

The Home Orchard Pest Management Guide

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Components of a Successful Pest Management Program

Pest identification

Before deciding to take any control action, be sure you have correctly identified the pest (insect, mite or disease) and be sure that it is or will be serious enough to be worth the cost and time of control. Refer to the section on pest biology at the end of this guide for descriptions and pictures that will help you identify many of the common pests found in home orchards. You may also want to consult your local Utah State University Extension County Office for more information on orchard pests and to obtain assistance with their proper identification and spray timing.

Surveying for pests

One of the most important features of a successful pest management program is to look for pests and damage symptoms on a regular basis in your home orchard trees. Monitoring devices, such as insect pheromone traps can be used, but may provide less accurate information when only a few trees are involved because they can draw in pests from outside the area of concern. Check your fruit trees at least once a week during the growing season for signs of pests and pest damage. Pick a few leaves on each side of the tree to check for insect and disease damage. Check the trunk for injury, oozing sap, or migrating insects. Observe fruit for scars or insect entry holes.

Control action guidelines

For home purposes, some pests can be ignored if their levels are too low to justify the costs involved in their control. More time can be invested in cultural and sanitation practices (see sections below) because the homeowner can often afford to trim out some damaged fruit. On the other hand, some orchard pests in the state, the apple maggot for example, are pests you must control to help protect commercial orchards in your area.

General Management Practices

The easiest, lowest cost and often most reliable way to avoid many pest problems is to provide an environment that discourages pest activities or reduces the tree's susceptibility to damage. These type of methods include adjustments in cultural practices such as fertilization, water management and sanitation, and management of areas adjacent to the orchard trees. In addition, proper management of naturally occurring biological control organisms can help reduce pest problems. For pests that directly attack the fruit or trunks of trees, pesticides are often the most reliable pest control option.

Tolerant/Resistant varieties

Use insect and disease resistant varieties and rootstocks whenever they are available. In Northern Utah, choose varieties that will survive cold winter temperatures. Winter damage resulting in bark cracking can cause a tree to be more susceptible to attack by many diseases and insects.

Soils and nutrition

Although you cannot change your soil type around your home, there are some practices you can follow to improve growing conditions for your fruit trees. Proper fertilization of trees with a nitrogen containing fertilizer is important for optimal tree growth; however, over fertilization can lead to excessive, lush growth that can be attractive to aphids, psylla and other foliage pests. Fertilizers should be applied in the spring and not later than June 30 since they may prevent the tree from “hardening off” properly for winter. Two common soil problems in fruit orchards which should be avoided are dry and dusty conditions, which encourage mite outbreaks, and poor drainage and over watering, which can lead to crown and root rot problems.

Water management

Mismanagement of water is a major contributing factor to many pest problems. Too little water can result in stunted growth of trees, poor development of root systems, lower fruit and nut yields, and exacerbates the injurious effects of many pests. Severe water stress can cause leaves to drop and nuts or fruit to remain on trees after harvest. On the other hand, excessive watering can damage roots by depriving them of oxygen and creates conditions that favor infection of soilborne diseases, particularly Phytophthora root and crown rot. Orchard trees can be irrigated with surface water (flood or furrow), sprinkler, or drip methods. Flood or furrow irrigation may discourage ground squirrels and pocket gophers from digging burrows near tree trunks. Sprinkler irrigation can increase disease problems if water is applied so leaves or fruit remain wet for extended periods; adjust sprinkler heads so this does not happen.

Sanitation

Many pests can overwinter and survive inside fruit, other tree parts and debris. Gather and discard fallen and rotten fruit, and fruit remaining on trees after you have harvested (e.g., cherries and apples that remain on tree after you have picked all you want). Pick up and destroy or till under June drop walnuts and apples as soon as they fall; they may contain codling moth. Rake up dead leaves under trees. Prune and destroy dead and injured twigs or branches since diseases and insects may inhabit them.

Cover crops in orchards

Ground covers or cover crops can be interplanted between fruit trees. Orchard floor vegetation can have both positive and negative effects on pest problems. Orchards with cover crops may have higher populations of certain natural enemies, largely due to increased habitat and alternate food sources for beneficial insects and mites; they also may have fewer problems with mites because of reduced dust. However, if not properly managed, a cover crop can be a source of pests as well as natural enemies. Rodent, crown rot, ant, stink bug and lygus bug problems have been associated with ground covers that get too overgrown. Piercing-sucking insects such as lygus and stink bugs should be especially discouraged in peach and apricot orchards because they can cause “cat facing” (scarring and marking) damage to the exterior of fruits.

