

HOME ORCHARD PEST MANAGEMENT GUIDE PREFACE

Elizabeth Little, Extension Homeowner IPM Specialist

Home Orchard Pest Management Guides suggest cultural and chemical control practices that offer a reasonable degree of protection from important fruit diseases and insect pests. Home orchardists should note that producing quality edible fruit is challenging, and that commercial quality, blemish-free fruit is often an unrealistic expectation. During the growing season, weekly monitoring of the crop and pests that may be present is important. Insecticides work best when pest levels are low. Timely application of controls helps minimize damage to fruit. In order to be effective, fungicides need to be applied before appearance of symptoms and / or just prior to and during weather conditions favorable for disease development. In most cases these are cool to mild periods with moderate to high amounts of rainfall. Pruning and removal of diseased and/or dead twigs and branches, raking and removal of leaves and debris, periodically mowing around vines, trees or bushes, and disposing of rotten and/or diseased fruit greatly improves disease and insect control. Collectively these practices are referred to as sanitation. Sanitation, in combination with choosing disease resistant cultivars and the use of chemicals as needed, is usually necessary for acceptable control of fruit diseases and insects. A few fruits can be grown successfully with good sanitation alone.

Pre-mixed home fruit or orchard spray products containing pesticides for both disease and insect control are commonly available. Home orchard pesticides are often less effective than their commercial counterparts. Using the highest label rate, and spraying more often when the weather is wet, will generally improve disease and insect control. For the sake of brevity not all brand names of pesticides are listed. Many may be found by their generic names in the Homeowner Fungicide Guide.

Always consult the label when purchasing or using pesticides. Be sure the label states the material(s) are labeled for use on your crop, whether it be apple, peach, pear, etc. Carefully follow all precautionary statements. They serve to protect you, the environment and those who consume your crop. Label restrictions are legally binding. General considerations for home orchard pesticide applicators are as follows:

- Wear goggles or other eye protection to shield yourself from spray drift;
- Wear long sleeves, long trousers and shoes;
- Remove and launder clothing worn while applying pesticides; launder these clothes separately from family laundry before reusing them;
- Always check for and follow the pre-harvest interval(s) listed on the pesticide container(s), and use the longest one; often, they are listed in days or hours in (parenthesis);
- Many pesticides, especially insecticides, are toxic to honey bees as well as other pollinators, do not spray during bloom unless the product label specifically recommends bloom sprays, and do not apply insecticides if bees are foraging on orchard weeds;
- Assume pesticides to be toxic to fish and other non-target organisms, do not apply to water or where runoff can occur;
- Store pesticides in the original container only.

HOME ORCHARD INSECT PEST MANAGEMENT GUIDE

Dan Horton, John All, and Dean Kemp, Entomology

Home orchardists face the same insect and mite pests as their commercial counterparts. Unfortunately, home orchard pest pressures are often as high, or higher, than is experienced in commercial orchards. Edge effect, a biological phenomenon wherein the abundance of organisms, in this case pests, is higher where two different habitat types meet. Edge effect is often evident in commercial orchards, where many pest species are much more common on the outside rows. In home orchards, all the trees, bushes or vines fall within the “border rows,” so pest pressure is often quite high.

Pesticide options for managing home orchard pests are modest. While there are many different trade named products on the market, there are relatively few active ingredients. The effectiveness of, and the range of pests controlled by, any trade name product is determined by its active ingredient(s) and amount of active ingredient(s) applied.

Product labels, which should be present on all pesticide containers, indicate what crops that particular trade name product may be used on. Home garden pesticide labels vary, but they will indicate where that particular product may be used. Generic crop groupings, such as trees, shrubs, lawns, vegetables or fruit, are often seen. Federal law clearly restricts use of any pesticides to the crops, or sites, listed on the package’s label. Home garden pesticides for use on fruits must specifically list fruits, or cite individual fruits such as apples, pears or peaches. These federal restrictions are based on rigorous food, applicator and environmental safety considerations, and they are legally binding.

Active ingredients vary in their effectiveness, depending on the pest. When comparing products containing the same active ingredients, product effectiveness is heavily influenced by how much active ingredient is applied. Dose, the amount of product applied, is determined by two factors, the amount applied (tablespoons, fluid ounces or ounces), and by the active ingredient’s concentration. The amount of product applied is limited by the product label. Higher dosages normally provide better control. Remember, by following the product label you are assured of using safe amounts. Sometimes products containing the same active ingredients will have varying amounts of active ingredient. To get the best control, it is important to check the label carefully, and buy the product which has the highest concentration of the active ingredient you select.

