

STRAWBERRY INSECT & DISEASE MANAGEMENT SCHEDULE

APPLICABLE TO THE MARITIME PROVINCES

Nova Scotia Guide to Pest Management in Strawberry 2011
[Straw1-11]

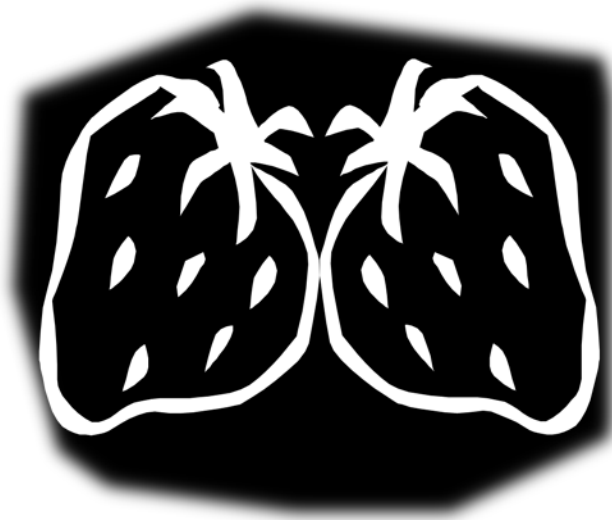
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Strawberry Insect & Disease Management Schedule

Site Selection & Preparation

Insect / Disease	Note
White Grubs	Summer fallow or crop rotation recommended between planting years. Do not plant strawberries following sod. White grubs and wireworms can be numerous in sod and even after tillage and soil preparations, residual populations of these insects may still be present to harm the newly planted strawberry plants. To minimize the risk, prepare soil at least one year in advance.
Wireworms	
Root Weevils	Several weevil species are root feeders that can be a problem in older plantings and may pose a threat to nearby newer plantings. Avoid planting next to old plantings as a way to isolate the new plantings from land migration of the flightless root weevils. If this is not possible, it may be necessary to manage emerging weevil adults in older plantings with crop protection products. See OCCASSIONAL PESTS section.
Strawberry Bud Weevil	Start monitoring for strawberry bud (clipper) weevil early by checking the edges of fields for clipped buds. At the first sign of clipped buds, consider using a registered crop protection product. If new damage occurs 7 days after the first application, then a second application may be warranted.
Red Stele	Plant only certified transplants. Improve drainage. Use resistant varieties. Several races of the red stele fungus occur in Nova Scotia. Some of these races will attack resistant varieties. Where these races occur consider using 30 cm high raised beds. Aliette or Ridomil may be used. See the NEW PLANTING and FRUITING FIELD sections
Verticillium Wilt	Do not plant strawberries following potatoes, alfalfa or where Verticillium is known to occur. Effective control can be achieved with soil fumigation. Root lesion nematodes increase the susceptibility of strawberry plants to Verticillium wilt.
Black Root Rot	Ensure that fields have good drainage. Use sub-soiling to break hardpans. Practice crop rotations that maintain soil structure and organic matter content. Reduce nematode levels. Mulch to prevent winter damage. Consider using raised beds. Fumigation helps suppress this disease complex.
Nematodes	The root lesion nematode is the most important nematode of strawberry in Nova Scotia. The threshold for root lesion is 500-1000 nematodes per kilogram of dry soil. Summer following the year before planting will reduce nematode populations. In the fallow year, cultivate every few weeks during the summer to kill young weeds and to desiccate nematodes. Crop rotations using fall fescue, brome grass, or rye grass are less likely to increase nematode populations than crops such as soybeans, corn and clovers. Effective control of nematodes can also be achieved with soil fumigation.

