



# ***Environmental Horticulture Notes***

**EHN 81**

## **SUMMARY OF REDUCED CHEMICAL PEST MANAGEMENT FOR FRUIT AND NUT TREES**

As a result of increasing environmental contamination and pesticide safety concerns, we strongly recommend the use of reduced or non-chemical approaches to pest management where possible. Integrated pest management (IPM) emphasizes the use of non-chemical methods first, and the use of chemical pesticides only as a last resort. These methods include proper pest identification; periodic monitoring; appropriate cultural practices; release of beneficial insects, if appropriate; applications of lowest toxicity pesticides; and application of other pesticides, if other methods fail.

Be sure to thoroughly read all labels to determine if a pesticide is appropriate for a given pest and crop, and always use the protective clothing and gear stated on the label when applying pesticides. If your pest problem is eliminated with a single spray, or in the case of some fungicides if the weather turns dry, no additional sprays may be necessary, even though the label says to use every 7 to 14 days. When spraying, be sure to thoroughly cover leaves and/or branches.

In a few cases, beneficial insects may be purchased through mail-order catalogs and released on the trees. Such insects include *Trichogramma platneri* for codling moth and *Aphytis melinus* for California red scale. Releasing lady beetles (lady bugs) is usually not effective because they quickly fly away. In most cases, predatory insects will come when the conditions are right.

**TABLES:** The tables on the following pages are intended as a quick guide for managing pests using the least toxic approaches. Products or methods in **bold** are preferred over others based on efficacy or safety. Some of the products and methods listed may not be as effective as chemical pesticides. For example, codling moth can be very difficult to control using cultural practices, and oil and other low-toxicity insecticides are not effective or require a large number of applications, if populations are high. In some cases, applications of Sevin may be the only effective control measures for codling moth.

### **UC RESOURCES:**

- *Pests of the Small Farm and Garden* (UC Pub 3332)
- *Pests of Landscape Trees and Shrubs* (UC Pub 3359)
- *The Home Orchard* (UC Pub 3485)
- UC IPM *Pest Notes* at <http://www.ipm.ucdavis.edu/PDF/PESTNOTES/>: Aphids (7404), Apple & Pear Scab (7413), Bordeaux Mixture (7481), Codling Moth (7412), Cottony Cushion Scale (7410), Fire Blight (7414), Leaf Curl (7426), Powdery Mildew on Fruits and Berries (7494), Scales (7408), Spider Mites (7405), Spotted Wing Drosophila (74158), Thrips (7429), and Walnut Husk Fly (7430).
- *Integrated Pest Management Publications* for Stone Fruit (UC Pub 3389), Apples and Pears (UC Pub 3340), Citrus (UC Pub 3303), Almonds (UC Pub 3308), and Walnuts (UC Pub 3270).
- In addition, the most up-to-date information is on the UC IPM website: <http://www.ipm.ucdavis.edu>.
- Sacramento UC Master Gardener website at [ucanr.edu/sites/sacmg/PLC\\_control\\_demonstration/](http://ucanr.edu/sites/sacmg/PLC_control_demonstration/) for the Peach Leaf Curl Study.

November 2012, revised. January 2000, written by Chuck Ingels, UCCE Sacramento County Pomology, Viticulture, and Environmental Horticulture Advisor. Edited by Christine Joshel, Center for Pest Management Research and Extension, and Mary Lou Flint, IPM Education and Publications, UC Davis.

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## SUMMARY OF REDUCED CHEMICAL METHODS OF MANAGING SELECTED INSECT AND DISEASE PESTS OF BACKYARD FRUIT TREES

(NOTE: Products or methods in **bold** are most effective and/or safest to use.)

### -- DORMANT SEASON --

Disease or Insect	Product or Method	Signal Word	When to Use	Frequency	Comments
<b><i>Peach leaf curl</i></b> ( <i>peach, nectarine</i> )	<b>Liquid copper product</b> (e.g. Liqui-Cop)	CAUTION	1) Late Fall and 2) At bud swell	2X/year	Toxic to soil microbes. Liquid copper products may be less effective than wettable powders. Use spreader sticker to prevent rain washing off.
	<b>Copper Soap</b> (e.g. Concern)				
<b><i>Scale insects</i></b> ( <i>decid, fruits/nuts</i> )	<b>Superior/ Supreme Oil</b>	CAUTION	Early dormant season (by mid-Jan.)	1X/year	Can also treat scale with summer oil during crawler stage, but hard to get good coverage with foliage. Avoid applying oil during dry, warm, and windy periods; best to apply just <i>after</i> rain or fog.

#### WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in their original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits and/or vegetables ready to be picked.

Mix and apply only the amount of pesticide you will need to complete the application. Spray all the material according to label directions. Do not dispose of unused material by pouring down the drain, toilet, or storm drain. Do not pour on ground: soil or groundwater may be contaminated. Follow label directions for disposing of containers. Never burn pesticide containers.

#### PHYTOTOXICITY WARNING

Certain chemicals may cause plant injury if used at the wrong stage of plant development or when temperatures are too high. Injury may also result from excessive amounts of the wrong formulation or from mixing incompatible materials. Inert ingredients, such as wetters, spreaders, emulsifiers, diluents, and solvents, can cause plant injury. Since manufacturers often change formulations, it is possible that plant injury may occur, even though no injury was noted in previous seasons.

#### NOTE ON COPPER AND LIME SULFUR

Fixed copper is no longer available but liquid copper products, such as Liqui-Cop and copper soap sprays, can be found at nurseries. Copper sulfate can be found in some chemical supply stores and online companies and it may require a pest ID number (available through the agricultural commissioner). Copper sulfate can be mixed with hydrated or construction lime to make Bordeaux mixture, but this may not be practical for most gardeners due to the difficulty in finding the ingredients and in agitating the mixture to prevent settling and sprayer clogging. Liquid copper products are somewhat less effective than fixed copper; but recent studies in Sacramento County showed that they can provide 70% to 80% control, which is adequate. Lime sulfur was removed from the residential market by the US EPA.

**SUMMARY OF REDUCED CHEMICAL METHODS OF MANAGING  
SELECTED INSECTS AND DISEASE PESTS OF BACKYARD FRUIT TREES**

-- SPRING AND SUMMER --

Disease	Product or Method	Signal Word	When to Use	Frequency	Comments
<b>Apple/Pear scab</b>	General Comments				Few or no sprays necessary in dry springs. All sprays are preventive only. Green tip (delayed dormant) spray most important.
	<b>Cultural methods</b>				Remove fallen leaves in winter.
	<b>Wettable Sulfur</b>	CAUTION	1) Green tip 2) Just before petals open 3) Late bloom	1-3X	
	Copper product	CAUTION		1-3X	Later applications may russet fruit.
<b>Fire blight</b> (pears, Asian pears, apples)	<b>General Comments</b>				Also attacks quince, loquat, crabapple, and pyracantha.
	<b>Cultural methods</b>				Cut branches 12"+ below infection, sterilize shears if branches moist.
	<b>Copper product</b>	CAUTION	Bloom period	Every 4-5 days thru bloom	Spray only if fire blight has been a problem in past years. Late applications may russet fruit.
<b>Brown rot</b> (stone fruits and almonds)	<b>General Comments</b>				Few or no sprays necessary in dry springs.
	<b>Cultural methods</b>				Remove mummified fruits in winter. Thin fruit in April for air circulation.
	<b>Copper product</b>	CAUTION	1) Bud swell 2) Full bloom 3) Petal fall 4) Before hvst.	1-3X	Spray #1 also for peach leaf curl. Spray #2 and 3 during wet springs Spray #3 and 4 may russet fruit Spray #4 if spring infection severe
	Wettable Sulfur	CAUTION	Same	Same	Do not spray within 30 days of oil.
<b>Grape Powdery Mildew</b>	<b>Wettable Sulfur</b>	CAUTION	Budbreak to 2" thru berry softening	Every 7-10 days	Use 10-day interval during cold or very hot weather. All sprays are preventive only.
	<b>Dusting sulfur</b>	CAUTION	Same	Same	Can use wettable in early season, dusting later for best coverage. Avoid using when temperature 90F+
	<b>"Garden Fungicide"</b>	CAUTION	Same	Same	Sulfur + Surfactants (Safer brand).
	<b>Neem oil</b>	CAUTION	Same	Same	Do not spray w/in 30 days of sulfur.
	Kaligreen (Potassium bicarbonate)	CAUTION	Same	Same	Lowers pH of fruit and leaf surfaces.
<b>Bunch Rot</b> (grapes)	<b>Cultural method</b>				Remove leaves around clusters in early June for air circulation. Two-wire trellising and mid-season hedging of shoots for air circ. Remove/destroy infected clusters. Avoid sprinkling vines. Avoid excess nitrogen fertilization.