Fruit Insect & Mite Pest Overview

Fruit-attacking Insect Pests:

- Scale Insects
- Catfacing Insects
- Fruit-feeding caterpillars
- Fruit-feeding beetles

Tree, Bush & Vine–Attacking Insect Pests:

- Scale
- Borers (caterpillars such as grape root borer, dogwood borer, peachtree borer, lesser peachtree borer)
Flatheaded borers of apple, pear, blueberries
- Roundheaded borers of blackberry & raspberry
- European red mite & Two spotted spider mite

HOME ORCHARD APPLE DISEASE SPRAY GUIDE

Elizabeth Little, Extension IPM Homeowner Specialist

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Dormant	Black rot, bitter rot and white (Bot) rot survive the winter on dead wood in the tree and on the ground. Spores disseminated to apple buds in December, January, and February may infect at silver tip. Carefully prune to remove all dead wood from the tree. Disinfect pruners with 10% bleach or rubbing alcohol after each cut. Complete sanitation by removing dead wood from the ground. To control bitter rot, it is also necessary to remove all dried fruit (last year's crop) from trees and the ground. After you have done this for 2 years, you may not need the pre-pink, pink, bloom and petal fall captan sprays. Consult your county Extension agent for advice on deleting these preventive sprays if your fruit has very little disease and your sanitation is good. Scab, Brooks spot, Alternaria leaf blotch, and Necrotic leafblotch of 'Goldens' overwinter on dead leaves on the ground. Raking and composting or destroying these leaves will control or greatly aid in control of these diseases. Do this as soon after leaf fall as possible.					
Silver tip (when swollen buds first break and develop a silver color)	Black rot	Captan 50WP Thiophanate methyl	3 1/3 Tbs. See label	4 days	day of harvest	Black rot infection occurs around this time. A very important spray for this disease. Good sanitation is also important for control.
Delayed Dormant	Leaf Spot	Lime Sulfur Spray (Hi-Yield)	9.5-13 oz.			Use on Delicious Apples may result in injury. No time limitation.
	Scab	Lime Sulfur Spray (Hi-Yield)	2-2.5 oz.	see label		Use on Delicious Apples may result in injury. No time limitation.
		Bordeaux Sulfur (Fertilome)	8-9 tbsp	see label		Plant resistant varieties for best control.
		Thiophanate methyl	1 tbsp	see label		
Captan	2 tbsp	see label				
Between Silver tip and Green tip	Fire blight	copper hydroxide (Hi-Yield Copper; others) Streptomycin sulfate (Fertilome)	2 2/3 - 5 1/3 tsp 1 tbsp (makes 2.5 gal)	1 day	pre-green tip only	Kills bacteria which ooze from overwintering cankers. Crop injury may occur if applied later than 1/2 inch green tip. Important spray after a bad fire blight year. Make application as a full cover spray.
Prepink (when center buds first show pink)	Black rot Brooks spot scab	Captan 50WP Thiophanate methyl	2 Tbs. See label	4 days	day of harvest	
	Cedar apple rust	Immunox	1/2 oz.	1 day	14 days	Only use Immunox when cedar apple rust is an annual problem.
	Scab Powdery Mildew	Lime Sulfur Spray (Hi-Yield), Copper Sulfate, Wettable Sulfur, Triadimefon - powdery mildew only	2-2.5 oz. 3.2 oz. see label 1 tbsp.	1 day see label see label		Use on Delicious Apples may result in injury. No time limitation.
Pink	black rot Brooks spot scab	captan 50 WP, Thiophanate methyl	2 Tbs.	4 days	day of harvest	Fire blight develops on tender shoots and blooms when temperatures are between 65 and 80°F and it is humid and/or raining. If these conditions occur or are forecast, apply streptomycin within 24 hours before rain . Re-spray before the next rain if bee activity has occurred.
	cedar apple rust	Immunox	1/2 oz.	1 day	14 days	
	fire blight	streptomycin (Fertilome Fire Blight Spray)	1 tbsp (makes 2.5 gal)	12 hrs	50 days	Use on Delicious Apples may result in injury. No time limitation.
	Scab Powdery Mildew	Lime Sulfur Spray (Hi-Yield), Copper Sulfate, Wettable sulfur, Triadimefon - powdery mildew	2-2.5 oz. 3.2 oz. See labels			

HOME ORCHARD APPLE DISEASE SPRAY GUIDE (continued)

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Bloom	black rot scab	captan 50WP, Thiophanate methyl	2 Tbs. See label	4 days	day of harvest	<p>Conditions conducive to fire blight are listed above. Always spray streptomycin under these conditions. Spray within 24 hours before rain. Re-spray before the next rain if bee activity has occurred or every 3-4 days during the bloom period.</p> <p>Prune out all fire blight affected twigs 12 inches below the disease-killed tissue. Dip pruners in 10% chlorine bleach or rubbing alcohol and wipe between cuts. Oil pruners after use.</p> <p>Do not use Immunox more than ten times per season.</p>
	Fire blight	streptomycin (bactericide- Fertilome Fire blight Spray)	1 tbsp (makes 2.5 gal)	12 hrs	50 days	
	cedar apple rust	Immunox	½ oz. see label	1 day 1 day	14 days 7 days	
NO INSECTICIDE DURING BLOOM						
Petal fall (when most petals are off) through Covers 1, 2, and 3 (3 sprays after petal fall); spray every 7-10 days	black rot scab	captan 50WP Thiophanate methyl	2 Tbs. See label	4 days	day of harvest	Spray more frequently, when weather is wet.
	cedar apple rust	Immunox	½ oz.	1 day	14 days	<p>Only use Immunox when cedar apple rust is an annual problem.</p> <p>Several available home orchard sprays may be used for control of both diseases and insect pests.</p>
Summer cover sprays (every 14 days until 6 weeks before harvest)	bitter rot sooty blotch fly speck	Captan 50WP Thiophanate methyl	2 Tbs. See label	4 days	day of harvest	<p>Spray promptly at first sign of bitter rot. This disease spreads rapidly if left unchecked.</p> <p>Several available home orchard sprays may be used for control of both disease and insect pests.</p>
Six weeks, 4 weeks and 2 weeks before harvest	bitter rot white rot sooty blotch fly speck	Captan 50WP or sulfur	2 Tbs. see label	4 days 1 day	day of harvest day of harvest	<p>Important disease control sprays, particularly for bitter rot and white rot.</p> <p>Do not use sulfur when temperatures are expected above 90 degrees.</p> <p>Some varieties such as MacIntosh, Red Delicious, Staymen, Baldwin, King, Golden Delicious and Jonathan are sensitive to sulfur.</p>