Soil Fumigation (Fumigants may not be used in PEI)

Insect / Disease	Product	Rate / ha	Note
Nematodes	Telone II	170 L	Application rates depend on soil type and application method. Rates noted are given for broadcast application with the lower rates for fumigation of coarse (sandy) soil under ideal conditions. Consult label for row only, and muck soil, application rates.
Verticillium Wilt	Telone C17	200-380 L	Vapam can be applied with an irrigation system. See label for directions. Some fumigants will also suppress certain weeds and control soil insects such as wireworms and white grubs.
	Vapam	470-900 L	
<p>FUMIGATION should be done in the fall (September or early October) prior to spring planting. Previous crop debris must be cultivated into the soil during the summer so that it is fully decomposed at the time of fumigation. One week prior to fumigation, till the soil to a depth of at least 25 cm to break clods and loosen the soil. The soil should be moist but not wet. Inject fumigant 15 to 20 cm deep and drag immediately to fill injector shank slits. Seal by rolling, cultipacking or with a light irrigation. For Vapam only, apply via sprinkler irrigation using a minimum of 25 mL of water per hectare. For fall fumigation, the soil can be left undisturbed until spring. Heavy, wet, cold soils require longer to fully aerate. To prevent contamination do not cultivate deeper than the injection depth. Do not plant if you can still smell the fumigant. Read the label completely before handling fumigants. Follow all safety precautions.</p>			

Strawberry Insect & Disease Management Schedule

New Planting (Establishment Year)

Insect / Disease	Product	Rate / ha	Note
Immediately After Transplanting			
Exposed Roots	After transplanting, check plants for exposed roots as a result of erosion and reset plants as required.		
Strawberry Leafroller	Malathion 25W	2.75-4.25 kg	Works best at temperatures of 20°C or higher.
	Sevin XLR Plus	2.5-5.8 L	
	Diazinon 50W	1 kg / 1000L	Labels recommend 2000 L of water per hectare
	Diazinon 500E	1 L / 1000L	
Omnivorous Leaf-tier	Diazinon 50W	2.25 kg	Label recommends 2000 L of water per hectare
Starting One Month After Transplanting			
Insects, mites, & diseases	Starting one month after transplanting, scout fields every 2 weeks.		
Leaf Spot	Maestro 80DF	2.75-4.25 kg	Thresholds have not been developed in Nova Scotia for leaf diseases. Low levels of leaf spot, leaf scorch and leaf blight do not have a significant impact on plant growth. Kent, Micmac and Mira are very susceptible to leaf spot.
	Captan 80WDG	2.8-4.2 kg	
	Equal 65 WP	1.75-2.25 kg	May cause injury when applied in cold weather.
	Senator 70WP	1.1 kg	
	Folpan 50WP	2.0 kg / 1000L	Use up to 2000 L per hectare.
	Topas 250E	500 mL/ha	Make 1 st application when disease levels are no more than 5%. Apply at 7 day intervals for control of leaf spot. It is recommended that no more than 2 consecutive applications be made before switching to another fungicide with a different mode of action. Apply a maximum of 4 applications per season.
	Copper 53W	2.5-3.8 kg	Some varieties (Kent, Mohawk, Sable etc.) are injured using the high rate of copper.
	Pristine WG	1.3-1.6 kg/ha	Max 5 applications per growing season at 7-14 day intervals. Begin applications no later than 10% bloom or prior to disease development.
Leaf Scorch Leaf Blight	Equal 65WP	1.75-2.25 kg	May cause injury when applied in cold weather.
Two-spotted Spider Mite	Same as PREHARVEST for Bearing Year		Monitor by collecting 60 leaflets randomly from 30 plants. Action threshold is 25% of leaflets infested with mites. Try to avoid the need for miticides by controlling broadleaved weeds which can harbour mites. Consult a weed specialist to determine the best strategy of weed control for specific situations.
Cyclamen Mite	Establish new plantings away from bearing plantings so as to provide a physical barrier that will help prevent the spread of this mite into new fields. "These tiny microscopic mites feed on emerging strawberry leaves and cause crinkling, stunting and deformation of the new growth. Population peaks occur in early June, and again in September. Walk strawberry fields and look for areas of stunted plant growth. Examine the newest unfolded leaves in the crown of suspect plants, looking for the tiny cyclamen mites (Pam Fisher, OMAFRA)." It is very difficult to see cyclamen mites without a microscope. With experience, it may be possible to spot them using a good hand lens, or samples can be submitted to Wildwood Labs Inc or Delbridge Disease Management for diagnosis.		
Red Stele	Ridomil Gold 480 EC	1.0 L	Apply in early September and late October but not later than October 31. Apply as a broadcast application in sufficient water to ensure even coverage. If dry conditions occur at the time of application, use sufficient water volume (2500 L/ha) to ensure movement of Ridomil into the root zone. Do not apply to established plantings in the spring.
	Aliette 80WDG	5.6 kg	Maximum of 4 applications per year-2 in spring, 2 in fall. Apply in spring when plants start active growth. Repeat at 30-60 day intervals. Apply in the fall when conditions favor disease e.g., cool, saturated soils.

