2002

Disease and Insect IPM in the Home Orchard

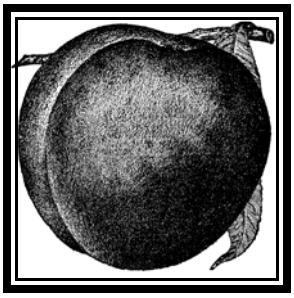

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Table of Contents

Managing Diseases and Insects in the Home Orchard 3

- Plant Selection and Resistant Varieties 3
- Pest Identification 3
- Mechanical Control 3
- Biological Control 3
- Chemical Control 4
- Cultural Controls 5
- General Notes 5

Home Orchard Apple IPM Guide 6

Home Orchard Blueberry IPM Guide 9

Home Orchard Bramble IPM Guide 10

Home Orchard Bunch Grape IPM Guide 12

Home Orchard Muscadine IPM Guide 14

Home Orchard Peach, Plum and Nectarine IPM Guide 16

Stages of Bud Development: Plum & Peach 18

Home Orchard Pear IPM Guide 19

Home Orchard Strawberry IPM Guide 21

Pesticide Precautions 22

2002 Disease and Insect IPM in the Home Orchard

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Managing Diseases and Insects in the Home Orchard

Backyard fruit production can be an enjoyable and rewarding hobby, but you may be disappointed unless you take steps to manage disease and insect pests. The following Home Orchard Pest Management Guides offer suggestions and guidance on cultural and chemical control practices that provide an acceptable degree of protection from the most common pests. Managing disease, insect and weed pests of fruit is best accomplished by carefully monitoring and implementing appropriate controls in a timely manner. A sound integrated pest management (IPM) program is necessary to control pests and to consistently produce quality fruit. Pest resistant varieties are rare in fruit culture, but properly sited and cared-for plants are healthier and more tolerant of pests. Basic components of an IPM program include proper cultural care, pest identification, mechanical and cultural control (pruning, weeding, sanitation), biological control (optimizing the impact of beneficial organisms) and chemical control (pesticides).

If you are willing to accept a reduction in fruit yield and/or cosmetic quality, some fruit crops can be grown successfully without spraying **if** good growing techniques and sanitation are practiced. Fruits that may be grown in this manner have a statement to that effect in front of the spray schedule.

Plant Selection and Resistant Varieties (Host Plant Resistance)

When selecting new plants, choose adapted varieties and the most resistant varieties available. The publications **Southeastern Home Fruit Pest Management and Culture** and the **Home Garden Fruit Horticulture Bulletins,** available at your county extension office, provide a list of well-adapted, resistant varieties for most fruit crops grown in Georgia.

Pest Identification

Weeds, rodents and some other wildlife, harmful insects and mites and disease organisms such as fungi, bacteria and viruses are examples of organisms that can reach damaging levels in the home orchard. It is essential to identify the organism accurately before implementing control strategies. Proper identification prevents waste of time and money caused by using the wrong material to control a pest and also prevents exposure of the environment to excess pesticide. Control strategies for disease organisms are primarily preventive — take control measures when conditions promoting disease are present but before symptoms of disease are evident. An example of this is fungicide cover sprays used from after bloom to harvest to prevent bitter rot of apple. Control strategies for weed and insect problems, however, are more reactive and are often taken after a pest problem has been detected, unless a chronic seasonal pest problem gives you cause to treat preventively. An example is an oil spray used while apple trees are dormant to prevent resurgence of scale, mite and aphid populations.

Mechanical Control

Mechanical controls include using mulches or cover crops to reduce weed invasion, pruning out diseased or insect-infested branches, applying burlap or sticky material to tree trunks to trap crawling insects, thinning to improve air circulation through plants, and hand-picking pest insects or diseased fruit and foliage (when practical).

Biological Control

Many naturally-occurring organisms in your orchard help you control diseases and insect pests. These are referred to as *beneficial organisms* or *natural enemies*. A number of fungi and viruses infect pest insects and mites. Insect predators like lady beetles and praying mantids feed on aphids and other destructive insects. Many wasps and flies parasitize pest insects. Their young develop in or on other insects, killing them in the process. Encourage the activities of beneficial organisms in the orchard by providing sheltering habitats such as strips of cover crops or ground covers, perennial flower beds for nectar- and pollen-feeders, temporary water sources and rocks where predatory beetles can hide. Beneficial fungi, mites and insects

also are available commercially through catalogues or garden centers. Naturally-occurring populations of these organisms can be increased, typically only temporarily, by releasing purchased beneficials.

Incorporating natural enemies into your pest control program will be more effective if you are selective in your choice of chemical pesticides and cultural control techniques. Whenever possible, choose pesticides specific to your pest problem. For example, different formulations of the bacterium, *Bacillus thuringiensis* (B.t.), specifically target early instar caterpillars, beetles, or flies and won't harm beneficials. The use of B.t. is also an example of biological control. Insecticidal soaps are "soft" contact insecticides that tend to harm fewer beneficials than many chemical pesticides.

Chemical Control

Home orchard pesticide products frequently use the same or related materials that commercial growers use. From a practical standpoint, concentration is the most important difference between these formulations. The more dilute products offer the applicator an additional measure of safety. Follow recommended spray rates, intervals and application methods. The presence of white residue on foliage and fruit does not always ensure retention of an effective residual of pesticide(s).

Always read pesticide product labels carefully before purchasing or using them. Be certain the label indicates the material(s) are cleared for use on your crop. Carefully follow all precautionary statements. They protect you, the environment and those who consume your crop. They are legally binding. Generic safety considerations for home orchard pesticide applicators follow:

- Wear goggles or other eye protection to shield yourself from spray drift.
- Wear long sleeves, long trousers and shoes.
- Remove and launder clothing worn when applying pesticides. Launder these clothes separately before reusing them.
- Always check for and follow the pre-harvest interval(s) listed on the pesticide label(s) and use the longest one. Usually they are listed in days or hours. Do not harvest or consume fruit until after the pre-harvest interval has expired.
- Many pesticides, especially insecticides, are toxic to honey bees and 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 run-off can occur.
- Store pesticides in original containers only.