HOME ORCHARD BLUEBERRY DISEASE SPRAY GUIDE

Elizabeth Little, Extension Homeowner IPM Specialist

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Dormant	Phomopsis twig blight	Lime sulfur (Hi-Yield Lime Sulfur Spray)	see label			Apply when bud begins to swell. Avoid excessive nitrogen fertilization. Avoid any drought stress - irrigate plants adequately. Most effective when applied before buds break dormancy.
Before bud break	<p>Sanitation, in the form of removing dead berries and debris under the bushes during the winter will reduce disease pressure from Botrytis blight and mummy berry. Compost or destroy debris. Replace with new mulch. Do not place mulch right up against the trunk of the plant. With good sanitation, and little or no history of Botrytis blight and mummy berry, there should be no need for green tip and pre-bloom sprays. If these diseases have been damaging in the past, spray every 7-10 days thru bloom.</p>					
Green tip, from the first green tissue after bud break to first bloom, spray every 7-10 days	Botrytis blight	Captan 50WP	2.5 Tbs.	4 days	day of harvest	<p>The fungi causing Botrytis blight and mummy berry overwinter in dead berries and debris under the bushes. Remove dead berries, debris, and mulch during the winter and compost or destroy it. Replace with new mulch. Do not place mulch right up against the trunk of the plant. With good sanitation and little or no history of Botrytis blight and mummy berry, there should be no need for green tip and pre-bloom sprays. If these diseases have been damaging in the past, spray every 7-10 days thru bloom.</p>
10-20% bloom and full bloom	Botrytis blight, Mummy berry, Anthracnose, & various Leaf spots	Captan 50WP	2.5 Tbs.	4 days	day of harvest	<p>DO NOT APPLY INSECTICIDES DURING BLOOM Botrytis causes flower and twig blight. Good air circulation around fruit clusters will help prevent Anthracnose. For leaf spots, apply post bloom to August/Sept at 7 to 10 day intervals. SANITATION is key for mgmt of these diseases (esp. mummy berry).</p>

HOME ORCHARD BRAMBLE SPRAY GUIDE

Elizabeth Little, Extension Homeowner IPM Specialist

Blackberries can often be grown successfully without pesticides, if you practice good sanitation, and have no wild blackberries nearby. Several important fungal and insect pests of blackberry canes overwinter on old canes that were infected the previous season. Cut and remove old canes to the ground after harvest. Do not cut with a rotary mower as pieces will become too small to remove. Cut old fruiting canes from fall-fruiting raspberry cultivars such as ‘Heritage’ in early spring before new shoots begin to develop. This method produces a single fall crop. Strawberry weevil is not a problem on fall bearing raspberry cultivars such as ‘Heritage’. A week to 10 days after cutting, plants should to be fertilized and irrigated to force new growth for next year’s crop. Plants infected with orange rust, which can be detected from green tip to early cane growth must be promptly dug up and removed or destroyed. Copper fungicides are toxic to humans and other life forms. Phytotoxicity is a problem with both copper and sulfur products. In addition, copper is a heavy metal which can accumulate in the soil. Copper and sulfur have limited effectiveness and non-chemical methods of disease management should be used before turning to the use of fungicides.