Biological control

Biological control is any activity of one species that reduces the adverse effect of another. Predators, parasites and pathogens of pest species can occur naturally in fruit orchards or may be purchased from commercial suppliers and released for supplementary control of pests. Most biological control occurs naturally without assistance from the grower or homeowner. Often its importance is not appreciated until a broad spectrum pesticide, which kills many of the

beneficials as well as the targeted pest, is applied and a new pest—suddenly released from biological control—becomes a serious problem. There are several things you can do to encourage the activities of biological control agents already present in your orchard. The most important is to avoid the use of broad spectrum pesticides unless necessary. You can also provide a habitat that is more favorable for biological control agents (see Cover crop section) by choosing adjacent plants that supply nectar, pollen, alternate hosts, and habitat for natural enemies. There is evidence that providing adequate organic content in soil may be important in ensuring a good habitat for soil microorganisms that can control a variety of pests, particularly soil pathogens and nematodes. You can buy biological control agents to release for controlling pest species; however, mass release of natural enemies is really a minor part of biological control. Most commercially available biocontrol agents are directed against insect and mite pests. Predatory mites have been successfully mass released for control of plant-feeding spider mites in orchards. *Steinernema* nematodes, which parasitize insects, show great promise for use against certain boring insects, soil dwelling insects, or insects in other types of moist, confined habitats. Release of *Trichogramma* wasps for control of numerous caterpillars and release of lacewings for aphids and other small insects have potential, but results have been mixed because of variation in the quality of agents available and lack of reliable release procedures.

Pheromones

Pheromones are chemical cues that insects use to communicate. The most common are sex pheromones, typically released by the female of a species to attract a male mate. You may be familiar with pheromones that are used as attractants or lures in insect traps. These traps can be extremely helpful in determining the proper time to apply control sprays for certain orchard insect pests. In most fruit-producing counties of Utah, USU Extension Agricultural County Agents place insect traps in representative orchard areas. You can obtain this insect trapping information from your local USU Extension County Office to assist with proper timing of controls. Also, check your local newspaper and radio stations for updated information on pest control from your local Extension agent. Pheromones have recently been registered for control of some orchard pests (e.g, codling moth, peach twig borer, oriental fruit moth). In these products, pheromones are enclosed in a dispensing device (plastic rope, foil packet). Pheromone dispensers can be placed in fruit trees to help control the insect pests by releasing such a high concentration of pheromone that the males are confused or disrupted from locating females for mating. However, these products have **NOT PROVEN SUCCESSFUL FOR HOME ORCHARD SITUATIONS**. These products have been successful in large commercial orchards where a large enough area is treated to develop a block or curtain of pheromone. Pheromones do not kill the insects, only disrupt their mating behavior. Where only a few trees are involved, the pheromone concentration is too low, and mated female moths fly in from nearby sources to lay fertile eggs on your trees. Therefore, these pheromone products are not recommended for use in home orchards.

Pesticides

Any substance applied to control insects, fungi, weeds or other pests is called a pesticide. Since the advent of “synthetic” pesticides over 40 years ago, growers and gardeners have become more and more reliant on pesticides to manage pest problems. The grower and homeowner should become more familiar with the alternative pest management options discussed above rather than relying on pesticides as the sole means of pest control. Although pesticides have perhaps been overused in recent decades, they still remain an important pest management tool. Many chemicals used before the development of synthetic pesticides are now being used as alternative choices for control of pests. In addition to “synthetic” chemicals there

are now more choices of “organic” chemicals. These include chemicals derived from plant, animal or naturally occurring rock sources (e.g., lime, nicotine sulfate, horticultural oils, pheromones, pyrethrum, rotenone, ryania, sabadilla, and soaps). Another category of chemicals are called “biological” pesticides. These are naturally occurring substances which are microbial agents, such as *Bacillus thuringiensis*, that cause diseases in certain pests.

Using pesticides safely

Be aware that using a pesticide except as registered by the manufacturer is a violation of the law. The risks to your orchard associated with misusing a pesticide include failure to achieve control, unacceptable residues on the fruit, killing of beneficials or damaging your trees through phytotoxicity. Whenever you use a pesticide, pay special attention to the health and safety recommendations of the manufacturer. You must take special precautions to assure the safety of people who may come in contact with the spray and to prevent environmental contamination. Always read the pesticide label. Read it before you buy the pesticide to be sure it is legally allowed for your situation. Then read it again before opening it to be sure you properly mix and apply the material and are prepared to handle emergencies. Wear the proper clothing, choose a sprayer that is appropriate for your situation and the pesticide you are applying, and choose a pesticide material that is appropriate for managing your pest problem and will cause the least amount of disruption to beneficials.