Home orchardists often find pre-mixed **"home orchard fruit sprays"** to be the most available and practical pesticide options. They are convenient formulations that eliminate much of the measuring and mixing associated with developing tank mixes from individual pesticides. However, these products reduce the applicator's ability to adjust rates up or down as pest pressures change. If pests are present, especially when the weather is wet, spray pre-mixed products sooner, as few as 7 to 10 days between sprays. If conditions are dry and no pests or injury are found, spray intervals often may be extended from the standard 14-day interval to 18 or 21 days. **Home fruit spray products are good general combinations, but they do not control outbreaks of mites or other occasional but potentially damaging pests.** If you use a ready-mixed home fruit pesticide mixture, follow the manufacturer's recommendations and apply at the recommended rate stated on the label. Best results are achieved when the product used is recommended and labeled for the pest you need to control. Home fruit sprays are listed in this guide where appropriate. Whether you use a ready-mixed, general purpose spray or homemade mixture, timing and thoroughness of spray coverage are extremely important.

Tips for a Good Spray Program

1. DO NOT use herbicides (weed killers) in sprayers to be used for fungicides and insecticides.
2. Apply dormant and delayed dormant oil sprays only when the temperature is expected to be above 40 degrees F and below 85 degrees F for 24 hours.
3. Stir the spray mixture or shake the sprayer often while spraying so the chemicals will not settle out.
4. Spray before rains for disease control. Diseases develop in as few as six to eight hours when plants are wet.
5. Mix fresh spray for each application. Add spray materials to a little water in a clean container and smooth out all lumps before pouring the material into the sprayer. Strain the spray mixture through a screen when filling the sprayer to help prevent nozzle clogging. Always use clean water.
6. Prune trees so you can reach all parts with your home orchard sprayer. Large trees are difficult to spray thoroughly and you will need an extension

rod to get proper spray coverage. It is unsafe to spray fruit tree while using a ladder.

7. Spray carefully and thoroughly to cover all parts of flowers, leaves and fruits. Spray until a noticeable amount drips from the tree. Cover both upper and lower leaf surfaces. The following table gives the approximate amount of spray solution or mixture needed for various sizes of fruit trees in full leaf

Height (feet)	**Spread** (feet)	**Gallons to Apply**
5-8	3-6	$^1/_2$-1
8-12	6-9	1-3

8. Dispose of surplus pesticides and containers in accordance with label instructions so contamination of water and other hazards will not result.
9. Wash out the sprayer as soon as you stop spraying. Do not wait until the next day. A 24-hour delay in cleaning may cause a clogged sprayer.

Cultural Controls

1. Proper site selection and planting. A healthy plant is the best defense against disease and pest insect problems. For purposes of this publication, we assume the orchard site was selected for maximum benefit of your plants, that the soil is tested each season and recommended amendments made prior to planting, and that the soil was well-tilled and your trees/vines/shrubs were planted properly. Your county extension agent can provide advice and information on these topics.

2. Irrigation and plant nutrition. Extremes in soil moisture and fertility will stress plants, making them more susceptible to attack by disease-causing organisms and pest insects. Seasonal soil testing and extension publications will guide you in managing soil fertility. Your county extension agent can teach you how to properly sample your orchard soil and submit a sample for analysis. Learn the water requirements for your fruit crop(s) and try to avoid extreme fluctuations in soil moisture. Don't forget that, although the plants may be dormant during the late fall and winter, they still need water during dry periods.

3. Sanitation. Prune out and destroy all dead and diseased branches in all fruit trees. Prune to maintain a very open tree that dries quickly and is easy to spray. It is difficult to get adequate insect and disease control with a hand sprayer on trees more than 10 feet tall and 8 feet across. Use light summer pruning to open up trees. Improper pruning cuts leave trees open to pest invasion. Publications on proper pruning techniques are available in your county extension office.

Dried berries, fruit, leaves and other refuse should be turned under the soil or raked up, composted or destroyed during the year and during a fall clean-up. Plant debris and weeds provide shelter during the growing season and an overwintering habitat for pathogenic organisms and pest insects. In spring after the risk of frost is past, thin to improve fruit size. During the growing season, selectively remove and destroy fruit that has disease or insect injury. Remove and destroy fruit that drops to the ground. Timely cultivation can be an important part of the sanitation program for control of diseases and insects on all fruit. Control weeds throughout the spring and summer to make spraying easier, to provide good air circulation and to reduce competition for nutrients and water.

General Notes

Mites

Mites are sometimes quite damaging to fruit crops. These tiny, eight-legged, spider-like creatures rasp the leaf surface and wound the leaves. This releases plant juices for the mites to feed on. Mites are capable of explosive population growth. Their feeding weakens fruit trees, often reducing fruit size and the return bloom for the next year's crop. Mite-damaged leaves may be bronzed, stippled or off-colored. Apples, pears and plums are especially sensitive to mite damage. To help reduce mite problems, treat most home tree fruit orchards two times every year before bud break with 2 percent oil treatments. Make a dormant oil treatment and a delayed dormant oil treatment. As needed, in-season applications of 1-2 percent highly refined summer oils such as Sunspray will control mites. Pay close attention to label precautions as phytotoxicity (bum) can occur from in-season application of even summer oils.

Pollination: Don't Use Insecticides When Blossoms Are Present

Honey bees and/or other pollinating insects must visit blossoms for fruit to develop on most orchard plants. Insecticides applied when the plants are in bloom will kill these helpful insects, resulting in little or no fruit. Fungicides may be applied during bloom when they are recommended, but not insecticides.

HOME ORCHARD APPLE IPM GUIDE

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Dormant (before buds begin to swell)	scale mites aphids	70-sec Superior Oil	3 oz.	12 hrs	pre-bloom use only	This is a very important spray. Spray entire tree to run off, use at least $^1/_2$ gal. finished spray per tree. Do not apply after $^1/_4$ inch green tip.
Mow the orchard area shortly before apple buds break. This lowers plant bug numbers and improves control. 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. Disinfest 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	3 1/3 Tbs.	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.
Between Silver tip and Green tip	fire blight	copper hydroxide (Kocide 101, Hi-Yield Copper Fungicide, KOP-Hydroxide)	see label	1 day	pre-green tip only	Kills bacteria which ooze from over wintering cankers. Crop injury may occur if applied later than 1/2 inch green tip. Important spray after a bad fire blight year.
Delayed dormant (when 1/4 inch of green is showing)	scale mites aphids	70-sec Superior Oil plus Malathion 57EC* or Ortho Home Orchard Spray (malathion 7%, methoxychlor 15%, captan 14.7%)	3 oz. 2 tsp. 12 ozs.	12 hrs 12 hrs 12 hrs	pre-bloom only 3 days 7 days	This is a very important spray for scale, mites and aphids.
Prepink (when center buds first show pink)	black rot Brooks spot scab cedar apple rust	Captan 50WP plus Immunox or ferbam plus	2 Tbs. 1/2 oz. see label	4 days 1 day 1 day	day of harvest 14 days 7 days	Only use Immunox or ferbam when cedar apple rust is an annual problem.
	plant bugs green fruitworm	Ortho Home Orchard Spray (malathion 7%, methoxychlor 15%, captan 14.7%)	12 ozs.	12 hrs	7 days	An important plant bug and aphid spray. **Ortho Home Orchard Spray** contains captan, malathion and methoxychlor and may be used for control of both disease (except for cedar apple rust) and insect pests.

