cypermethrin	pyrethroid	7		
Ronilan EG	vinclozolin	dicarboximide	3	72 hours	4
Rovral	iprodione	dicarboximide	1	12 hours	
Scala SC	pyrimethanil	anilinopyrimidine	1	24 hours	3
Supra Captan 80 WDG	captan	phthalimide	2	48 hours	
Sluggo	ferric phosphate		0		
Thiodan 4 EC	endosulfan	chlorinated cyclodiene	7		
Thiodan 50 WP	endosulfan	chlorinated cyclodiene	7		
Thionex 50 WP	endosulfan	chlorinated cyclodiene	7		

\* established plantings \*\* non-bearing plantings