

WILD BLUEBERRY INSECT & DISEASE MANAGEMENT SCHEDULE

Nova Scotia Guide to Pest Management in Wild Blueberry 2011
[Wild2-11]

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LIABILITY STATEMENT

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All products listed in this guide are registered for use in Canada; however, foreign markets may have specific restrictions on which pesticides can be used on the crop they are buying. It is a good idea to check with the receiving shed or processor you are selling to, for an allowable inputs list.

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IMPORTANT NOTES ON FUNGINEX AND DYLOX

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, as of spring 2010, 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.

Dylox was also withdrawn from the market in the US in 2002 and all minimum residue levels have been removed. In Canada, as of spring 2010, this product is still legal to use. However, fruit that has been treated with Dylox will not be suitable for export to the US.

**ALWAYS DISCUSS WITH YOUR BUYER OR
PROCESSOR WHICH PRODUCTS ARE
PERMITTED FOR THEIR MARKETS.**

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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			
DF	Dry flowable	mL	millilitre
EC or E	Emulsifiable concentrate	kPa	kiloPascal
L	Liquid	g	gram
WDG	Wettable dry granule	L	litre
WP or W	Wettable powder	BIU	Billions of International Units

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

* Pesticide Units of Measurement

It is not recommended to convert label rates to imperial units because there is a high likelihood of mathematical errors creeping in to the results. 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

COMMON NAME	TRADE NAMES	DAYS TO HARVEST	REENTRY INTERVAL	TOXICITY		
				TO BEES	TO APPLICATOR	
					ORAL	DERMAL
<i>acetamiprid</i>	Assail	7	12 hours	high	moderate	low
<i>Bacillus subtilis</i>	Serenade Max	0		low	low	low
<i>Bacillus thuringiensis</i>	Foray, Dipel 2X DF	0		low	low	low
boscalid	Lance	0	4 hours	low	low	low
boscalid, pyraclostrobin	Pristine	0	24 hours	low	low	low
captan	Captan, Maestro	2	48-72 hours	low	low	low
carbaryl	Sevin XLR Plus	2		high	moderate	moderate
chlorothalonil	Bravo	54		low	low	low
cyprodinil, fludioxonil	Switch	1		-	low	low
deltamethrin	Decis	14		high	low	low
dimethoate	Cygon, System, Lagon	15		high	moderate	moderate
fenhexamid	Elevate	1		low	low	low
ferbam	Ferbam	40		low	low	low
fluazinam	Allegro	30	24 hours	low	low	low
malathion	Malathion	1		high	moderate	moderate
propiconazole	Topas, Mission	60		low	low	low
prothioconazole	Proline 480 SC	365		low	low	low
permethrin	Pounce	sprout		high	moderate	low
phosmet	Imidan	15		high	moderate	low
spinetoram	Delegate	3		moderate	low	low
spinosad	GF-120 NF Naturalyte Fruit Fly Bait,	0	Once product is dry	moderate	low	low
spinosad	Success 480 SC	3	Once product is dry	moderate	low	low
thiophanate-methyl	Easout, Senator	1		low	low	low
trichlorfon	Dylox	30		moderate	moderate	moderate
triforine	Funginex	60		low	low	low

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 than recommended.

TOXICITY TO BEES - 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 indicate 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 (WP) formulations recommended in this guide are now available in low exposure packaging (Instapak, Solupak) or low dust formulations such as dry flowable (DF). Use of these products reduces inhalation exposure during handling.

RESISTANCE MANAGEMENT - The use of some products leads to selection of some pests which are more tolerant. 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 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. Refer to the labels for more detailed information on resistance management.

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.*

STAGES OF BUD DEVELOPMENT

To help growers accurately time pest management strategies, a classification system for both vegetative and flower bud stages has been developed.