HOME ORCHARD APPLE IPM GUIDE (continued)

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Pink	black rot Brooks spot scab	Captan 50 WP plus	2 Tbs.	4 days	day of harvest	Fire blight develops on tender shoots and blooms when temperatures are between 65 and 80^{0}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 or	1/2 oz.	1 day	14 days	
		ferbam	see label	1 day	7 days	
	fire blight	streptomycin	see label	12 hrs	50 days	
Bloom	black rot scab	Captan 50WP plus	2 Tbs.	4 days	day of harvest	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.
	Fire blight	streptomycin (bactericide)	see label	12 hrs	50 days	
	cedar apple rust	Immunox or	½ oz.	1 day	14 days	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. Do not use Immunox more than 10 times per season.
		ferbam	see label	1 day	7 days	
		NO INSECTICIDE DURING BLOOM				
Petal fall (when most petals are off) through Covers 1, 2, and 3; spray every 7-10 days (3 sprays after petal fall)	black rot scab	Captan 50WP plus	2 Tbs.	4 days	day of harvest	Spray more frequently if weather is wet. Ortho Home Orchard Spray may also be used.
	cedar apple rust	Immunox or	½ oz.	1 day	14 days	Only use Immunox or ferbam when cedar apple rust is an annual problem.
		ferbam	see label	1 day	7 days	
	black rot scab codling moth plant bugs leafrollers plum curculio	Ortho Home Orchard Spray (malathion 7%, methoxychlor 15%, captan 14.7%) plus if needed	1.2 oz.	12 hrs	7 days	Critically important sprays for plum curculio and codling moth. Also helps suppress leafrollers for the remainder of the season. **Ortho Home Orchard Spray** contains captan, malathion and methoxychlor and may be used for control of both disease (except for cedar apple rust) and insect pests.
	mites	Safer's Insecticidal Concentrate (soap) or	3 fl. oz.	0 hrs	0 days	**Treat for more than 3 mites per leaf** or when mites and bronzing are present. Apply two times at 7 day intervals. Do not make more than 2 applications of Kelthane per season.
		Kelthane spider mite spray	1½ tsp.	1 day	7 days	

HOME ORCHARD APPLE IPM GUIDE (continued)

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Summer cover sprays (every 14 days until 6 weeks before harvest)	bitter rot sooty blotch fly speck	Captan 50WP	2 Tbs.	4 days	day of harvest 7 days	May elect to scout for insects and diseases during this period. Examine at least 25 apples on each tree weekly and spray if fresh insect injury or early disease symptoms are noted. Spray promptly at first sign of bitter rot. This disease spreads rapidly if left unchecked. Ortho Home Orchard Spray may be used for control of both disease and insect pests. Treat for more than 5-10 mites per leaf or when mites and bronzing are present. Apply two times at 7 day intervals. Do not make more than 2 applications of Kelthane per season. Do not apply oil to drought stressed trees.
	bitter rot sooty blotch fly speck codling moth leafrollers	Ortho Home Orchard Spray (malathion 7%, methoxychlor 15%, captan 14.7%)	1.2 oz.	12 hrs		
		plus as needed				
	mites	Safer's Insecticidal Concentrate (Soap)	3 fl. oz.	0 hrs	0 days	
		or				
		Kelthane spider mite spray	1½ tsp.	12 hrs	7 days	
		or				
		Sunspray Ultrafine Spray oil	see label	12 hrs	day of harvest	
Six weeks, 4 weeks and 2 weeks before harvest	bitter rot white rot sooty blotch fly speck	Captan 50WP	2 Tbs.	4 days	day of harvest	Important disease control sprays, particularly for bitter rot and white rot. Do not apply Benlate within **14 days of harvest**. Do not use sulfur when temperatures are expected above 90 degrees. Some varieties such MacIntosh, Red Delicious, Staymen, Baldwin, King, Golden Delicious and Jonathan are sensitive to sulfur. Do not apply malathion plus methoxychlor mix or Ortho Home Orchard Spray within **7 days of harvest.** Do not apply **Imidan within 7 days of harvest.** Do not apply **Sevin within 1 day of harvest.** Do not apply **malathion within 3 days of harvest.**
		or				
		sulfur	see label	1 day	day of harvest	
		plus				
		Benlate 50WP	1 Tbs.	1 day	14 days	
		plus				
	codling moth leafrollers	malathion 0.57EC	2 tsp.	12 hrs	3 days	

*Malathion is labeled for use on apples if and **only** if apples are listed on the package.