Fruiting Field (Bearing Year)

Insect / Disease	Product	Rate / ha	Note
Before Bud Formation (when flower buds visible in crown)			
Cyclamen Mite	Thiodan 4EC	5 L	Apply in 4000-8000 L of water per hectare depending on foliage development. This treatment should be applied as a drench over the plant row.
	Thiodan 50WP	4.0 kg	
	Kelthane 50W	700 g /1000 L	Read label for rates based on plant size. Label says, "Apply 2000-5000 litres per hectare. Force spray into crown of plant. Apply when numbers of mites begin to build. Use only one application of Kelthane 50W per season."
Botrytis Grey Mould	Scala	2.0 L	Make first application at the white bud stage (prebloom) and repeat applications as required at 7-10 day intervals. Apply maximum of 3 applications.
	Pristine WG	1.3-1.6 kg/ha	Max 5 applications per growing season at 7-14 day intervals. Begin applications no later than 10% bloom or prior to disease development.
	Serenade Max	3.0-6.0 kg/ha	Serenade Max and Serenade ASO are bio-pesticides that will only suppress botrytis. Begin applications at first sign of disease or when conditions become conducive for disease development. Repeat as necessary on a 7-10 day interval.
	Serenade ASO	4.0-15.0 L/ha	
	RootShield HC	10g / L of water	Biopesticide. Apply in sufficient spray volume to cover leaves. As leaf canopy increases, spray volume should increase. Apply every 7-14 days. Do not use low volume sprayers. Agitation is required to maintain suspension. Organism does not work well when soils are below 10 degrees C.
Two-spotted spider mite	Destroy the alternate hosts of this mite through an effective weed management program that eliminates broadleaf weed species in the field. Consult a weed specialist to determine the best strategy of weed control for specific situations.		
Strawberry Aphid	Admire 240	850-1300 ml/ha	Apply to established plantings as a soil drench when growth begins in the spring. Do not apply just prior to bud opening, during bloom or when bees are foraging. Apply in 2000 L/ha of water banded directly to the plant row. Use higher rate if aphid infestations are expected later in crop development. Maximum 1 application per season. See label for liability statement.
	Assail 70 WP	56-86 g/ha	Use the high rate under heavy pressure. Do not make more than 2 applications per season. Do not apply more than once every 7 days. Do not apply during bloom. Apply in a minimum of 187 L/ha of finished spray volume.
Buds Extend from Crown			
Strawberry Bud (Clipper) Weevil	Furadan 480F	1.10 L/ha	Label says, "Make only one application before first bloom. Do not use FURADAN on strawberry varieties Cavendish, Annapolis or Kent because the use of FURADAN has been associated with calyx burn or discoloration after some applications." Also registered for tarnished plant bug control.
	Matador 120EC	104 mL/ha	These three products are synthetic pyrethroids. This group of chemicals is LESS EFFECTIVE at temperatures ABOVE 25°C. Use of these products disrupts natural control of mite pests and can result in mite outbreaks. <i>Ripcord label says "Apply at early bloom and repeat in 10 to 12 days at the end of full bloom". UP-Cyde label says "apply...when buds are first visible and repeat when first buds show white."</i> These two materials have the same active ingredient, but differ in the label directions. Therefore, it is VERY IMPORTANT to READ THE LABELS and follow the directions.
	Ripcord 400EC	175 mL/ha	
	UP-Cyde 2.5EC	280 mL/ha	
Fruit Rot	Bravo 500	3.5 L/ha	
Red Stele	Aliette 80WDG	5.6 kg/ha	See under NEW PLANTING
Leaf Spot Leaf Scorch Leaf Blight	As under NEW PLANTING		Thresholds have not been developed in Nova Scotia for leaf diseases. Low levels of leaf spot, leaf scorch and leaf blight do not have a significant impact on plant growth. Kent, Micmac and Mira are very susceptible to leaf spot.