Vegetative Buds		Flower Buds	
Classification	Stage	Classification	Stage
V0	dormant	F0	Dormant
V1	Green tip (< 2 mm green showing)	F1	Green bud swell (slight green showing)
V2	2-5 mm green tip	F2	bud scales separating
V3	> 5 mm and leaves &/or leaves separating	F3	flower buds visible – sepals covered
V4	leaves visibly separated	F4	corolla visible in flower bud
		F5	corolla extends past calyx – pre-bloom

INTEGRATED PEST MANAGEMENT TIPS

Non-chemical pest management strategies

Pesticides should be utilized as a tool of last resort in any cropping system and the wild blueberry management system is no different. There are many management decisions that can minimize or reduce pest pressures, so that pesticide applications can be reduced. This not only reduces environmental risk, but can lower input costs to the grower.

Pruning by burning is an effective way to help reduce some insect and disease pressures. To be effective, the burn has to be intense and uniform. Straw burning may not be as effective for pest control, because it generally does not burn as hot as an oil burn. Straw can also introduce new weed pressures, if it is not free of weed seeds. Therefore, if a grower decides to straw burn, it is important to determine how clean the supply is. Burning repeatedly can be more expensive than mowing, and it will reduce organic matter content in the soil. To balance the costs and benefits, a pruning rotation can be implemented, where burning is done every second or third cropping cycle.

Some studies have shown that creating buffer zones of diverse plant communities (eco-zones) around fields can also help minimize some pest pressures. Certain pest species of insects overwinter, or live, in the tree line surrounding a field, and a physical barrier may limit accessibility for these insects. With the tree line pushed back at least 10 meters, the zone can be promoted to grow vegetation that is good habitat or feeding grounds for beneficial insects (e.g. wild flowers for pollinators, parasites, and predators). This also allows the blueberry plants on the edge of a field to be free of shading pressure and less susceptible to birds feeding. The more open field may also allow for quicker drying times during disease infection periods.

Monitoring for insects and diseases

Monitoring requires visiting fields at least once a week throughout the growing season. With a minimum of equipment, and some experience, you can learn to prevent pests from becoming unmanageable. Using pesticides only when and where needed is the responsible thing to do and is cost effective.

Monitoring defoliating insects is normally done using a standard 30 cm diameter sweep net. Sweep net samples are taken by passing the net through the blueberry foliage using 180° horizontal strokes while walking across the field. One sweep is a full 180° pass through the foliage and 25 sweeps make up one sample. The number of samples to take will vary depending on the size of the field. Three samples per four hectares is usually regarded as adequate. Sweep on warm sunny days and walk into the sun to avoid casting a shadow that may alert insects and cause them to drop to the ground.

In an integrated pest management system, it is preferable to examine and count sweep net samples in the field immediately after the sample has been taken. This ensures that small larvae are found and allows for rapid decision making on management options. Empty the contents of the net on to the sorting tray and count the number of each insect species present and record the results on a field data sheet. In addition, it is useful to keep track of the numbers of beneficial arthropods in the sample.

If it is impossible to field count samples, then samples can be placed into containers or bags. Keep the samples cool and place them in a freezer as soon as possible to preserve the quality of the specimens. Sort the frozen samples within a day or two, to optimize its usage as a management tool.

Excellent record keeping is a must for a successful integrated pest management system. All samples should be labeled with information on location, sample number and date. It is important that records of pest problems in fields are kept over the years as this can help to understand what is happening in the field both within the season and among years.