HOME ORCHARD BLUEBERRY IPM GUIDE

TIME OF APPLICATION	PESTS	MATERIALS	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Before bud break, spray only if scale infestation exists	Scale	If needed Superior oil	3 fl oz.	12 hrs	pre-bloom use only	Oil treatments are most effective when applied near bud break. Do not apply when temperatures are expected to be <40ºF or >80ºF within 24 hours.
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.						
Green tip, from the first green tissue after bud break to first bloom, spray every 7-10 days	Botrytis blight	Captan 50WP plus	2.5 Tbs.	4 days	day of harvest	DO NOT APPLY BENLATE ALONE.
	Mummy berry	Benlate 50WP or	1 Tbs.	1 day	21 days	If mummy berry becomes established, Funginex or Benlate is essential in the pre-bloom sprays.
		Funginex 1.6EC	.5 fl oz.	12 hrs	pre-bloom use only	
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.						
10-20% bloom and full bloom	Botrytis blight & Mummy berry	Captan 50WP plus	2.5 Tbs.	4 days	day of harvest	DO NOT APPLY INSECTICIDES DURING BLOOM
		Benlate 50WP	1 Tbs.	1 day	21 days	Botrytis causes flower and twig blight.
Immediately after bloom	Cranberry fruit worm	If needed, malathion 25WP	3 Tbs.	1 day	1 day	Treat if fruitworms are injuring fruit.
Cranberry fruit worm is a pest throughout Georgia. Scout bushes twice a week from full bloom until 4 weeks after petal fall. Examine fruit clusters for pinsized holes and frass, and premature ripening in more mature fruit. Break open berries to look for larvae and damage. Early varieties like 'Climax' are usually infested first. Spray when you detect this pest.						
As needed during the season	Leafminers, Leaftiers, Blueberry maggot (BBM) (mid-May - harvest)	IF NEEDED, MALATHION 25WP	2 oz.	1 day	1 day	Treat when damaging infestations or defoliation are occurring and pests are present. Malathion can be used until 1 day before harvest. Treat if BBMs are present.
Blueberry maggots (BBM) are sporadic but very serious, mid to late-season pests of cultivated blueberries in GA. BBM adults are small, 3/16 inch long, black flies. A distinctive pattern of black bands runs across each wing; a white spot is visible on the back of the thorax (middle of three body segments). BBM flies lay eggs on ripening fruit. If you have a history of BBM infestations, spray preventively. Continue treatment until all the fruit are off the bushes. Carefully follow pesticide pre-harvest intervals.						

HOME ORCHARD BRAMBLE IPM GUIDE

In most cases when growing blackberries, if you practice good sanitation and have no wild blackberries nearby, acceptable yield can be obtained without spraying pesticides. A good sanitation program helps to control most common pest problems. Most fungi that infect blackberry canes overwinter on old canes that were infected the previous season. Immediately after harvest, remove and discard canes that have fruited; mowing or cutting canes back 12" above the ground is a convenient means of removing dead canes. Plants then need to be fertilized and irrigated after pruning 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.

Diseases and insects are also frequently of minor importance on raspberry. Cut and remove old canes in the winter and discard or destroy them. 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. Cuts should be made at soil level (no stubs) and all old canes should be removed from the planting. This method produces a single fall crop. Strawberry weevil is not a problem on fall bearing raspberry cultivars such as 'Heritage.'

TIME OF APPLICATION	TO CONTROL	MATERIALS	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Delayed dormant (Blackberries only)	Leaf and cane spot	copper hydroxide (Nu-Cop, Hi-Yield Copper Fungicide, KOP-Hydroxide)	see label	1-2 days (see label)	None listed	Apply as delayed dormant spray after training in the spring
		or				
	Anthracnose	liquid lime sulfur	see label	see label	Dormant/ delayed dormant only	Apply lime-sulfur at delayed dormant, but prior to 3/4-inch shoot stage to avoid leaf burn.
Green tip	Anthracnose, Leaf and cane spot	copper (Top Cop w/ Sulfur, 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.
When buds appear and new canes are 8-12" high	Anthracnose, Leaf and cane spot,	copper (Top Cop w/ Sulfur, Dragon Copper Fungicide, Bonide Liquid Copper) *	see label	Until dry	None listed	
	orange rust					
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.						
Pre-bloom	Anthracnose, Leaf and cane spot	copper (Top Cop w/ Sulfur, Dragon Copper Fungicide, Bonide Liquid Copper)	see label	Until dry	None listed	Repeat at 10-14 day intervals as necessary
	Strawberry weevil	Sevin 80S	1 Tbs.	12 hrs	7 days	Use only if strawberry weevils or their damage are present.
Strawberry weevils are small (.1 inch long) reddish brown snout beetles. Adults kill flower buds and blossoms by severing or "clipping" most or all of the stem just below the bloom. Eggs are laid in these damaged blooms. Adults will typically move from strawberries to blackberries and raspberries. Summer blooming raspberries should be watched, but they are less likely to be attacked.						

TIME OF APPLICATION	TO CONTROL	MATERIALS	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Bloom	Botrytis Flower Blight, Rosette (Double blossom)	Benlate 50WP or	2 tsp.	1 day	3 days	Apply at 5-10% bloom and repeat at full bloom. Two additional sprays can be applied at 14 day intervals.
		Rovral 4 Flowable or	1 tsp.	1 day	0 days	
	Powdery Mildew	micronized wettable sulfur (Microthiol Special)	see label	1 day	0 days	Use Benlate or Rovral if Botrytis or Rosette are a problem. Do not make more than 5 Benlate applications per season. Do not make more than 4 Rovral applications per season. DO NOT SPRAY INSECTICIDE DURING BLOOM.
Rosette or double blossom *(Cercosporella rubi)* 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 witches broom. Several of these witches 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 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.						
Just after bloom, through May	Strawberry weevil Red necked cane borer	if needed, Sevin 80S or	1 Tbs.	12 hrs	7 days	Use this spray only if strawberry weevils or their damage are present.
		Malathion 0.57EC	2 tsp.	1 day	1 day	Spray for RNCB if removal of canes is not providing acceptable control.
Red-necked cane borer (RNCB) adults are slender, 1/4 inch long, black beetles with an iridescent coppery-red to golden thorax or "neck." Larvae are legless, white, and have flattened heads. They are 3/4 inch when mature. They tunnel in bramble canes above or below the swollen galls they induce in bramble canes. **Sanitation by mowing for rosette or selective removal of galled canes will suppress RNCB populations.** Insecticides timed to adult emergence (generally in May) will also help reduce RNCB populations.						
After old canes have been removed	Anthracnose, leaf and cane spot	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.
	Orange rust	*				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 IPM GUIDE