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Delayed dormant (Blackberries only)	Leaf and cane spot	copper hydroxide (Hi-Yield Copper Fungicide)		5 1/3 tsp	1-2 days (see label)	None listed Apply as delayed dormant spray after training in the spring (Make fall application after harvest.
	Anthracnose	liquid lime sulfur (Polysul, Lilly Miller Dormant Spray, or Bonide Lime Spray)		see label (6 to 12 gal/100gal water)	48 hrs	Dormant/ delayed dormant only Apply lime-sulfur at delayed dormant, but prior to 3/4-inch shoot stage to avoid leaf bum.
Green tip	Anthracnose, Leaf and cane spot	copper (Dragon Copper Fungicide, Bonide Liquid Copper)		see label	Until dry	None listed See remarks above this guide. Avoid overhead watering Labeled copper products available under several different brand names.
Orange rust attacks all brambles except for red raspberries. The fungus infects in a systemic fashion, once plants are infected they remain so for life. Infected plants are stunted and produce very little fruit. They can be identified in the early spring. Shortly after leafing out, the lower surface of infected leaves develops orange pustules that gives the disease its name. The timely removal of infected plants is most important to control this disease. Inspect plants in early spring and try to identify the pustules before the orange spores are produced. Once spores are released, they cause new infections that may not show up until the following spring. Dig up, remove and dispose of or destroy these plants. Nearby wild brambles should also be destroyed.						
When buds appear and new canes are 8-12” high	Anthracnose, Leaf and cane spot	copper (Dragon Copper Fungicide, Bonide Liquid Copper) or Liquid lime sulfur (Hi-Yield Lime Sulfur Spray)		see label 4 tsp	Until dry	None listed None listed Apply before blossoms have opened.
Pre-bloom	Anthracnose, Leaf and cane spot	copper (Dragon Copper Fungicide, Bonide Liquid Copper)		see label	Until dry	None listed Repeat at 10-14 day intervals as necessary
Bloom	Botrytis Flower Blight					Apply copper at the start of flowering and continue every 7 to 10 days until harvest.
	Powdery Mildew	copper (Bonide Liq. Copper)		0.5 to 2.0 fl. oz	see label	None listed
	Botrytis Fruit Rot					DO NOT SPRAY INSECTICIDE DURING BLOOM.

HOME ORCHARD BRAMBLE DISEASE SPRAY GUIDE (continued)

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
<p>Rosette or double blossom (<i>Cercospora rubi</i>) occurs on both blackberries and raspberries, but is most damaging to blackberries. Symptoms are unusual and markedly change the appearance of the plant. In the spring, infected buds from the previous year produce numerous leafy sprouts. This proliferation of shoots is referred to as a witch's broom. Several of these witch's brooms may occur on one cane. As flower buds open, petals are pinkish in color, wrinkled and twisted. Berries do not develop from infected blossoms, uninfected parts of the same plant produce smaller, poorer quality fruit. Sanitation to prevent this disease is similar to that of orange rust. Wild brambles should be removed from the immediate area. They can serve as sources of inoculum. Remove and destroy old fruited canes after harvest. Infected blossom clusters should be removed before they open. Where this disease is especially severe on trailing blackberries, cut off plants at the ground after fruiting. This extreme practice only works well where the growing season is long. For other brambles, cut all canes back to 12 inches immediately after harvest. Fertilize and irrigate plants to force new growth before winter.</p>						
After old canes have been removed	Anthracnose, leaf and cane spot Orange rust	copper (Dragon Copper Fungicide, Bonide Liquid Copper) *		see label	Until dry none listed	See introductory section. Labeled copper products available under several different brand names. Avoid overhead watering.

*Carbamate WDG is no longer registered by the U.S. Environmental Protection Agency for blackberries or raspberries. There are no other labeled chemicals available to control orange rust. If any become available, we will notify your county agent.

HOME ORCHARD BUNCH GRAPE DISEASE SPRAY GUIDE

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TIME OF APPLICATION	TO CONTROL	MATERIALS	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Dormant season sanitation helps reduce disease pressure. Fungal rot organism of grapes overwinter on old vines and dried fruit on the vines and ground. Vines should be pruned back to the main stem each winter, leaving only 1 vine of the previous year's growth for each wire. Fruit and leaves on the ground should be raked and composted or destroyed.						
Dormant - mid-winter	Anthracnose	liquid lime sulfur	see label	see label	see label	Do not apply lime sulfur and superior oil within 30 days of each other. Objective of lime sulfur spray at this time is to reduce fungal inoculum on canes.
	Powdery Mildew	Hi-Yield Improved Lime Sulfur Spray	2.5-6.5 fl. oz.			
Pre-bloom beginning with 1-2 inches green, apply every 7 days until bloom	Black rot	mancozeb	see label	1 day	see label	Use mancozeb if downy mildew is a problem
	Powdery mildew, downy mildew, anthracnose	or Immunox	2 oz.	1 day	14 days	Use Immunox if anthracnose is a problem. Do not make more than 6 applications of Immunox (@ 2 oz./gal) per season.
Bloom - 10% bloom and full bloom	Black rot, Powdery mildew	Captan 50WP	2 Tbs	4 days	day of harvest	DO NOT APPLY INSECTICIDE DURING BLOOM. Do not apply mancozeb within 66 days of harvest.
		or mancozeb	see label	1 day	see label	
		or Immunox	2 oz.	1 day	14 days	
DO NOT APPLY INSECTICIDES OF ANY KIND DURING BLOOM, OR INJURY TO BEES AND OTHER POLLINATORS MAY OCCUR.						
Cap fall and 1st Cover (10 days after cap fall)	Black rot, powdery mildew	Captan 50WP	2 Tbs	4 days	day of harvest	
		or Immunox	2 oz.	1 day	14 days	
	downy mildew	as needed copper hydroxide (Hi-Yield Copper Fungicide and others)	see label	1 day	see label	Foliage injury may occur on copper sensitive varieties such as Concord, Delaware, Niagara and Rosettes. Test for sensitivity.
Summer cover sprays every 14 days until 14 days before harvest	black rot powdery mildew	Captan 50WP	2 Tbs	4 days	day of harvest	Do not make more than 6 applications of Immunox (@ 2 oz./gal) per season.
		or Immunox	2 oz.	1 day	14 days	
Preharvest (7 days before harvest)	Black rot	Captan 50WP	2 Tbs	4 days	day of harvest	