Wild Blueberry Insect Management Schedule

Insect - 1

Insect	Active Ingredient	Product	Rate	Timing	Notes
Blueberry leaf tier (<i>Croesia curvalana</i>)	<i>Monitor larval activity early and often. Keep accurate records of larval abundance and map the locations of infestations in fields. The treatment target is the emerging larval stage, before they burrow into the buds, where they are protected from insecticides.</i>				
	deltamethrin	Decis 5 EC	150 mL/ha	F1 stage	Apply in 100-200 litres of water per hectare.
Blueberry spanworm (<i>Itame argillacearia</i>)	<i>Sweep every 2 weeks until late June. Check foliage for damage. NOTE: Larvae tend to hide in litter at base of plants during the day and feed in the plant canopy during the night. Threshold 12 larvae in 25 sweeps in crop year.</i>				
	phosmet	Imidan 50 WP INSTAPAK	2.24 kg/ha		Maximum 2 applications per year, apply in 1000 litres of water per hectare.
	spinetoram	Delegate WG	100-200 g/ha	Egg hatch to small larvae	Suppression. Use high rate for higher populations and/or larger larvae. Maximum of 3 applications per year, with a minimum re-treatment interval of 6 days. Avoid when pollinators are active.
	spinosad	Success 480 SC	145-182 ml/ha	Egg hatch to small larvae	Apply in 300-500 litres of water per hectare. Use high rate under high insect pressure or large larvae. Maximum of three applications per year. Repeat applications at 7-10 day intervals. 3 day PHI.
	acetamiprid	Assail 70 WP	136-160 g/ha		Suppression. Apply in a minimum spray volume of 187 L/ha.
	<i>Bacillus thuringiensis</i>	Dipel 2X DF	550-1125 g/L	Larvae are 1 st or 2 nd instar	Apply in a minimum of 300 L/ha. Also registered to control Chainspotted Geometer, Rannoch looper and various leafroller species.
	carbaryl	Sevin XLR Plus	4.0 L/ha		For control of Bruce Spanworm. Apply in 1200-1500 litres of water per hectare. Avoid spraying during flowering.
	deltamethrin	Decis 5 EC	125 ml/ha		For control of Bruce Spanworm . Apply in 100-200 litres of water per hectare. Avoid spraying during flowering.
Blueberry flea beetle (<i>Altica sylvia</i>)	Larvae: <i>Provisional threshold is 75-125 larvae in 25 sweeps. Check foliage for damage. First instar larvae are present in early May but they are protected in the buds and cannot be dislodged by sweeping. No threshold for bud inspection has been established.</i>				
	spinosad	Success 480 SC	165-220 ml/ha	mid-May to early June	Suppression of Flea Beetle larvae. Maximum of 3 applications per season. Apply high rate when populations are high. Best results when applied to early larval stages. Allow 7-10 day intervals between applications if monitoring indicates a need to re-treat.
		Entrust 80W	100-132 g/ha		
	acetamiprid	Assail 70 WP	160 g/ha		
spinetoram	Delegate WG	200 g/ha	Early larval stages	Maximum of 3 applications per year, with a minimum re-treatment interval of 6 days. Avoid when pollinators are active. 3 day PHI	
Blueberry case beetle (<i>Neochlamisus cribripennis</i>)	<i>Sample once per week. Provisional threshold is 15-20 larvae in 25 sweeps in June to Late July. This insect is generally not a problem in the crop year of a two year rotation, but can become more problematic in a three year rotation.</i>				
	trichlorfon*	Dylox 420 L	2.75 L/ha	May-June	Max 2 applications 30 days apart per season. 30 day PHI

Wild Blueberry Insect & Disease Management Schedules

Insect - 2

Insect	Active Ingredient	Product	Rate	Timing	Notes
Blueberry sawfly (<i>Neopareophora litura</i>)	<i>Threshold is 75-125 larvae in 25 sweeps in early May to mid June. Check foliage for damage. Infestations can be very localized, so map locations for spot treatments.</i>				
	trichlorfon*	Dylox 420 L	2.75 L/ha	early-May - mid-June	Treat only if threshold is exceeded and damage is observed. Max 2 applications 30 days apart per season. (May be no longer be available from your supplier)
Blueberry fruit fly (<i>Rhagoletis mendax</i>)	<i>Apply one of the listed materials 5 to 7 days after the first blueberry fruit fly is captured. Continue to monitor fields after treatment. If trap catches reach an average of one blueberry fruit fly per trap per day, a second application is warranted. Apply second treatment 10-12 days after first treatment. Trap placement: One interior; 10-15 cm above fruit bearing plants; near woods & unmanaged blueberry field edges; set traps 10-15 m from field edge; check 2-3 times per week from early July to harvest; replace traps 2-3 times</i>				
	acetamiprid	Assail 70 WP	136-160 g/ha	Early to Late July	Apply in a finished spray volume of 187 L/ha (75 L/acre). Use high rate under heavy insect pressure or dense vegetation. Do not apply more than 4 applications per season. Do not apply more than once every 12 days. Do not apply during bloom. This product has a 7 day PHI and a 12 hour restricted entry interval This product has a different mode of action than other products listed. You may still get some trap captures 2-3 days after application.
	phosmet	Imidan 50 WP INSTAPAK	2.25 kg/ha	Early to Late July	Maximum 2 applications per year, apply in 1000 litres of water per hectare.
	spinosad	GF-120 NF Naturalyte Fruit Fly Bait	1.0-1.5 L	Early to Late July	Note: This product is registered on Blueberry in general and there is limited information on the effectiveness in a lowbush blueberry field. Apply with a large spray droplet size (4-6 mm). Begin applications as soon as traps indicate flies are present. Repeat on 7 day intervals, use a shorter interval during rainy periods. Max 5 applications per season.
	dimethoate	Cygon 480 E	580-825 mL/ha	Early to Late July	If using an air-blast orchard sprayer, weather conditions should be checked frequently (every 15 minutes). Wind speed should be from 2 to 10 km/h. Relative humidity should not be less than 50%. Air temperature should not exceed 25°C. Maximum of 2 applications per season.
		Lagon 480 E	600-825 mL/ha		
	malathion	Malathion 25W	2.25 kg/1000 L	Early to Late July	Average control
	carbaryl	Sevin XLR PLUS	4.0 L/ha	Early to Late July	Apply in 1200-1500 litres of water per hectare.