TIME OF APPLICATION	TO CONTROL	MATERIALS	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
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.
Delayed dormant, late spring before buds break	Mite eggs Scale	70-sec superior oil, spray if an infestation exists.	3 fl oz	12 hrs	before buds break	Apply to near the point of run off. One oil spray is sufficient on grapes. Do not apply when temperature are expected to be below 40ºF or above 80ºF within 24 hours.
The fungi causing diseases on bunch 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 beginning with 1-2 inches green, apply every 7 days until bloom	Black rot Powdery mildew, downy mildew, anthracnose	mancozeb (DithaneM45, Maneb 80WP)	see label	1 day	66 days	Use mancozeb if downy mildew is a problem
		or				
		Immunox	2 oz.	1 day	14 days	Use Immunox if anthracnose is a problem.
		or				
		ferbam	see label	see label	7 days	Do not make more than 6 applications of Immunox (@ 2 oz./gal) per season.
		plus, if needed				
	Plant bugs Flea beetles	home fruit spray	see label	see label	see label	Apply an insecticide when plant bugs or flea beetles are present and damage is evident.
						Home orchard/home fruit sprays contain captan and malathion and may also contain methoxychlor, carbaryl and/or sulfur. They may be used for disease and insect control at cap fall, first cover and summer cover sprays. Be sure to observe the pre-harvest interval stated on the label.
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.
		or				
		mancozeb (Dithane M45, Maneb 80WP)	see label	1 day	see label	Do not apply more than 24 lbs. Maneb 80WP or Dithane M45 per acre per crop season. Do not apply mancozeb within 66 days of harvest.
		or				
		Immunox	2 oz.	1 day	14 days	
		or				
		ferbam	see label	see label	7 days	
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	
		or				
		ferbam	see label	see label	7 days	
	downy mildew	as needed copper hydroxide (Kocide 101, Hi-Yield Copper Fungicide, KOP-Hydroxide)	see label	1 day	see label	Foliage injury may occur on copper sensitive varieties such as Concord, Delaware, Niagara and Rosettes. Test for sensitivity
		plus				
	Plant bugs Flea beetles Leafrollers Grape berry moth	home fruit spray	see label	see label	see label	Home orchard/home fruit sprays contain captan and malathion and may also contain methoxychlor, carbaryl and/or sulfur. They may be used for disease and insect control at cap fall, first cover and summer cover sprays. Observe the pre-harvest interval stated on the label.
Grape berry moth larvae feed on flowers and fruit of bunch grapes early in the season. Larvae enter fruit near the stem or where grapes touch each other. Scout and spray as needed. Grape curculio are small (.1 inch) reddish-black snout beetles. Adults emerge and move to fruit to feed and lay eggs around mid-June in Georgia. Adults feed on the underside of leaves in a zig-zag pattern. Spray if weevils are found.						

HOME ORCHARD BUNCH GRAPE IPM GUIDE (continued)

TIME OF APPLICATION	TO CONTROL	MATERIALS	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Summer cover sprays every 14 days until 14 days before harvest	black rot powdery mildew	Captan 50WP or Immunox	2 Tbs 2 oz.	4 days 1 day	day of harvest 14 days	Do not make more than 6 applications of Immunox (@ 2 oz./gal) per season.
	Grape berry moth	plus, as needed home fruit spray	see label	see label	see label	
	Grape curculio Japanese beetles	plus, if needed				Do not apply malathion plus methoxychlor within 14 days of harvest.
	Green June beetles	Kelthane Spider Mite Spray or	1/2 tsp	12 hrs	7 days	Do not apply Kelthane within 14 days of harvest.
	Mites	Sun Spray Ultra Fine Oil	2-3 Tbs	12 hrs	day of harvest	Do not apply to heat or drought stressed vines.
Grape berry moth larvae feed on flowers and fruit of bunch grapes early in the season. Larvae enter fruit near the stem or where grapes touch each other. Scout and spray as needed. Grape curculio are small (.1 inch) reddish-black snout beetles. Adults emerge and move to fruit to feed and lay eggs around mid-June in Georgia. Adults feed on the underside of leaves in a zig-zag pattern. Spray if weevils are found.						
Preharvest (7 days before harvest)	Black rot Green June beetles	Captan 50WP plus, if needed malathion 57EC or home fruit spray	2 Tbs 2 tsp see label	4 days 12 hrs see label	day of harvest 3 days see label	Do not apply malathion within 3 days of harvest.
Mid June and between Thanksgiving and Christmas	Grape root borer	Construct a 1 ft high soil mound for 1.5 feet around each vine between early and mid June. Knock the mounds down between Thanksgiving and Christmas.				Grape root borers can kill grapevines. Borers tunnel inside vines at or below ground level, weakening or killing them. All grapes (bunch, muscadine and vinifera) are susceptible. Mounding provides cultural control. It is 60-90% effective when done correctly. Mounding uses layers of soil to make it more difficult for young larvae to reach the roots or adults to emerge. Mound around plants between early and mid-June. Knock down mounds between Thanksgiving and Christmas. Do not fail to remove mounds.

HOME ORCHARD MUSCADINE IPM GUIDE

In most cases muscadine grapes can be produced without the aid of pesticides. It is advisable to watch and treat for (if necessary) the control of angular leaf spot. 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. Depending on weather conditions, cover sprays from bloom to harvest are sometimes necessary for prevention of ripe rot, Macrophoma rot and bitter rot.

TIME OF APPLICATION	TO CONTROL	CHEMICAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
			PRE-BLOOM			
Every 14 days from bud break until bloom	Black Rot Bitter Rot	mancozeb or	2 Tbs	1 day	4 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.
		Captan 50WP or	3 Tbs	4 days	day of harvest	
		Immunox or	2 oz	1 day	14 days	
		ferbam	see label	see label	7 days	
	Plant Bugs Flea Beetles	plus as needed prebloom or				If plant bugs or flea beetles have been a problem or are present and damaging, **it may be necessary to spray insecticide shortly before bloom, at cap fall (petal fall) and at 1st cover.** Always scout and treat as needed. **DO NOT SPRAY INSECTICIDE DURING BLOOM**.
		home fruit spray	see label	see label	see label	
Muscadine grape varieties often produce more fruit than many homeowners need, even if half of the crop is lost to diseases and insects. Unless you have had a shortage of fruit or a history of severe disease and insect problems, we suggest that you do not spray this crop. 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. Grape berry moths are occasionally damaging to grape clusters during June, July and August. Grape curculio emerge and feed on the underside of leaves between mid-June and early July. Spray as they begin to lay eggs and feed on grapes.						
			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	3 tbs	4 days	0 days	Captan may cause mild phytotoxicity to fruit if applied when conditions are cool and wet. Plant bugs and flea beetles are typically early season pests.
		Immunox	2 oz	1 day	14 days	
	Plant Bugs Flea Beetles Grape Berry Moth Grape Curculio	Use as needed at Cap (Petal) Fall and First Cover and thereafter when insects and damage are present:				Home orchard/home fruit sprays contain captan and malathion and may also contain metho-xychlor, carbaryl and/or sulfur. They may be used for disease and insect control at cap fall, first cover and summer cover sprays. Be sure to observe the pre-harvest interval stated on the label.
		home fruit spray	see label	see label	see label	
	Japanese Beetles June Beetles	Sevin 80S	2 Tbs	12 hours	7 days	**Grape berry moth is an occasional pest with high damage potential.** It is a mid to late season pest in muscadines. Scout and spray insecticide promptly if damage and pests are found. **Grape curculio is an occasional pest with high damage potential.** The adults are small small 1/10 inch long red-black snout weevils. They emerge around June 15 and feed on the underside of leaves in a shallow zig-zag pattern for about 2 weeks before they begin laying eggs. **Scout and spray insecticide if damage and pests are found.** Do not apply Sevin within 7 days of harvest or malathion within 3 days of harvest.