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Bloom - WARNING – Spraying insecticides during bloom is hazardous to bees. Spray in the evening or when bees are not working			
10% Bloom (50% of primary blossoms open)			
Fruit Rot	Maestro 80DF	2.75-4.25 kg/ha	Use Rovral, Lance or Elevate when disease pressure is high during bloom.
	Captan 80WDG	2.75-4.25 kg/ha	
	Folpan 50WP	2.0 kg / 1000L	Use up to 2000 L per hectare
	Elevate 50WDG	1.7 kg/ha	Avoid more than two consecutive applications of Elevate. Do not apply if rain is expected within 6 hours after application.
	Rovral 50WP	2.0 kg/ha	To reduce the possibility of disease resistance to Rovral and Lance, alternation with other fungicides is recommended.
	Lance 70 WDG	0.56 kg/ha	
	Switch 62.5 WG	975 g/ha	Begin applications at or before bloom and continue on 7 to 10 day intervals. Do not apply more than 2 consecutive sprays of switch or fungicides from the same group. One of the actives in this product is persistent and may carryover. It is recommended that any products containing fludioxonil not be used in areas treated with this product during the previous season. There is a rotation restriction on crops where this product is not registered.
	Serenade Max	3.0-6.0 kg/ha	Serenade Max and Serenade ASO are bio-pesticides that will only suppress botrytis. Begin applications at first sign of disease or when conditions become conducive for disease development. Repeat as necessary on a 7-10 day interval.
	Serenade ASO	4.0-15.0 L/ha	
RootShield HC	10g / L of water	Biopesticide. Apply in sufficient spray volume to cover leaves. As leaf canopy increases, spray volume should increase. Apply every 7-14 days. Do not use low volume sprayers. Agitation is required to maintain suspension. Organism does not work well when soils are below 10 degrees C.	
Anthracnose	Cabrio 20 EG	0.56 – 1 kg/ha	Begin applications no later than first bloom, or when disease appears, at 7-14 day intervals. Use higher rate and shorter interval when disease pressure is high. Do not apply Cabrio 20 EG more than twice in a row to decrease the risk of resistance development.
	Pristine WG	1.3-1.6 kg/ha	Max 5 applications per growing season at 7-14 day intervals. Begin applications no later than 10% bloom or prior to disease development.
Powdery Mildew	Nova 40W	340 g/ha	Begin applications when disease first appears or when conditions favor disease development. Repeat application at 14 to 21 day intervals. Observe a 120 day plant-back interval between the last application and planting leafy vegetable or grain crops, and a 210 day plant-back interval between the last application and planting root vegetable.
	Pristine WG	1.6 kg/ha	Max 5 applications per growing season at 7-14 day intervals. Begin applications no later than 10% bloom or prior to disease development.
	Quintec	300-440 ml/ha	Maximum of 4 applications per year. Repeat applications on 10-14 day intervals. 1 day Pre harvest interval. And 12 hr worker re-entry interval. Apply before visual symptoms of Powdery Mildew appear. Quintec has no curative properties and will not control established infections. * Note * – product is toxic to bees exposed to direct treatment, drift, or residues on crops or weeds.
Tarnished Plant Bug	Tap 30 blossom clusters per field. The action threshold is 15 per 30 clusters. Controlling weed species will also contribute to reduced incidence of tarnished plant bug. Crop protection products used for tarnished plant bug management will also suppress flower thrips.		Use the high rate under heavy pressure. Do not make more than 2 applications per season. Do not apply more than once every 7 days. Do not apply during bloom. Apply in a minimum of 187 L/ha of finished spray volume.
	Assail 70 WP	84-210 g/ha	