HOME ORCHARD MUSCADINE GRAPE DISEASE SPRAY GUIDE

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Muscadine grapes may yield satisfactorily without the aid of pesticides. It is advisable to watch and treat as-needed for angular leaf spot and for insect pests. Angular leaf spot is most damaging in July or early August. Uncontrolled angular leaf spot often can result in almost complete defoliation which terminates further fruit development. When wet weather favors disease cover sprays from bloom to harvest will sometimes be needed to prevent severe losses from ripe rot, Macrophoma rot and bitter rot. Dormant season sanitation will reduce disease pressure. Most diseases overwinter on dead leaves and fruit on the vine and the ground. Removing this material usually will benefit or give sufficient disease control.

TIME OF APPLICATION	TO CONTROL	CHEMICAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
DORMANT						
Dormant season sanitation helps reduce disease pressure. Fungal rot organism of grapes overwinter on old vines and dried fruit on the vines and ground. Vines should be pruned back to the main stem each winter, leaving only 1 vine of the previous year's growth for each wire. Fruit and leaves on the ground should be raked and composted or destroyed.						
PRE-BLOOM						
Every 14 days from Bud Break until Bloom	Black Rot Bitter Rot Angular leaf spot Powdery mildew	mancozeb or captan 50WP or Immunox (myclobutanil) or ferbam or Copper Hydroxide (Hi-Yield)	2 Tbs 3 Tbs 2 oz see label 1 3/4 tsp	1 day 4 days 1 day see label until dry	4 days day of harvest 14 days 7 days not listed	BLACK ROT susceptible varieties should be sprayed with fungicide every 14 days from the start of new growth until after bloom. This disease develops on the fruit during and just after bloom. Where ripe rot is a problem, use Captan 50WP. Do not make more than 6 applications of Immunox (@ 2 oz./gal) per season. DO NOT SPRAY INSECTICIDE DURING BLOOM.
Bloom	Black Rot Bitter Rot Angular leaf spot Powdery mildew	mancozeb or captan 50WP or Immunox (myclobutanil) or ferbam	2 Tbs 3 Tbs 2 oz see label	1 day 4 days 1 day see label	4 days day of harvest 14 days 7 days	BLACK ROT susceptible varieties should be sprayed with fungicide every 14 days from the start of new growth until after bloom. This disease develops on the fruit during and just after bloom. Where ripe rot is a problem, use Captan 50WP. Do not make more than 6 applications of Immunox (@ 2 oz./gal) per season.
DO NOT APPLY INSECTICIDES OF ANY SORT DURING BLOOM OR INJURY TO BEES AND OTHER POLLINATORS MAY OCCUR.						
COVER SPRAYS						
Cap fall, First Cover and every 14 days from second cover until 6 to 8 weeks before harvest	Black rot, ripe rot Macrophoma rot	Captan 50WP or Immunox	3 tbs 2 oz	4 days 1 day	0 days 14 days	Captan may cause mild phytotoxicity to fruit if applied when conditions are cool and wet.
PREHARVEST SPRAYS						
Every 10 to 14 days during the last 6-8 weeks before harvest (Start July 1 on the Coastal Plain and July 10-14 in Middle Georgia)	Bitter Rot Macrophoma Rot Ripe Rot Angular Leaf spot	Captan 50WP or fruit tree spray	3 Tbs see label	4 days see label	day of harvest see label	Captan may be applied up to day of harvest. Most home fruit sprays require a 14 day preharvest interval for grapes. Check the individual product label.