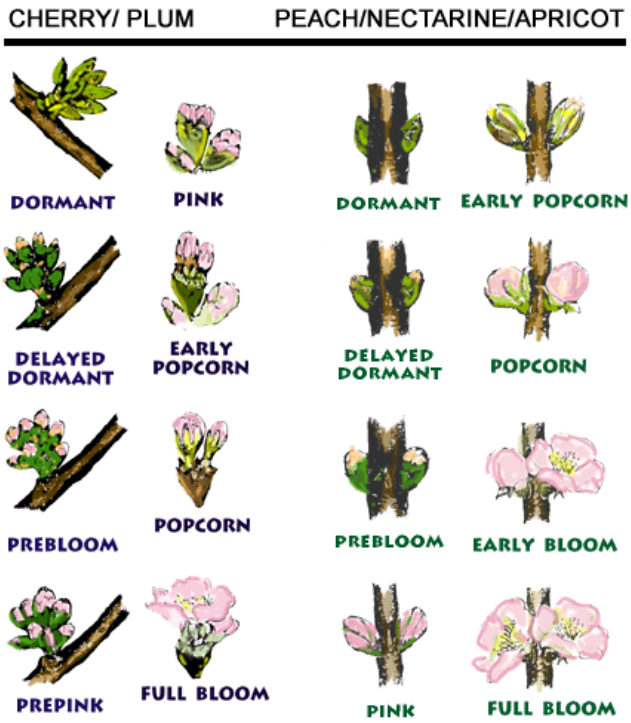
TIME OF APPLICATION	TO CONTROL	CHEMICAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
MITES may damage grapes. They feed on leaves by roughing and rasping the leaf surface and consuming the sap released. Mites can become a serious problem, and they are capable of explosive population growth. Treat if more than 15 mites per leaf are found or if leaves are bronzed from mite feeding. Drought and heavy crop load aggravate mite injury, especially early in a growing season. Two treatments at 1 week intervals may be needed.						
	Mites	Kelthane spider mite spray	$1^1/_2$ tsp	12 hrs	7 days	Do not apply within 14 days of harvest. Do not re-enter treated area for 12 hours.
		or				
		Sun Spray Ultrafine Spray Oil	2-3 Tbs	12 hrs	day of harvest	May apply the day of harvest. Do not apply to drought stressed plants. **Use with caution as phytotoxicity may occur.** Do not apply when temperatures and humidity are high; wait until late afternoon or early evening. Do not re-enter treated area within 12 hours.
		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	3 Tbs	4 days	day of harvest	Captan may be applied up to day of harvest.
		or				
		fruit tree spray	see label	see label	see label	Home orchard/home fruit sprays contain captan and malathion and may also contain methoxychlor, carbaryl and/or sulfur. They may be used for disease and insect control at cap fall, first cover and summer cover sprays. Be sure to observe the pre-harvest interval stated on the label.
		plus as needed				
		or				
	Grape berry moth	Sevin 80S	1 Tbs	1 day	7 days	
Make the last scheduled insecticide application 2 weeks before harvest.	June beetle	or				
		Malathion 0.57EC	2 tsp	12 hrs	3 days	Do not use Sevin within 7 days of harvest or Malathion within 3 days of harvest. Sevin will not control aphids.
Green June beetle and Japanese beetle populations can get out of hand rapidly. Moderate defoliation is seldom damaging, but fruit feeding is serious. Do not allow these pests to feed heavily on and become abundant in blocks with ripe fruit. Beware of heavy emergence and migration to blocks with ripe fruit after rains. Multiple applications are often necessary to maintain control if populations are allowed to build up. Ripening fruit and aggregation pheromones seem to be attractive to and continue to draw new beetles even after their brethren have been controlled.						
June beetles can be very abundant and damaging near harvest. Spray as needed before they become abundant.						
GRAPE ROOT BORERS can kill grapevines. Borers tunnel inside vines at or below ground level, weakening, or killing them. All grapes (bunch, muscadine, vinifera) are susceptible. Use a layer of soil to make it more difficult for young larvae to reach the roots or adults to emerge. Mound soil 1 foot high and 1½ feet out from the base of each vine by early- to mid-June. It is equally important to knock these mounds back down between early November and Christmas. Mounding provides cultural control. It is 60-90% effective when done correctly.						

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Dormant sprays - mid winter before bud swell	Bacterial spot, Leaf curl	copper hydroxide (Kocide 101, Hi-Yield Copper Fungicide, KOP-Hydroxide)	see label	2 days	21 days	Do not apply copper hydroxide with oil Preventive leaf curl sprays at this time are for cooler areas of the state where leaf curl occurs (primarily upper piedmont and mountains).
	Leaf curl	liquid lime sulfur or	see label	see label	Do not apply after petal fall	
		Ortho Daconil 2787	3/4 Tbs	2 days	Do not apply after shuck split	Liquid lime sulfur and ferbam can be combined with one of the oil sprays listed below. Ortho Daconil 2787 and copper hydroxide cannot.
		or ferbam	see label	1 day	21 days	
		or Bordeaux mixture	see label	until dry	dormant spray only	If leaf curl has been severe, a fungicide application should also be made after leaf drop in the fall. **Do not apply oil or oil plus fungicide after buds break.**
Approximately 21 and 7 days before bud break	Scale Mites	Superior oil (70-second)	2 fl ozs	12 hrs	pre-bloom use only	Two superior oil sprays should be applied 10-14 days apart every year during the **dormant** season. Thorough coverage with oil application is essential. Do not make oil applications when temperatures are expected above 85ºF or below 40ºF.
Pink and bloom	Blossom blight (early season phase of brown rot - blossoms turn brown and die) Scab	Ortho Daconil 2787 or	3/4 tsp	2 days	Do not apply after shuck split	DO NOT SPRAY INSECTICIDE DURING BLOOM. This is a very important spray for suppression of pre-harvest brown rot. Make this preventive application every year.
		Captan 50WP or	2 Tbs	4 days	day of harvest	
		liquid lime sulfur or	see label	see label	Do not apply after petal fall	
		Immunox	1/2 oz	1 day	day of harvest	Do not make more than 6 applications of Immunox (@ 2 oz./gal) per season.
Petal fall (when most of the petals have fallen)	Brown rot Scab	Ortho Daconil 2787 or	3/4 tsp	2 days	shuck split only	Avoid use of sulfur when temperatures are above 90F.
		Captan 50WP or	2 Tbs	4 days	day of harvest	Sprays applied at petal fall, shuck split, shuck off, and the first cover spray are essential for control of plum curculio and scab.
		sulfur or	see label	1 day	day of harvest	
		Immunox	1/2 oz	1 day	day of harvest	
	Plum curculio Plant bugs Stink bugs Oriental fruit moth	Ortho Home Orchard Spray (malathion 7%, methoxychlor 15%, captan 14.7%)	1.2 oz	12 hrs	21 days	**Ortho Home Orchard Spray** contains captan, malathion and methoxychlor and may be used for control of both disease and insect pests.

