

**Excerpts of EPA Insecticide Labels Registered for Blackberry and Blueberry and  
Insecticide Resistance Action Committee (IRAC) Classification of Insecticides on line:  
(<http://www.irc-online.org/eClassification/>)**

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**Insecticide Resistance Management:** Any insect population may contain individuals that are naturally resistant to a specific pesticide formulation (mode of action); therefore, the use of any one insecticide formulation against many consecutive generations of a pest can result in the development of resistance problems.

**To prevent or delay the development of resistance, we recommend:**

- 1) Routine pest monitoring to justify and improve spray timing;
- 2) Do not use a given formulation on more than three consecutive generations of a pest; and then
- 3) Rotate insecticide formulation with another formulation with different mode of action (**Class**).

**Class: Pyrethroid - Sodium channel modulators**

**1) Capture 2EC or Brigade 2EC or WSB - bifenthrin - Insecticide & miticide**

**CANE BERRIES**

CROP	PEST	DOSAGE		REMARKS
		LB/AI/A	FL OZ/A	
Caneberries Including: Blackberries Bingleberries Dewberries Lowberries Marionberries Ollalieberries Youngberries Loganberries Raspberries	Leafrollers Orange Tortrix Root Weevils	0.05 - 0.10	3.2 - 6.4	Apply by air or ground equipment using sufficient water to obtain full coverage of foliage. (minimum of 10 gallons per acre by air and 50 gallons per acre by ground).  One application may be made pre-bloom and a second application may be made post bloom.
	Raspberry Crown Borer Spider Mites	0.10	6.4	For Crown Borer, apply 0.1 lb ai / a, post-harvest (fall) or pre-bloom (spring), as a drench application directed at the crown of plants in a minimum of 200 gallons water / acre. Greater efficacy is observed at higher water gallonages (up to 400 gallons/a) or in an application prior to a significant rainfall event. Do not make both pre-bloom foliar and pre-bloom drench applications.

**Class: Insect growth regulators disrupt molting**

**1) Confirm 2F - tebufenozide (ecdysone agonists) induces premature lethal molting.**

**Use Dirgections for Bushberries**

*(Blueberries-high bush and low bush, Currant, Elderberry, Gooseberry and Huckleberry)*

**Ground Application:** Make applications by conventional boom or air-blast sprayers that are calibrated to deliver a minimum of 30 gallons per acre.

**Aerial Application:** Make applications of Confirm 2F in a minimum of 10 gallons per acre.

**Spray Adjuvant:** A Spreader-Sticker such as Latron B-1956 or similar adjuvant should only be used if recommended by a local expert and if previous experience has been satisfactory. Under certain conditions adjuvant usage can result in blossom and fruit damage.

Target Pests	Application Rate (fl oz/acre)	Application Timing	Restrictions
Cranberry fruitworm <i>(Acrobasis vaccinii)</i>	16.0 (0.25 lb a.i./acre)	Apply at initiation of egg laying [approximately 400 Day Degrees (DD) base 50°F] following biofix <sup>1</sup> .	Do not apply more than 64 fl oz of this product per season.
Cherry fruitworm <i>(Grapholita packardii)</i>		Make a second application at 100% petal fall (usually 7 to 14 days following the first application). Additional applications at 10- to 14-day intervals may be required under high pressure or sustained moth flight.	Allow at least 14 days to elapse between final application and harvest.

**2) Esteem 35 WP - pyriproxyfen (juvenile hormone mimic) suppresses egg hatch**

**GENERAL**

*Esteem 35 WP* Insect Growth Regulator acts by suppressing embryogenesis within the insect egg and by inhibiting metamorphosis and adult emergence of target insects. *Esteem 35 WP* has no activity on adult insects, but hatching of eggs laid by treated adults will be suppressed. Since *Esteem 35 WP* is an Insect Growth Regulator (IGR) and activity depends on the insects' development, evidence of activity will be slower than typical contact insecticides.