HOME ORCHARD PEACH, NECTARINE AND PLUM DISEASE SPRAY GUIDE

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TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Dormant sprays - Leaf drop until early bud swell	Bacterial spot, Leaf curl	copper hydroxide (Hi-Yield Copper Fungicide, Polysul Summer and Dormant Spray)	2 2/3 tsp	Until dry	21 days	Bacterial spot - chemical control is difficult - dormant sprays - are somewhat effective against fall infections. Apply copper hydroxide fungicide when leaves just begin to shed. Do not apply copper hydroxide with oil. Leaf curl - once symptoms become visible, control is impossible.
	Leaf curl Shot hole Scab	Ortho Garden Disease Control (Daconil 2787) or Bordeaux mixture or Lime Sulfur Spray (Hi-Yield & others)	see label 3/4 Tbs 12.5 - 15 gal	see label 2 days see label	Do not apply after petal fall Dormant spray only Dormant spray only	Preventative leaf curl sprays at this time are for cooler areas of the state where leaf curl occurs (primarily upper piedmont and mountains). Liquid lime sulfur can be combined with one of the oil sprays listed below. Ortho Daconil 2787 and copper hydroxide cannot. If leaf curl has been severe, a fungicide application should also be made after leaf drop in the fall.
		Copper Hydroxide (Hi-Yield & others)	2 2/3 - 5 1/3 tsp	Until dry	Apply at leaf fall	
Pink to 5% bloom	Bacterial spot	copper hydroxide (Hi-Yield & others)	2 2/3 tsp	2 days	21 days	Cooper rate reductions are tied to crop development, rates must be reduced as the season progresses. Note rates at various stages.
	Brown Rot Shot Hole Scab Jacket rot	copper hydroxide (Hi-Yield & others) or Lime Sulfur or Captan	2 2/3 - 4 tsp 4 tsp 2 tsp	until dry see label	see label see label	Full cover spray at pink bud. apply 3 to 5 times weekly before harvest repeat at 7 to 10 day intervals as needed to maintain cover
Bloom	Blossom blight (early season phase of brown rot - blossoms turn brown and die)	Ortho Daconil 2787 or captan 50WP	3/4 tsp 2 Tbs	2 days 4 days	Do not apply after shuck split day of harvest	This a very important spray for suppression of pre-harvest brown rot. Make this preventative application every year.
	Scab	liquid lime sulfur (Hi-Yield) or Immunox	see label 1/2 oz	see label 1 day	Do not apply after petal fall day of harvest	Do not make more than 6 appli- cations of Immunox (@ 2 oz./gal) per season.
DO NOT USE INSECTICIDE DURING BLOOM.						

HOME ORCHARD PEACH, NECTARINE AND PLUM DISEASE SPRAY GUIDE (continued)

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Petal fall (when most of the petals have fallen) through Cover Sprays 1, 2 and 3 apply every 7 to 10 days	Bacterial spot	copper hydroxide (Hi-Yield Cooper Fungicide)	see label	2 days	21 days	Use caution if coppers are used post-bloom. The recommended rate reductions lessen, but do not eliminate phytotoxicity.
	Brown rot Scab	Ortho Daconil 2787	3/4 tsp	2 days	shuck split only	Avoid use of sulfur when temperatures are above 90/F.
		or captan 50WP	2 Tbs	4 days	day of harvest	
		or sulfur	see label	1 day	day of harvest	
	or Immunox	½ oz	1 day	day of harvest		
Summer cover sprays (every 14-21 days until mid-June)	Scab Brown rot	Captan 50WP	2 Tbs	4 days	day of harvest	Do not use Ortho Home Orchard Spray within 21 days of harvest.
		or sulfur	see label	1 day	day of harvest	
	or Immunox	½ oz	1 day	day of harvest		
	Powdery Mildew	Lime Sulfur Spray (Hi-Yield)	0.5 fl. oz.			
Pre-harvest Disease Spray - 2 weeks and 1 week before harvest for each variety	Brown rot	Captan 50WP	2 Tbs	4 days	day of harvest	Avoid use of sulfur when temperatures are above 90/F.
		or sulfur	see label	1 day	day of harvest	
		Lime Sulfur Spray (Hi-Yield)	4 tsps.			Apply 3 to 5 times at weekly intervals before harvest.

HOME ORCHARD PEAR DISEASE SPRAY GUIDE

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TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Dormant - before buds begin to swell	fire blight	Bordeaux mixture	8 Tbs. copper sulfate plus 8 Tbs. hydrated lime	see label	dormant spray only	DO NOT APPLY AFTER GREEN IS SHOWING. Several leaf spot fungi overwinter on cankers on diseased or dead twigs and on leaves on the ground. Pruning and removing diseased wood and raking, composting or destroying these leaves each fall will aid in disease control.
Green cluster bud	Scab	or if needed Ortho Home Orchard Spray or Hi-Yield Improved Lime Sulfur Spray	5 Tbs 4-6 tsp	12 hrs	7 days	If scab has been a problem use Ortho Home Orchard Spray (same as white bud) instead of malathion. Scab spores are at their highest number just after this spray.
White bud (Popcorn)	fire blight	streptomycin sulfate or copper hydroxide (Hi-Yield Copper Fungicide and others)	100 parts per million - see table below see label	12 hrs 1 day	30 days see label	Apply streptomycin just before the earliest blooms open, and every 3-4 days thru petal fall for fireblight. Fire blight starts only when the trees are blooming, temperatures are between 65 and 80°F, and it is very humid or raining. If these conditions occur, streptomycin needs to be applied within 24 hours before the rain. Do not re-apply until there has been a period of bee activity and another rain occurs. Prune out all fire blight affected twigs 12 inches below the disease-killed tissue. Dip pruners in 10% chlorine bleach or rubbing alcohol between cuts. Oil pruners after use.
Bloom - every 5 days	Fire blight	streptomycin sulfate (Fertilome Fire blight) or copper hydroxide (Hi-Yield Copper Fungicide and others)	100 parts per million - see table below. see label	12 hrs 1 day	30 days see label	DO NOT APPLY INSECTICIDE DURING BLOOM. Apply streptomycin every 5-7 days when weather is favorable for fire blight (see above).
Petal fall - when most of the petals are off and again 10-14 days after petal fall	Scab fungal leaf spots	Ortho Home Orchard Spray	5 Tbs.	12 hrs	7 days	Avoid use of sulfur when temperatures are above 90/F. D'Anjou pears are sensitive to sulfur.
When first leaves have completely unfolded	Scab bitter rot fungal leaf spots	Ortho Home Orchard Spray	5 Tbs.	12 hrs	7 days	Ortho Home Orchard Spray contains captan (a fungicide) and malathion and methoxychlor (insecticides).
Preharvest 28 days and 14 days pre-harvest	Scab Bitter rot	Ortho Home Orchard Spray	5 Tbs	12 hrs	7 days	