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Shuck split (when flower shucks begin to split or 7 days after petal fall)	Scab	Ortho Daconil 2787	3/4 tsp	2 days	Do not apply after shuck split	Do not apply Ortho Daconil 2787 after shuck split.
		or				
		Captan 50WP	2 Tbs	4 days	day of harvest	Sprays applied at petal fall, shuck split, shuck off, and the first cover spray are essential for control of plum curculio and scab.
		or				
		Immunox	½ oz	1 day	day of harvest	
	Bacterial spot	copper hydroxide (Kocide 101, Hi-Yield Copper Fungicide, KOP-Hydroxide)	see label	2 days	21 days	Only apply copper hydroxide if bacterial spot is an annual problem.
	Plum curculio Stink bugs Oriental fruit moth	Ortho Home Orchard Spray (malathion 7%, methoxychlor 15%, captan 14.7%)	1.2 oz.	12 hrs	21 days	**Ortho Home Orchard Spray** contains captan, malathion and methoxychlor and may be used for control of both disease (except for bacterial spot) and insect pests.
Shuck fall (when most of the flower shucks have fallen, or 10 days after shuck split)	Scab	Captan 50WP	2 Tbs	4 days	day of harvest	Sprays applied at petal fall, shuck split, shuck off, and the first cover spray are essential for control of plum curculio and scab.
		or				
		sulfur	see label	1 day	day of harvest	
	Plum curculio Cat-facing insects	Ortho Home Orchard Spray (malathion 7%, methoxychlor 15%, captan 14.7%)	1.2 oz.	12 hrs	21 days	**Ortho Home Orchard Spray** contains captan, malathion and methoxychlor and may be used for control of both disease (except for bacterial spot) and insect pests.
SUMMER COVER SPRAYS (10 AND 20 DAYS AFTER SHUCK FALL, AND THEN EVERY 14 DAYS UNTIL 1 MONTH BEFORE HARVEST)	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				Do not use Imidan within **14 days of harvest.**
		IMMUNOX PLUS	1/2 oz	1 day	day of harvest	
	PLUM CURCULIO CAT-FACING INSECTS	ORTHO HOME ORCHARD SPRAY (MALATHION 7%, METHOXYCHLOR 15%, CAPTAN 14.7%)	3 Tbs.	1 day	14 days	Do not use **malathion within 7 days of harvest.**
			1.2 ozs.	12 hrs	21 days	Do not use **methoxychlor within 21 days of harvest.**
	MITES	plus as needed for Sun Spray Ultra Fine Spray Oil	3 fl oz.	12 hrs	day of harvest	Use miticide when there are 30 or more mites per leaf, or if mites and leaf bronzing are evident. Do not apply to heat or drought stressed plants. Sulfur applied as fungicide will provide some mite suppression.

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
2 weeks and 1 week before harvest for each variety	Brown rot	Captan 50WP or sulfur plus	2 Tbs see label	4 days 1 day	day of harvest day of harvest	Avoid use of sulfur when temperatures are above 90F.
	Fruit-attacking insects	Sevin 80S	1 Tbs	1 day	1 day (peach/plum) 3 days (nectarine)	Do not use Sevin within 3 days of harvest.
North and Middle Georgia Aug. 1 and again Sept. 1. South Georgia Immediately after harvest and again after Sept. 1.	Peach tree borer	endosulfan 9.9%EC	2 Tbs	48 hrs	post-harvest only	Use 1 qt. finished spray material/ tree and spray trunk and lower limbs. Do not use with fruit on the tree.

Stages of Bud Development: Plum and Peach



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COOPERATIVE EXTENSION
Washington State University

HOME ORCHARD PEAR IPM GUIDE

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.
Delayed dormant, when green tip first shows ($^1/_2$ inch green)	scale mites aphids	70-sec Dormant Oil plus Malathion 0.57EC	3 ozs. 2 tsp	12 hrs	3 days	Spray entire tree to run-off, use at least 1/2 gal. finished spray per tree.
Green cluster bud	Pear psylla scale aphids	Malathion 0.57EC	2 tsp	12 hrs	3 days	This spray is important to reduce feeding damage by these insects and the growth of sooty mold. Sooty mold is fungal growth on the "honeydew" produced by these sap-feeding insects.
	Scab	or if needed Ortho Home Orchard Spray	5 Tbs	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. Ortho Home Orchard Spray contains captan (a fungicide) and malathion and methoxychlor (insecticides).
White bud (Popcorn)	fire blight	streptomycin sulfate or	100 parts per million - see table (p. 20)	12 hrs	30 days	**Apply streptomycin just before the earliest blooms open, and every 3-4 days thru petal fall for fireblight.**
		copper hydroxide (Kocide 101, Hi-Yield Copper Fungicide, KOP-Hydroxide) plus	see label	1 day	see label	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.
	scab pear psylla scale aphids	Ortho Home Orchard Spray	5 Tbs.	12 hrs	7 days	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 or	100 parts per million - see table (p. 20).	12 hrs	30 days	**DO NOT APPLY INSECTICIDE DURING BLOOM**. Apply streptomycin every 5 -7 days when weather is favorable for fire blight (see above).
		copper hydroxide (Kocide 101, Hi-Yield Copper Fungicide, KOP-Hydroxide)	see label	1 day	see label	