**BUSHBERRIES**

CROPS	PESTS	RATE PER ACRE	SPECIAL INSTRUCTIONS
Blueberry Currant Elderberry Gooseberry Huckleberry Juneberry Lingonberry Salal	Cherry Fruitworm Cranberry Fruitworm Lecanium Scale	5 oz.	Apply with ground or air equipment as a full coverage spray (minimum of 5 gals./A by air or 50 gals./A by ground). Thorough coverage is critical for adequate control. It is essential to use adequate water volume to ensure thorough coverage.  <b>Fruitworms:</b> Apply when egg laying begins and again at petal fall. Additional applications of another insecticide, at 10 - 14 day intervals, may be needed under high population pressure or sustained moth flight.  <b>Lecanium Scale:</b> Apply at either dormant, delayed dormant or as an in-season cover spray. At dormant or delayed dormant use a spray oil at the manufacturer's recommended oil rate. In a cover spray make applications when scale crawlers first emerge. Follow local recommendations regarding in-season use and rates of oil in your area.
			<i>Esteem 35 WP</i> may be mixed and/or alternated with commonly used insecticides to comply with local IPM programs and Resistance Management programs. <ul style="list-style-type: none"> <li>• Do not apply within 7 days of harvest.</li> <li>• Do not make more than 2 <i>Esteem 35 WP</i> applications per growing season.</li> <li>• Do not exceed 10 oz. of <i>Esteem 35 WP</i> per acre per season.</li> <li>• Do not apply earlier than 14 days after last <i>Esteem 35 WP</i> treatment.</li> </ul>
<b>MANAGING INSECT RESISTANCE:</b> Repeated use of the same class of insecticides with similar modes of action can lead to the buildup of resistant insect strains. To optimize resistance management practices, Valent U.S.A. Corporation is restricting <i>Esteem 35 WP</i> Insect Growth Regulator to two applications per growing season. <i>Esteem 35 WP</i> may be used in alternation with other IGR materials possessing dissimilar modes of action and/or with other chemical classes of insecticides. Follow local, state and federal IPM and Insect Resistance Management (IRM) recommendations. Read and follow all product labels before applying any insecticide.			

**Class: Organophosphate = inhibit acetylcholine esterase (nerves)**

**1) Imidan 70WP - phosmet**

FRUIT AND NUT CROPS (continued)			
CROP	PEST	USE RATE lbs./acre	COMMENTS
BLUEBERRIES (High Bush) (3) (Except California)	Blueberry Maggot, Cherry Fruitworm, Cranberry Fruitworm, Flea Beetle, Grasshopper, Japanese Beetle, Plum Curculio, Obliquebanded Leafroller, Redbanded Leafroller, Redstriped Fireworm, Rose Chafer, Sawfly, Spanworm, Strawberry Root Weevil Adult	1 1/2	If applying by air, apply in a minimum of 2 gals. of water by aircraft. Additional applications may be made when indicated by insect infestations and local or State spray programs.
	<ul style="list-style-type: none"> <li>Do not enter or allow entry into treated areas during the restricted entry interval (REI) of 24 hours.</li> <li>Do not apply more than 7 1/2 lb Imidan 70-W per acre per year.</li> <li>Do not make more than 5 applications per acre per year.</li> <li>Do not apply within 3 days of harvest.</li> <li>Limit spray drift; turn airblast spray nozzles inward on row ends; and do not apply when bees are in the area.</li> </ul>		
BLUEBERRIES (Low Bush) (3) (Except California)	Blueberry Maggot, Cherry Fruitworm, Cranberry Fruitworm, Flea Beetle, Grasshopper, Japanese Beetle, Plum Curculio, Obliquebanded Leafroller, Redbanded Leafroller, Redstriped Fireworm, Rose Chafer, Sawfly, Spanworm, Strawberry Root Weevil Adult	1 1/2	If applying by air, apply in a minimum of 2 gals. of water by aircraft. Additional applications may be made when indicated by insect infestations and local or State spray programs
	<ul style="list-style-type: none"> <li>Do not enter or allow entry into treated areas during the restricted entry interval (REI) of 3 days.</li> <li>Do not apply more than 5 1/8 lb Imidan 70-W per acre per year.</li> <li>Do not make more than 5 applications per acre per year.</li> <li>Do not apply within 3 days of harvest.</li> <li>Limit spray drift; turn airblast spray nozzles inward on row ends; and do not apply when bees are in the area.</li> </ul>		

**2) Malathion 5EC**

**BLACKBERRY, BOYSENBERRY, CURRANT DEWBERRY, LOGANBERRY, RASPBERRY:(1)**

Aphids, rose scale chafers, Japanese beetle, Leafhoppers, Mites, Thrips - 1 1/2 pints per 100 gallons, 3 pints per acre. The rates for use on brambles are based on a standard of 200 gallons per acre dilute spray.