Wild Blueberry Insect & Disease Management Schedules

Insect - 3

Insect	Active Ingredient	Product	Rate	Timing	Notes
White-marked tussock moth (<i>Orgyia leucostigma</i>)	<i>Threshold is 12 larvae in 25 sweeps from early June through late August. Outbreaks occur only sporadically (every 5-10 years). Delay treatment if small larvae are still blowing in from adjacent woodlands</i>				
	B.t.k	Bioprotec	4.0 L /ha	3 rd week of June & 2-5 days later	Make two applications 2-5 days apart
		Foray 48 BA	4.0 L /ha		Make two applications 2-5 days apart
Blueberry thrips (<i>Frankliniella vaccinii</i> , <i>Catinathrips kainos</i>)	<i>Divide field in to a grid pattern of 10 m x 10 m squares. Suggestion: Map thrip infestations by rating the damage in each grid. Target adults as they move out of the ground onto the plants. Once thrips are in the leaves they are protected from the spray</i>				
	permethrin	Pounce 384 EC	180 mL/ha	mid-May to early June	Make one application when plants are 1-2 cm tall
	acetamiprid	Assail 70 WP	160 g/ha		Apply when new shoots are 0.5 – 1.5 cm tall. Repeat applications may be made at least 12 days later if required. Apply in a minimum spray volume of 187 L/ha.
malathion	Malathion 25W	2.25 kg/1000 L			

Wild Blueberry Disease Management Schedule

Diseases	Active Ingredient	Product	Rate	Timing	Notes
Monilinia Blight <i>(Monilinia vaccinii-corymbosi)</i> Crop Year Only	<i>Treat fields with a history of disease. First application at 40 - 50% F2 and beyond stage on a preventative basis OR wait until an infection period occurs at the 40-50% F2 and beyond stage and then apply a treatment within 72hrs. of the infection period. A second application may be required depending on the season. Refer to the Monilinia Blight Fact Sheet for further information.</i>				
	propiconazole	Topas 250 E	500 mL/ha	Late April to mid to late May 40-50% F2 stage	Maximum of two applications per year
		Mission 418 EC	300 mL/ha		
	triflorine *	Funginex 190 EC	1.7 L/ha		
	fluazinam	Alleagro 500F	2.24 L	Apply pre infection	SUPPRESSION ONLY. Apply as a foliar spray in 300-1000 L/ha. Do not make more than 4 applications per year. Application interval is 7 to 10 days. Begin applications at bud break and repeat applications every 7-10 days until petal fall. 30 day PHI.
	<i>Bacillus subtilis</i>	Serenade MAX	3.5-6.0 kg/ha	Apply pre infection	Serenade MAX and Serenade ASO are biopesticides that may only suppress the indicated diseases. Repeat as necessary on a 7-14 day interval.
Serenade ASO		24 L/ha			
Botrytis blight <i>(Botrytis cinerea)</i> Crop Year Only	<i>Monitor weeds and early blooming blueberry clones. If disease begins to build up at mid bloom, and favorable wet periods for infection are predicted, apply a fungicide prior to the wet period. Refer to Botrytis Fact sheet.</i>				
	captan	Captan Supra 80 WDG	2.25 kg/ha	Mid bloom to early fruit set.	
		Maestro 80 DF	2.25 kg/ha		
	boscalid	Lance 70 WDG	0.56 kg/ha		Do not apply more than twice consecutively
	cyprodinil, fludioxonil	Switch 62.5 WG	775 to 975 g/ha	Early bloom	Make the first application during early bloom. A second application may be made 7 to 10 day later. 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.
	pyraclostrobin, boscalid	Pristine WG	1.3-1.6 kg/ha	Prior to disease development	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. Maximum of 4 applications per season. Will also suppress Valdensinia leaf spot.
	<i>Bacillus subtilis</i>	Serenade MAX	3.0-6.0 kg/ha	Prior to disease development	Serenade Max and Serenade ASO are biopesticides that may only suppress the indicated diseases. Begin application prior to