ANTIBIOTIC FORMULATIONS FOR A 100 PPM SOLUTION

MATERIAL	TSP./GAL.	OZS./100 GALS.
Agrimycin 17, 21.3% streptomycin sulfate	3/4 tsp.	8 ozs.
Agrirestrep, 21.2% streptomycin sulfate	3/4 tsp.	8 ozs.
Ortho Streptomycin, 21% streptomycin sulfate	3/4 tsp.	8 ozs.

HOMEOWNER STRAWBERRY DISEASE CONTROL

Elizabeth Little, Extension Homeowner IPM Specialist

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Dormant season sanitation will reduce disease pressure most years. Strawberry leaf spots and Botrytis blight overwinter on old leaves and debris on the bed. Clipping old leaves, raking, and composting or destroying greatly aids in disease control.						
New growth, begin as soon as new growth starts, and every 10-14 days until just before bloom.	Leaf spots Anthracnose Botrytis blight (Gray mold)	Captan 50WP	2 Tbs	1 day	day of harvest	During periods of frequent rainfall, sprays at 7-10 day intervals may be necessary. Do not use more than 48 lbs of Captan per acre per crop.
10% bloom	Leaf spots, Botrytis blight and other fruit rots	Captan 50WP	2 Tbs	1 day	day of harvest	DO NOT APPLY INSECTICIDES DURING BLOOM. Critical time for Botrytis (Gray mold) control begins here.
Full bloom	Leaf spots, Botrytis blight and other fruit rots	Captan 50WP	2 Tbs	1 day	day of harvest	DO NOT APPLY INSECTICIDES DURING BLOOM.
Every 10-14 days from bloom until harvest.	Leaf spots, Botrytis blight and other fruit rots	Captan 50WP	2 Tbs	1 day	day of harvest	Under severe gray mold conditions, apply immediately after each picking through harvest. During periods of frequent rainfall, sprays at 7-10 day intervals or less may be necessary.

HOME FRUIT INSECTICIDE EFFECTIVENESS CHART

Dan Horton, John All, and Dean Kemp, Entomology

This list is not comprehensive. It offers pest-specific performance ratings which have been derived from in-orchard trials and observations in commercial fruit.

Insecticidal Active Ingredient	Product Name	Bugs/Mite Ratings ? = unknown, 0 = no control, 1 = poor, 2 = fair, 3 = good, 4 = excellent							
		Internal Fruit-Feeding Caterpillars (codling moth/oriental fruit moth, etc.)	Internal Fruit-Feeding Beetles (plum curculio/strawberry weevil, etc.)	Plant bug/Stink bug	Leaf feeding Caterpillars	Leaf feeding Beetles	Mites	Scales	Borers
PYRETHROIDS									
esfenvalerate	Ortho Bug-B-Gon MAX Garden & Landscape Insect Killer	4	3	3	4	3	0	0	3
esfenvalerate	Ortho Bug-B-Gon Multi-Purpose Insect Killer Ready-To-Use	4	3	3	4	3	0	0	3
gamma- cy-halothrin	Spectracide Triazicide Once & Done! Insect Killer 2 Conc. For Lawn	3	3	3	4	3	0	0	3
bifenthrin	Ortho Bug-B-Gon MAX Lawn & Garden Insect Killer 1	4	3	3	4	3	2	0	4
permethrin	Bayer Advanced Complete Insect Dust for Gardens	3	2	3	4	3	0	0	3
permethrin	Bonide Borer-Miner Killer	3	2	3	4	3	0	0	3
permethrin	Bonide Eight Vegetable, Fruit & Flower	3	2	3	4	3	0	0	3
permethrin	Green Light Borer Killer	3	2	3	4	3	0	0	3
permethrin	Green Light Conquest Insecticide Concentrate	3	2	3	4	3	0	0	3
permethrin	Ortho Ant-B-Gon Dust	3	2	3	4	3	0	0	3
permethrin	Ortho Bug-B-Gon MAX Garden Insect Dust	3	2	3	4	3	0	0	3
permethrin	Ortho Bug-B-Gon Multi-Purpose Garden Dust 1	3	2	3	4	3	0	0	3
permethrin	Spectracide Bug Stop for Gardens	3	2	3	4	3	0	0	3
permethrin	Total Kill Lawn & Garden Insect Killer Concentrate	3	2	3	4	3	0	0	3
ORGANOPHOSPHATES									
malathion	Spectracide Malathion Insect Spray	2	2	2	2	3	2	2	1