**BLUEBERRIES: (1)**

Blueberry maggots - 1 pint per 100 gallons plus 1 1/2 quarts Staley's Sauce Base No. 7 For use in the Northeast only. Apply in 100 gallons of water per acre.

Cherry fruitworm - 1 pint per 100 gallons, 2 pints per acre. Do not apply within 1 day of harvest.

Cranberry fruitworm - 1 pint per 100 gallons, 2 pints per acre. Make first application at egg hatch and repeat applications every 4 to 5 days until a total of four applications has been made. Do not apply within 1 day of harvest.

Japanese beetle - 3/4 pint per 100 gallons, 1 1/2 pints per acre. Make application when first berries turn blue and at 10 day intervals as long as infestation persists. The rates for use on blueberries are based on a standard of 200 gallons per acre dilute spray.

**3) Diazinon AG600 - For blueberries only (use on blackberries only in CA, OR and WA)**

Blue- berries (7)	Cranberry Fruitworm, Cherry Fruitworm, Blueberry Maggot, Aphids, Thrips, Two-spotted Spider Mite	25 1/2 fl. oz./A	Apply when infestation occurs.
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**Class: Carbamate = acetylcholine esterase inhibitor (nerves)**

**1) Lannate SP – methomyl - For use on blueberries only, but not for blackberries.**

Blueberries	Blueberry Leafhopper	1/2	3	48 hrs
	Aphids			
	Tussock Moth			
	Weevil			
	Sharp-Nosed Leafhopper			
	Cranberry Fruitworm*	1/2-1		
Cherry Fruitworm*				
Flea Beetle (larvae)	1			
Sawfly (larvae)				
Blueberry Leafroller				
Blueberry Maggot	1/4-1/2			
Do not apply during bloom. Do not apply more than 3.6 lbs a.i./acre/crop. Do not make more than 4 applications/crop.				

**2) Sevin 80S**

**SMALL FRUITS AND BERRIES**

CROP	PEST	POUNDS OF SEVIN® 80S PER ACRE	SPECIFIC DIRECTIONS	
Small Fruits and Berries: Caneberries, Blueberries, Cranberries, Grapes, Strawberries	European fruit lecanium	Rose chafer Snowy tree cricket	<b>OBSERVE BEE CAUTION.</b>  Repeat applications as necessary up to a total of 5 times but not more often than once every 7 days.  For cutworm control, this product is most effective against species which feed on the upper portions of the plant.  In grapes for grape leafroller control, apply before first brood larvae emerge from rolls.	
	European raspberry aphid	Strawberry bud weevil		
	Flea beetles	Strawberry clipper		
	Grape leafroller	Strawberry fruitworm		
	Grape leafroller	Strawberry leafroller		
	Japanese beetle	Strawberry weevil		
	Leafhoppers	Western grapeleaf skeletonizer		
	Leafrollers	Western yellowstriped armyworm		
	Meadow spittlebug			
	Omnivorous leaftier			
	Blueberry maggot	Elm spanworm		1 7/8 to 2 1/2
	Cherry fruitworm	Gypsy moth		
Cranberry fireworm	Spaganothus worm			
Cranberry fruitworms	Tarnished plant bug			
Cranberry twig girdler				
Eight-spotted forester	Orange tortrix	2 1/2		
Cutworms	Raspberry fruitworm			
Grape berry moth	Raspberry sawfly			
June beetles	Redbanded leafroller			
Omnivorous leafroller	Saltmarsh caterpillar			

**Approved Insecticides/ Protectants for Organic and Conventional Production**

**Class: Insect growth regulators disrupt molting**

**1) Aza-Direct - azadirachtin**

Extracted from neem tree seeds. Apply 2-3 applications at 7-10 day intervals (buffer water to pH of 6 or lower). After ingestion, it acts as a biological repellent, antifeedant and/or insect growth regulator preventing molting to pupa or adult.