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	Rimon 10 EC	835 g/ha	Reapplication on at a 10-14 day interval may be required. Do not apply more than 3 applications per crop season. Do not apply more than 2.5 Litres of product per hectare per season. Do not apply within 1 day of harvest. For control of Nymphs of Lygus. Apply in 450-1400 Litres of water per hectare.
	UP-Cyde 2.5 EC	400 mL/ha	Apply at first bloom and repeat at 7-10 days after first bloom. Do not use more than 3 times per year.
	Decis 5EC	200 mL/ha	Label says, "DO NOT apply more than 2 times per year." Will NOT control strawberry bud weevil. Do not apply when temperatures are over 25°C.
	Decis 2.5EC	400 mL/ha	
	Matador 120EC	104 mL/ha	Label says apply "7 to 10 days after first bloom and repeat 7 to 10 days later."
	Ripcord 400EC	250 mL/ha	Label says, "Apply at early bloom and repeat in 10 to 12 days at the end of full bloom. Use 300-500 L of water per hectare."
	Thiodan 50WP	2.0 kg/ha	According to label, "Apply 2000 L/ha. ...apply at first bloom and repeat 10 days later."
	Thiodan 4EC	2.5 L/ha	
	Lagon 480E	1.25 L/ha	Label says, "Apply first spray when first blooms appear and the second application 10-12 days later if needed."
Leafrollers, Aphids, leafhoppers	Malathion 25W	2.75-4.25 kg/ha	Highly toxic to bees. PHI 3 days
	Surround WP	12.5-25 kg/ha	This is an OMRI listed control product and is suitable for organic production. Apply in 500 L of water. Apply at 7-14 day intervals once initial infestation is detected. Use high rate for early applications. Do not exceed 25 kg/ha per application. Aster Leafhoppers only
Thrips	Delegate WG	0.2-0.28 kg/ha	Maximum of three applications per year, with a re-treatment interval of 3 days.
50% Bloom (or 7- 10 days after 10% bloom spray)			
Fruit Rot	As under 10% BLOOM		Apply in 7 days or extend until prior to the next predicted rain.
Tarnished Plant Bug	Same as for 10% BLOOM		Continue monitoring.
Slugs	Sluggo	25-50 kg/ha	Rate depends on severity of the infestation. Environmentally safe – label says, "...will degrade and become part of the soil. It will not harm pets, birds or wildlife." Apply selectively, by hand, between the furrows near the base of the plants.
Leafrollers, Aphids, leafhoppers	Same as for 10% BLOOM		Continue monitoring
90% Bloom (or 7-10 days after 50% bloom spray)			
Fruit Rot	As under 10% BLOOM		Apply in 7 days or extend until prior to the next predicted rain.
Tarnished Plant Bug	Same as for 10% BLOOM		Continue monitoring.
Leafrollers, Aphids, leafhoppers	Same as for 10% BLOOM		Continue monitoring
Preharvest			
Fruit Rot	As under 10% BLOOM		If wet weather persists during fruit enlargement and coloring or if fruit rot appears in the field.
Two-spotted spider mite	Kelthane 50W	700 g /1000 L	Read label for rates based on plant size. According to label, "Apply 2000-5000 litres per hectare. Force spray into crown of plant. Apply when numbers of mites begin to build. Use only one application of Kelthane 50W per season."
	Apollo SC	500 mL/ha	Apply at first sign of mite activity using 500-1000 L of water per hectare. Label indicates that this product "...acts primarily as an ovicide but has an effect on young motile stages."
	Nexter (75WP) (Pyramite)	600 g/ha	Label says that this product "...controls nymph and larva stage... This product is not an ovicide."