Wild Blueberry Insect & Disease Management Schedules

		Serenade ASO	4.0-15.0 L/ha	Prior to disease development	disease development and repeat on 7-10 day intervals. <i>May also control Bacterial blight (see product labels).</i>
	fenhexamid	Elevate 50 WDG	1.7 kg/ha	Mid bloom to early fruit set.	Do not apply more than twice consecutively

Disease - 1

Wild Blueberry Insect & Disease Management Schedules

Disease - 2

Diseases	Active Ingredient	Product	Rate	Timing	Notes
Septoria leaf spot	<i>If significant leaf spotting is seen and early leaf drop occurs in crop field, sprout year applications (the following year) may be required to suppress leaf diseases. Leaf and stem inspection periodically Mid May through August.</i>				
	chlorothalonil	Bravo 500	7.2 L/ha	Early to Mid-June	Application should be based on level of disease pressure the previous year. Do not exceed 2 applications per year. One application can be made early to mid-June of the sprout year (depending on location) for Septoria. This application will also be of some benefit for Valdensinia leaf spot and Phomopsis canker. Apply Bravo 500 in 200-950 L/ha of water.
	pyraclostrobin, boscalid	Pristine WG	1.6 kg/ha		Important: Read Product Label Liability Statement Suppression of Septoria only. Maximum number of applications in sprout year is 4, Maximum number in crop year is 2. Begin applications prior to disease development. REI of 24hrs, 0 day PHI
prothioconazole New 2011	Proline 480 SC	315 ml/ha	Suppression of Septoria only. Apply only in Non-cropping year of production, fruits are to be harvested at least a year after the last application. Apply at first sign of disease and an initial application may be made 10-14 days later. Do not apply more than two applications per year. The lowest labeled rate of a non-ionic surfactant may be tank mixed with Proline. Look at label for buffer zones and airstblast restrictions		
Valdensinia leaf spot (<i>Valdensinia heterodoxa</i>)	pyraclostrobin, boscalid	Pristine WG	1.3-1.6 kg/ha	Prior to disease development	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. Maximum of 4 applications per season. 24 Re-entry interval
Leaf Rust	chlorothalonil	Bravo 500	7.2 L/ha	Late July to early August	Application should be based on level of disease pressure the previous year. Make an application in late July to early August of the sprout year (depending on location) for Rust. These applications will also be of some benefit for Valdensinia leaf spot and Phomopsis canker. Apply Bravo 500 in 200-950 L/ha of water. Do not exceed 2 applications per year.
	prothioconazole New 2011	Proline 480 SC	400 ml/ha		Suppression of Blueberry Leaf Rust only. Apply only in Non-cropping year of production, fruits are to be harvested at least a year after the last application. Apply at first sign of disease and an initial application may be made 10-14 days later. Do not apply more than two applications per year. The lowest labeled rate of a non-ionic surfactant may be tank mixed with Proline. Look at label for buffer zones and airstblast restrictions

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