**PESTS**

**AZA-DIRECT may be used against the following pests:**

Aphids (such as pea aphid, Rosy Apple Aphid), Beetles (such as Japanese beetle), Borers, (such as peachtree borers, peach twig borers), True Bugs, (such as Lygus bugs, stink bugs), Caterpillars, (such as leafrollers, cutworms, loopers, armyworms), Flies (such as walnut husk fly, leafminers and fungus gnats), Leafhoppers, Leafminers, Whiteflies, Mealy Bugs, Midges, Mites, Psyllids (such as pear psylla), Weevils, Scales (such as San Jose scale), Thrips, (such as western flower thrips), and all other insect pests.

**2) Neemix 4.5 (similar to Aza-Direct) - azadirachtin**

After ingestion, it acts as a biological repellent, antifeedant and/or insect growth regulator preventing molting to pupa or adult. Control aphids, caterpillars (cherry fruitworm, leafrollers, cutworms, armyworms)

Application Rate for Whiteflies, Aphids, Leafminers, Armyworms, and Other Pests			
Pest	Rate Neemix® 4.5 Per Acre* (fluid ounces)	Frequency	Remarks
Sweetpotato Whitefly Low Pressure High pressure	4.0 – 7.0 fluid oz. 8.0 – 16.0 fluid oz.	4 – 10 days 3 – 7 days	Foliar application to larvae and nymphs
Aphids	5.0 – 7.0 fluid oz.	7 – 10 days	Suppression and adult feeding deterrence
Leafminer	4.0 – 7.0 fluid oz.	14 – 21 days	Foliar application to larvae and nymphs
Armyworms	4.0 – 10.0 fluid oz.	7 – 10 days	Foliar application to larvae
Others (including) Borers Leafhoppers Leafrollers Loopers	7.0 – 16.0 fluid oz.	7 – 10 days	Foliar application to larvae and nymphs
*apply in sufficient water to obtain adequate plant coverage.			

**Class: Sodium channel modulators (like pyrethroids)**

1) **PyGanic EC 1.4** - A pyrethrin derived from chrysanthemum flowers.

**About the only formulation that is labeled for stink bugs.**

**FOR THE CONTROL OF INSECTS:**

Including, but not limited to: Ants, Aphids, Apple Maggot, Armyworms, Artichoke Plume Moth, Asparagus Beetle, Beet Armyworm, Bagworm, Bean Beetles, Beetles, Blister Beetles, Blow Flies, Biting Flies, Boll Weevil, Cabbage Looper, Cankerworms, Carrot Weevil, Caterpillars, Clover Mite, Clover Weevil, Cockroaches, Codling Moth, Colorado Potato Beetles, Crane Flies, Crickets, Cross-striped Cabbageworm, 12-spotted Cucumber Beetle, Cucumber Beetles, Darkling Beetles (lesser meal worm), Deer Fly, Deer Tick, Earwigs, Diamondback Larvae, Eastern Tent Caterpillar, Elm Leaf Beetle, European Corn Borer, European Pine Tip Moth, Face Fly, Fall Webworm, Fire Ants, Firebrats, Fireworms, Flea Beetles, Flies, Forest Tent Caterpillar, Fungus Gnats, Fruit Flies, Fruittree Leafroller, Glassy Winged Sharpshooter, Grape Leafhopper, Grape Leaf Skeletonizer, Green Fruit Worm, Green Peach Aphids, Greenhouse Thrips, Gypsy Moth (adults and larvae), Harlequin Bug, Hornets, Horn Fly, Hornworm, Horse Fly, House Fly, Imported Cabbageworm, Indian Meal Moth, Japanese Beetle, Katydid, Lace Bugs, Leafhopper, Leafrollers, Leaf-tiers, Lice, Loopers, Lygus, Mealy Bugs, Mediterranean Flour Moth, Mexican Bean Beetle, Midges, Millipedes, Mosquitoes, Mushroom Flies, Navel Orangeworm, Onion Maggot, Pear Psylla, Potato Leafhopper, Psyllids, Rice Weevil, Saw-toothed Grain Beetle, Scale, Silverfish, Skippers, Sowbugs, Spiders, Stable Fly, Stink Bugs, Tabanidae, Tarnished Plant Bug, Thrips, Tomato Hornworm, Vinegar Flies, Wasps, Webworms, Whiteflies and Yellowjackets.