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	Agri-Mek 1.9% EC	1 L/ha	Apply first application when mites first appear. Re-apply at a 7-10 day interval if required. Max 2 L/ha per season. PHI 3 days.
	Oberon 240 SC	880-1160 ml/ha	Maximum of 3 applications and 3480 ml/ha per season. Minimum application volume of 100 L/ha. Maximum of 1160 ml/ha of Oberon allowed per 7 day period. PHI 3. Also controls whiteflies (including silverleaf, sweetpotato and greenhouse) 12 hour REI. See label for buffer zone restrictions.
Leafrollers, Aphids, leafhoppers	Same as for 10% BLOOM		Continue monitoring
Post Renovation			
Cyclamen mite	Same as for BEFORE BUD FORMATION		After mowing.
Two-spotted spider mite	Same as for PREHARVEST		After new growth appears.
	Agri-mek 1.9 EC	1 L/ha	Do not apply more than 2 L/ha per season. Do not apply in less than 375 L of water per hectare.
Fall			
Leaf Spot Leaf Scorch Leaf Blight	As under NEW PLANTING		Thresholds have not been developed in Nova Scotia for leaf diseases. Low levels of leaf spot, leaf scorch and leaf blight do not have a significant impact on plant growth. Kent, Micmac and Mira are very susceptible to leaf spot.
Fruit Rot	Bravo 500	3.5 L/ha	Apply once in the fall and twice in the spring when new growth appears and 10-12 days later. Bravo reduces Botrytis inoculum and fungal sporulation on senescing leaves.

Occasional Pests

Insect / Disease	Note
Diseases	
Anthraxnose	A fungal disease that can infect fruit, crowns, petioles and runners. The fruit rot phase is usually not a problem for June-bearing varieties but can cause serious loss in day neutral and ever bearing varieties. Cabrio 20EG 0.56-1 kg/ha may be used at 7-14 day intervals beginning no later than bloom or prior to disease development. Use higher rate and shorter interval when disease pressure is high. Do not apply more than two applications of Cabrio before alternating with another effective fungicide with a different mode of action.
Angular Leaf Spot	A bacterial disease that causes small angular, translucent spots on the leaves and brown-black necrosis of the hulls of the fruit. Most damage occurs when the disease spreads extensively during bloom and the pre-harvest period. Varieties differ in susceptibility. No pesticides are registered for control of this disease. Avoid irrigation under poor drying conditions. Copper 53W applied for leaf spot as under NEW PLANTING may help suppress angular leaf spot. Copper may burn varieties such as Kent, Mohawk, and Sable. Use lower rate and test varieties for sensitivity to copper.
Leather Rot	This fungus infects developing fruit under wet conditions. A good thick mulch which prevents soil from splashing onto fruit reduces infection. No fungicides are registered for control of this disease but Captan, Maestro and Folpan applied for fruit rot may help suppress leather rot.
Powdery Mildew (fruit infection)	This disease can infect fruit as well as leaves of susceptible varieties such as Annapolis, Cavendish, Jewel, Honeoye, and Veestar. Infections appear as a white, powdery growth on the fruit which looks like spray residue.
Flower thrips	<p>Fruit Bronzing can be caused by eastern flower thrips, <i>Frankliniella tritici</i>. For more information on this thrips and fruit bronzing, visit http://www.gnb.ca/afa-apa/40/05/4005506E.HTM. The western flower thrips may also be involved in some areas in some years. It is important to get flower thrips identified so species specific management strategies can be investigated. Wildwood Labs Inc has the capability to make this species specific identification. Samples can be submitted through the AgraPoint offices.</p> <p>Some general guidelines to determine if thrips may be problematic are as follows:</p> <ul style="list-style-type: none"> ➤ Examine early flower clusters and continue sampling as more bloom appears ➤ Dislodge the very tiny yellow to light brown thrips by tapping flowers over a white surface (e.g. styrofoam plate will work) ➤ Alternatively, shake flowers inside a re-sealable plastic bag and count the thrips that fall off the flowers ➤ The relationship between thrips density and damage has not been accurately determined, however, an action threshold range of 2-10 thrips per flower is used as a guide in some strawberry growing areas