HOME FRUIT INSECTICIDE EFFECTIVENESS CHART (continued)

		Bugs/Mite Ratings ? = unknown, 0 = no control, 1 = poor, 2 = fair, 3 = good, 4 = excellent							
Insecticidal Active Ingredient	Product Name	Internal Fruit-Feeding Caterpillars (codling moth/oriental fruit moth, etc.)	Internal Fruit-Feeding Beetles (plum curculio/strawberry weevil, etc.)	Plant bug/Stink bug	Leaf feeding Caterpillars	Leaf feeding Beetles	Mites	Scales	Borers
ORGANOPHOSPHATES (continued)									
captan + malathion + carbaryl	Bonide Fruit Tree Spray	3	3	2	3	3	1	1	1
captan + malathion + carbaryl	Bonide Insecticide-Miticide Fungicide	3	3	2	3	3	1	1	1
Carbamates									
carbaryl	Bayer Advanced Complete Insect Killer for Gardens R-T-U	2	2	2	2	3	1	1	1
carbaryl	GardenTech Sevin Bug Killer	2	2	2	2	3	1	1	1
carbaryl	GardenTech Sevin-5 Dust	2	2	2	2	3	1	1	1
captan + malathion + carbaryl	Bonide Fruit Tree Spray	3	3	2	3	3	1	1	1
captan + malathion + carbaryl	Bonide Insecticide-Miticide Fungicide	3	3	2	3	3	1	1	1
OILS									
horticultural oil	Ortho Volck Oil Spray	0	0	1	1	1	2	4	0
refined horticultural oil	SunSpray Ultra-Fine Pest Oil	0	0	1	1	1	2	2	0
SOAPS									
insecticidal soap + pyrethrin	Safer Tomato & Vegetable Insect Killer II	1	1	1	1	1	1	1	0
potassium salts of fatty acids	Safer Insect Killing Soap	1	1	1	1	1	1	1	0
NATURAL PRODUCT DERIVATIVES									
chemical from chrysanthemum flowers	Pyrethrin products	0	0	2	3	2	0	0	0
diatomaceous earth	Safer Ant & Crawling Insect Killer	0	0	2	2	2	1	1	0
diatomaceous earth	Diatomaceous earth	0	0	2	2	2	1	1	0
kaolin clay	Gardens Alive Surround at Home Crop Protectant	2	2	2	2	2	0	1	0
leaf extracts from the neem tree	Azadirachtin	0	0	1	2	0	0	1	0
neem + pyrethrin	Green Light Rose Defense II	0	0	2	1	2	0	1	0
neem oil	Green Light Rose Defense	0	0	1	2	2	0	1	0

HOME FRUIT INSECTICIDE EFFECTIVENESS CHART

		Bugs/Mite Ratings ? = unknown, 0 = no control, 1 = poor, 2 = fair, 3 = good, 4 = excellent							
Insecticidal Active Ingredient	Product Name	Internal Fruit-Feeding Caterpillars (codling moth/oriental fruit moth, etc.)	Internal Fruit-Feeding Beetles (plum curculio/strawberry weevil, etc.)	Plant bug/Stink bug	Leaf feeding Caterpillars	Leaf feeding Beetles	Mites	Scales	Borers
NATURAL PRODUCT DERIVATIVES (continued)									
oil extracted from neem tree nuts	Neem	0	0	1	2	2	0	1	0
pyrethrin	Schultz Houseplant & Garden Insect Spray	0	0	2	1	1	0	1	0
pyrethrins + canola oil	Garden Safe House Plant & Garden Insect Spray	0	0	2	1	1	0	1	0
pyrethrins + piperonyl butoxide	Spectracide Garden Insect Killer R-T-U	0	0	2	1	1	0	1	0
pyrethrins + piperonyl butoxide + hydrophdic extract of neem oil	Green Light Fruit Tree Spray	0	0	2	1	1	0	1	0
sesame oil	Organocide Organic Insecticide & Fungicide	0	0	0	?	1	1	1	0
spinosad	Ferti-Lome 'Come and Get It' Fire Ant Killer	2	0	0	4	0	0	0	0
spinosad	Ferti-Lome Borer, Bagworm, Leafminer & Tent Caterpillar Spray	2	0	0	4	0	0	0	0
spinosad	Gardens Alive Bulls Eye Bioinsecticide	2	0	0	4	0	0	0	0
BIOLOGICALS									
<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>	Green Light BT Worm Killer	2	0	0	4	0	0	0	0
Steinernema riobrave nematodes	Biovector (available online from Becker Underwood)		Effective on in ground life stages of plum curculio if soil is kept moist						
Steinernema carpocapsae nematodes	available online as: Millennium (Becker Underwood) NemaAttack (Arbico Organics) Capsanem (Koppert Biological Systems) SE Insectaries, Perry, GA 478-988-9412								effective on in-ground stages of peach tree borer if soil is kept moist