**2 Classes: Sodium channel modulators; Mitochondrial complex electron transport inhibitors**

1) **Pyrellin E.C.** (contains pyrethrins and rotenone) - derived from 2 plants.

Crop	Insect	Rate Pints/Acre	Additional Instructions
Apples	Aphids	1-2	Apply in 25 to 100 gallons of water by ground sprayer or in 1-2 gals. of water by Low-Volume apparatus, or in 1-2 pints of vegetable oil if applied with ULV spray equipment.
Blackberries	Blueberry Maggots	"	
Blueberries	Cherry Fruit Flies	"	
Cherries	Gooseberry Fruit	"	
Currants	Worms	"	
Gooseberries	Imported Currant	"	
Grapes	Worms	"	
Peaches	Japanese Beetles	"	
Pears	Leafhoppers	"	
Plums	Mites	"	
Raspberries	Red-necked Borers	"	
	Raspberry Fruit Worms	"	
	Rose Chafers	"	
	Thrips	"	
Strawberries	Mites	1-2	Apply as necessary to maintain control.
	Strawberry Root Worms	"	
	Strawberry Leafrollers	"	
	Thrips	"	

**Class: Nicotinic Acetylcholine receptor agonists**

**1) Spintor 2SC – spinosad - formulation for conventional growers**

**2) Entrust 2SC – spinosad - formulation for organic growers**

Toxin derived from bacteria. Suppress caterpillars (Lepidoptera) and thrips  
Heavy infestations may require repeat applications not less than 5 days apart.

**Caneberries**

Including, but not limited to: Blackberry, Loganberry, Red and Black Raspberry, and Cultivars and/or Hybrids of These

**Pests and Application Rates:**

Pests	SpinTor 2SC (fl oz/acre)
armyworms green fruitworm leafrollers raspberry fruitworm sawfly	4 - 6

**Bushberries**

(Insect Suppression)

Including, but not limited to: Blueberry, Currant, Gooseberry, Huckleberry, Elderberry, Juneberry, Lingonberry, Salal

**Pests and Application Rates:**

Pests	SpinTor 2SC (fl oz/acre)
armyworms blueberry gall midge cherry fruitworm cranberry fruitworm currant fruitfly fireworms leafrollers loopers thrips	4 - 6

**Class: None (no resistance development expected)**

**Kaolin clay white film makes plants less apparent, & reduces feeding & egg laying**

**Surround WP Crop Protectant**

This is a kaoline clay particle film that makes plant white. It protects or suppresses insects by making plant unattractive (white), or clay alters behavior so insect does not feed on plant or it does not lay eggs on plant and keeps plants cooler. It suppresses plum curculio, Japanese beetle, stink bugs, thrips, blackberry psyllid, and grasshoppers.

Reapply spray if a rain lessens the white film. Washing of fruit by packing line brushes or forced water sprays is required unless film weathers off before harvest.

**Berries**

Such as blackberry, raspberry, dewberry, boysenberry, loganberry, elderberry, blueberry, ribes such as currant and gooseberry, and including cranberry

PEST	LBS/ACRE	RECOMMENDATIONS
Blackberry psyllid, grasshoppers, Japanese beetle, leafhoppers, leafrollers, plum curculio, rose chafer, thrips	12.5-50 <sup>1</sup>	Suppression only*. Begin applications after fruit set and prior to infestation, applying every 7-14 days.
Blueberry maggot	12.5-50 <sup>1</sup>	Suppression only*. Apply 2 sprays 7 days apart before expected infestation or first detection of infestation. Continue applications every 7-14 days during egg lay period.
Sunburn and heat stress	12.5-50 <sup>1</sup>	See I d.
<sup>1</sup> 25 lbs per 50 gallons per acre preferred. * Supplemental controls may be needed for complete control.		