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Insects	
Root Weevils	<p>There are at least four different species of root weevils that can damage strawberry plants. They are the strawberry root weevil, <i>Otiorhynchus ovatus</i>, black vine weevil, <i>O. sulcatus</i>, rough strawberry weevil, <i>O. rugosostriatus</i>, and obscure root weevil, <i>Sciopithes obscurus</i>. More survey work needs to be done to confirm the presence of all of these species, and possibly others, in strawberry plantings in Nova Scotia. The most common species are considered to be the black vine weevil and the strawberry root weevil.</p> <p>Larvae feed on roots and crowns in the spring. In late summer and fall, adult weevils eat C-shaped notches in strawberry leaves. The leaf feeding is not serious; however, it does indicate weevil activity in the field.</p> <p>Unfortunately, there are very few options for effective root weevil control. Some crop protection products with the active ingredient azinphos-methyl include obscure root weevil on the label for use on strawberry; however, these products are scheduled to be withdrawn soon. If using one of these products, it is a good idea to apply the treatment at night when adult weevils are feeding on foliage. Probably the best strategy is to isolate new plantings of strawberries from infested fields. Because the adult stage of all root weevil species cannot fly, they will spread much more slowly if there is a land barrier between fields.</p>
Spittle Bugs	<p>Do not cause significant damage to strawberries in Nova Scotia; however, they are a nuisance in U-Pick operations. Weed control, and sprays for tarnished plant bug should provide adequate control. Sevin XLR Plus is registered for spittle bug control on strawberry.</p>

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,EW	Emulsifiable concentrate	kPa	kilopascal
EG	Water dispersible granule	kg	kilogram
L	Liquid	g	gram
WDG	Wettable dry granule	L	litre
WP,W	Wettable powder	BIU	Billions of International Units
SC	Suspension concentrate	ppm	parts per million

Helpful Conversions*	
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

*** 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 have greater toxic effects in smaller amounts. Therefore, even small conversion errors can lead to the use of incorrect dosages (either too high or too low). Use metric – you will be glad you did!

PESTICIDE INFORMATION SUMMARY

(Read product label for re-entry intervals, precautions, and other product specific details)

COMMON NAME	TRADE NAMES	DAYS TO HARVEST	TOXICITY			
			TO PRED MITES*	TO BEES	TO APPLICATOR	
					ORAL	DERMAL
abamectin	Agri-Mek	3	low	high	high	mod
acetamiprid	Assail	1	-	high	low	low
<i>Bacillus subtilis</i>	Serenade Max	0	-	low	low	low
boscalid	Lance	0	-	low	low	low
boscalid, pyraclostrobin	Pristine	1	-	low	low	low
captan	Captan, Maestro	2	low	low	low	low
carbaryl	Sevin	2	mod	high	mod	mod
carbofuran	Furadan	first bloom	high	high	high	high
chlorothalonil	Bravo	30	-	low	low	low
clofentezine	Apollo	15	low	low	low	low
cyhalothrin-lambda	Matador	7	high*	high	low	low
cypermethrin	UP-Cyde, Ripcord	7	high	high	low	low
cyprodinil, fludioxonil	Switch	1	-	--	low	low
deltamethrin	Decis	14	high*	high	low	low
diazinon	Diazinon	5	mod*	high	mod	mod
dicofol	Kelthane	7	mod	low	low	low
dimethoate	Lagon	7	mod*	mod	mod	mod
dodine	Equal	7	low-mod	low	low	low
endosulfan	Thiodan	7	mod*	mod	high	mod
fenhexamid	Elevate	1	-	low	low	low
ferric phosphate	Sluggo	-	-	low	low	low
folpet	Folpan	1	-	low	low	low
fosetyl-al	Aliette	30	-	low	low	low
iprodione	Rovral	1	-	low	low	low
imidacloprid	Admire	30	mod	high	low	low
kaolin	Surround	-	low	low	low	low
malathion	Malathion	3	low	high	low	low
metalaxyl-M	Ridomil Gold	In fall of bearing year	-	low	low	low
myclobutanil	Nova	3	low-mod	-	low	low
propiconazole	Topas	1	-	low	low	low
pyraclostrobin	Cabrio	1	-	low	low	low
pyridaben	Nexter	10	mod	-	mod	low
pyrimethanil	Scala	1	-	-	low	low
quinoxifen	Quintec	1	?	high	low	low
spinetoram	Delegate**	1	-	high	low	low
spiromesifen	Oberon	3	low	low	low	low