## SUMMARY OF REDUCED CHEMICAL METHODS OF MANAGING SELECTED INSECTS AND MITE PESTS OF BACKYARD FRUIT TREES

-- SPRING AND SUMMER --

Disease	Product or Method	Signal Word	When to Use	Frequency	Comments	
<b>Codling Moth</b> (apples, pears, Asian pears)	<b>General Comments</b>				Usually 3 generations: spray each generation during egg hatch period. Set trap(s) to detect each generation. Monitor degree days and/or fruit.	
	<b>Cultural methods</b>				Attach cardboard bands early May, remove late May, kill larvae/pupae. Also attach cardboard in August, remove and burn late fall. Can bag fruit and use mass trapping.	
	<b>Spinosad</b>	CAUTION	Egg hatch period(s)	2X per generation	Spray twice, one week apart during hatch periods. Kills CM larvae emerging from eggs.	
	<b>Cyd-X</b>	CAUTION	Egg hatch period(s)	2X per generation	Same as above. Virus – specific to CM only. Spray early evening.	
	Sevin (carbaryl)	CAUTION	Egg hatch period(s)	1X per generation	Kills beneficials; may increase mites. Apply during bloom may thin fruit. Use only as last resort.	
	Horticultural oil	CAUTION	Egg hatch period (s)	3X per generation	Do not use within 2 months of sulfur application (causes leaf burn). Kills CM eggs.	
<b>Spotted wing Drosophila</b> (cherries)	<b>General Comments</b>				Gnat-like fly, pierces skin to lay eggs starting at straw coloring.	
	<b>Spinosad</b>	CAUTION	Starting 3-4 weeks before harvest	Weekly	Repeated sprays and thorough coverage essential. Spinosad less effective. Malathion kills beneficial insects.	
	Malathion	WARNING				
Row Cover Over Tree (Agribon, Reemay)						
<b>Scale insects</b> (deciduous fruits and nuts)	<b>Horticulture oil</b>	CAUTION	Late dormant or crawler stage	1 X	Eggs hatch early June, crawlers move to twigs in fall. Control ants with Tanglefoot. Apply double-sided sticky tape to twigs late April, monitor weekly to detect crawler stage. Better to control in dormant season.	
	<b>Insecticidal soap</b>	WARNING	Crawler stage	1-2X		
	Neem oil	CAUTION	Crawler stage	1-2X		
<b>Calif. Red scale</b> (citrus)	<b>Horticulture oil</b>	CAUTION	Summer	1X	Oil spray directed at crawlers and immature scales.	
<b>Aphids</b> (deciduous fruits and nuts)	<b>General Comments</b>				Most serious on plums and apples. Look for natural enemies.	
	<b>Cultural Practices</b>				Tanglefoot on trunk if have ants. Avoid excess nitrogen fertilization.	
	<b>Horticulture oil</b>	CAUTION	Late Dormant	1X	Dormant application kills aphid eggs.	
	<b>Forceful water spray</b>		Spray before leaves curl in spring.	As needed	Knocks off aphids and honeydew; use early morning to allow drying.	
	<b>Pyrethrin</b>	CAUTION		Re-treat only if populations increase.		
	<b>Insecticidal soap</b>	WARNING				Do not use on water-stressed plants or when the temperature exceeds 90F.
	<b>Neem oil</b>	CAUTION				
<b>Horticulture oil</b>	CAUTION					
<b>Twospotted spider mites</b> (deciduous fruits and nuts)	<b>Cultural practices</b>				Reduce dust. Avoid broad-spectrum insecticides (especially Sevin).	
	<b>Forceful water spray</b>		Late spring and summer	As needed	Knocks off mites; spray early morning to allow drying.	
	Insecticidal soap	WARNING	Summer	1X	Treatments rarely necessary for backyard trees.	
	Horticulture oil	CAUTION	Summer	1X		