HOME ORCHARD PEAR IPM GUIDE (continued)

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
Petal fall - when most of the petals are off and again 10-14 days after petal fall	Scab fungal leaf spots Pear psylla plant bugs stink bugs codling moth oriental fruit moth	Ortho Home Orchard Spray or sulfur	5 Tbs. see label	12 hrs 1 day	7 days up to day of harvest	Insecticide applications at petal fall and when the first leaves have unfolded are normally adequate to control serious fruit feeding pear insect pests. If you have a history of insect injury fruit, spray one or two more times at 21 day intervals. Avoid use of sulfur when temperatures are above 90F. D'Anjou pears are sensitive to sulfur.
When first leaves have completely unfolded	Scab bitter rot fungal leaf spots Pear psylla plant bugs stink bugs codling moth oriental fruit moth	Ortho Home Orchard Spray or Sulfur plus Benlate 50WP plus malathion 57EC	5 Tbs. See label 1 Tbs 2 Tbs	12 hrs 1 day 1 day 12 hrs	7 days up to day of harvest 14 days 3 days	Ortho Home Orchard Spray comtains captan (a fungicide) and malathion and methoxychlor (insecticides). Insecticide applications at petal fall and when the first leaves have unfolded are normally adequate to control serious fruit feeding pear insect pests. If you have a history of insect injury fruit, spray one or two more times at 21 day intervals.
21 days later and every 14 days for two to three additional applications	Scab Bitter rot Pear psylla plant bugs stink bugs codling moth oriental fruit moth	Ortho Home Orchard Spray or Sulfur plus Benlate 50WP plus malathion	5 Tbs See label 1 Tbs 2 tsp	12 hrs 1 day 1 day 12 hrs	7 days up to day of harvest 14 days 3 days	Ortho Home Orchard Spray will provide control of late season scab and bitter rot if needed. Do not use Ortho Home Orchard Spray within 7 days of harvest.

*Malathion is labeled for use on pears if and **only** if pears are listed on the package.

ANTIBIOTIC FORMULATIONS FOR A 100 PPM SOLUTION

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

TIME OF APPLICATION	TO CONTROL	MATERIAL	AMT/GAL	REENTRY INTERVAL	PREHARVEST INTERVAL	REMARKS
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 plus Benlate 50WP	2 Tbs 1 Tbs	1 day 1 day	day of harvest 1 day	Do not use more than 5 lbs. Benlate per acre per crop. Do not use Benlate alone. The 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. 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.
Pre-bloom, just before bloom	Spray as needed for Strawberry weevil (clipper)	malathion 0.57EC or Sevin 80S	2 tsp 1 Tbs	12 hrs 12 hrs	3 days 1 day	Strawberry weevils are small (.1 inch long) reddish brown snout beetles. Adults kill flower buds and blossoms by severing or "clipping" most or all of the stem below the bloom. Eggs are laid in these damaged blooms. Adults will typically move from strawberries to blackberries and raspberries. Apply insecticide when fresh injury, pest presence or history of problems exists.
10% bloom	Leaf spots, Botrytis blight and other fruit rots	Captan 50WP plus Benlate 50WP	2 Tbs 1 Tbs	1 day 1 day	day of harvest 1 day	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 plus Benlate 50WP	2 Tbs 1 Tbs	1 day 1 day	day of harvest 1 day	
Just after bloom	treat as needed for strawberry weevil (clipper)	malathion 0.57EC or Sevin 80S	2 tsp 1 Tbs	12 hrs 12 hrs	3 days 1 day	
Every 10-14 days from bloom until harvest.	Leaf spots, Botrytis blight and other fruit rots	Captan 50WP plus Benlate 50WP	2 Tbs 1 Tbs	1 day 1 day	day of harvest 1 day	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.
Year round	treat as needed for mites	Kelthane spider mite spray or Sun Spray Ultra Fine Spray Oil	$1^1/_2$ tsp 2 Tbs	12 hrs 12 hrs	2 days 0 days	Apply when mites, webs and damage are observed. Two applications 5-7 days apart may be necessary. Thorough coverage is needed to get good control. In the coastal plain, mites may reach damaging numbers during the winter months. Do not use Sun Spray Ultra Fine Spray Oil on plants that are heat or drought stressed. **Use caution, as phytotoxicity may occur.**
	treat as needed for adult crown infesting beetles	Sevin 80S	1 Tbs	12 hrs	1 day	Carefully check soil in prospective sites for infestations prior to establishment. If adult weevils are observed spray immediately with Sevin. Continue to spray as long as adults are present.
	treat as needed for slugs	Sevin 5% bait	1.6 oz/100 ft²	12 hrs	1 day	Slugs are primarily a wet weather pest.

ATTENTION!
Pesticide Precautions

1. Observe all directions, restrictions and precautions on pesticide labels. It is dangerous, wasteful, and illegal to do otherwise.

2. Store all pesticides in original containers with labels intact and behind locked doors. **"KEEP PESTICIDES OUT OF THE REACH** OF **CHILDREN."**

3. Use pesticides at correct label dosage and intervals to avoid illegal residues or injury to plants and animals.

4. Apply pesticides carefully to avoid drift or contamination of non-target areas.

5. Surplus pesticides and containers should be disposed of in accordance with label instructions so that contamination of water and other hazards will not result.

6. Follow directions on the pesticide label regarding restrictions as required by State or Federal Laws and Regulations.

7. Avoid any action that may threaten an endangered species or its habitat. Your County Extension Agent can inform you of endangered species in your area, help you identify them and, through the Fish and Wildlife Service Field Office, identify actions that may threaten endangered species or their habitat.

Other publications available through your county extension agent that will help you in production of fruit crops include Southeastern Home Fruit Pest Management and Culture, Small Fruit Pest Management and Culture, Peach Production Handbook, and the Home Garden Fruit Horticulture Bulletins.

When you have a question ...
Call or visit your local office of The University of Georgia's Cooperative Extension Service.

You'll find a friendly, well-trained staff ready to help you with information, advice and free publications covering agriculture and natural resources, family and consumer sciences, 4–H and youth development, and rural and community development.

Plant Pathology 2
Entomology 2-3
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