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thiophanate-methyl	Senator	1	-	low	low	low
tri-basic copper sulphate	Copper 53W	1	low	low	mod	low
<i>Trichoderma harzianum</i> strain KRL-AG2	RootShield	1	low	low	low	low
1,3-dichloropropene	Telone II	Preplant in the fall	-	-	high	high
1,3-dichloropropene & chloropicrin	Telone C-17	Preplant in the fall	-	-	high	high
metam	Vapam	Preplant in the fall	-	-	high	high

* Various beneficial species. If the commercially available organophosphate resistant strain of *Amblyseius fallacis* is used, then the toxicity of organophosphates to this species can be considered to be low. Also some strains are pyrethroid resistant.

**Once this product is dry, it is very low toxicity to pollinators.

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 strawberries. 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 PREDATORY MITES – Two-spotted spider mites are a common pest of strawberries. Predatory mites help suppress two-spotted spider mite infestations. When possible, choose products and use patterns with the least toxicity to these beneficial mites.

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 affects 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 - Current disease concerns are for the development of resistance in the fruit rot fungus to Elevate, Lance, Switch, Nova and Rovral (they are from different chemical families). To slow the development of resistance, use the products at full rates and rotate with other fungicides from different chemical families or groups. Avoid application of more than 2 consecutive sprays of the same fungicide or a fungicide from the same group. If additional protection or control is required, choose a product from another chemical family... If Cabrio is used for anthracnose, do not apply more than two applications before alternating to another fungicide with different mode of action. Refer to the labels for more detailed information on resistance management.

SPRAY VOLUME AND PRESSURE - For control of Fruit Rot, insects, mites and leaf diseases, good spray penetration and coverage is essential. For bearing fields with a dense crop canopy a spray volume of 1000 L/ha should be considered a minimum and increasing the volume to 2000 L/ha should improve the

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control achieved with a conventional boom sprayer. Drop nozzles provide improved control. For Cyclamen Mites the label recommends spray volumes up to 8000 L/ha. High pressure is important for creating a droplet size which will result in good coverage on the underside of leaves. Pressures of 1000 to 2000 kPa are required for good control. Wetting agents can improve the control obtained by some products. Consult the label and use the wetting agent recommended.

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 strawberry pests, diseases and symptoms. For example, by scouting for the early signs of the strawberry bud weevil you can accurately time the application of control sprays. If the pest is not present then you may be able to eliminate sprays for this pest completely.
- Sanitation. Remove diseased plants from the field. For example, roguing green petal infected plants removes an important source of infection for healthy plants.
- 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.
- Use resistant varieties of strawberries if possible. Varieties differ greatly in susceptibility to diseases. See the Agriculture and Agri-Food Canada publication “Strawberry Variety Selection” (http://res2.agr.ca/kentville/pubs/fact00-02/index_e.htm).
- Choose the planting site carefully. Wet, poorly drained soils can lead to root problems. The crops that had been previously planted in the field can potentially cause disease and pest problems. Planting strawberries in a field which has recently been in sod can lead to a white grub or wireworm problem. Planting after potatoes or alfalfa can lead to Verticillium wilt. Consider using raised beds, at least 25-30 cm high, where red stele races are attacking resistant varieties.

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