Comments About This Guide and Pesticide Recommendations

DO NOT use this bulletin as the final answer of which pesticides to use, how to use them, or when to apply them to your fruit trees. The manufacturer's printed label must be your guide to formulations, timing, rates, the type of equipment and safety protection you need, and the required interval from application to harvest. **DO** use this bulletin as an initial guide to the kinds of problems you may experience with insect pests and diseases and the types of pesticides that are recommended for that problem.

Non-commercial uses for pesticides are often limited. Pesticides that are available depend on what is stocked by garden centers, nurseries, and other businesses. Some chemicals are considered undesirable or unsafe for use in urban areas. Others may lead to mite or other pest problems, or may burn foliage if used incorrectly. Persons with a modest or small investment in fruit production usually cannot afford the equipment for proper treatment of large trees, but this can be partly solved by planting dwarf varieties. When large trees already exist, pruning may help reduce their size and open their canopies for better spray coverage.

When you purchase a pesticide product, you must be certain of the type of chemical it contains, how it is formulated, and its concentration. The names of pesticides are either “generic,” “brand,” or “chemical.” In some cases, the “generic” and “brand” names are the same, and in other cases they differ. “Generic” names of pesticide products are used in this bulletin as there may be several “brands” of an acceptable product. A listing of common brand names appears at the end of this bulletin. The “generic” name will always be printed on the pesticide’s label under the heading “Active Ingredients.” There may be more than one active ingredient in a product. The concentration of the active ingredients will also be indicated, usually as a percentage. The ‘brand’ name will usually indicate the formulation (EC = emulsifiable concentrate; L = liquid; WP = wettable powder; granules; dusts; dormant oils).

This guide does not specify the formulations, concentrations, rates of application, or time to harvest allowed (pre-harvest interval) for most of the pesticides listed. There are too many

variations of formulation, active ingredient concentration, and suppliers for it to be practical to list them all. You must follow label directions explicitly to achieve the product's intended effects and margin of safe use. Also be aware that manufacturers frequently modify their labels and active ingredients in products. Refer to the USU Extension Service in your county or a reliable nurseryman for more detailed pesticide choice advice.

Predator Toxicity Guide

The predator toxicity table is intended as a guide to the relative toxicity of orchard pesticides to beneficial predators. If possible, select chemicals with the lowest toxicities: L = Low; M = Moderate; H = High.

Chemical	Toxicity Rating				Comments:
	Mite Predators		Aphid Predators		
	Stethorus Lady Beetle	Predator Mite	Lady Beetles	Lace- wings	
Bacillus thuringiensis (B.t.)	L	L	L	L	
Benomyl	L	H	L	*	
Carbaryl	H	H	M	H	Best if used early-season or post-harvest.
Chlorpyrifos	L	M	L	H	
Diazinon	M	L	M	M	
Dicofol	L	H	L	L	Only use if spider mites are a problem and predatory mite numbers are low.
Dimethoate	M	M	M	M	Broad-spectrum systemic insecticide: avoid use if possible.
Endosulfan	M	L	L	L	
Malathion	*	L	*	L	
Spray Oil	L	L	*	*	
Phosmet	L	L	M	H	
Sulfur	L	M	L	L	

* No information available.

Fruit Pest Control Guide: Apples

Pests	When to Spray	Materials
Aphids, Mites, Scale Insects and Leafrollers	Apply delayed dormant spray at first sign of green on bud tips (about 2-3 weeks before bloom).	Dormant oil + diazinon or chlorpyrifos
Powdery mildew (on susceptible varieties such as Idared, Jonathan, Redgold, or Rome. Occasionally on McIntosh, Red Delicious, and Golden Delicious (1))	Before bloom (half inch green to pink). Repeat every 14 days until terminal growth ceases in June. Sulfur must be applied every 7-10 days to be effective.	Benomyl, triforine, sulfur
Fire blight is more serious on Gala, Jonagold, Jonathon, Rome Beauty, Idared, Winter Banana, Yellow Transparent and PaulaRed. Other varieties are less susceptible.	See recommendations for pears. During bloom, comment 1.	Streptomycin or fixed copper
White apple leafhopper	Treat at petal fall (postbloom) when nymphs are present on the undersides of leaves. May need repeat application in August.	Diazinon or endosulfan
Codling moth (worms), Leafrollers	Starting 10 days after petal fall or based on trapping information (2). Repeat every 18-21 days with phosmet, every 10-14 days with diazinon, every 5 days with B.t. through August 20.	Phosmet, diazinon, or B.t.
Apple maggot (3)	Not generally a pest in backyard trees. Based upon trappings with Pherocon AM traps through period of fruit set and maturation; last week of June may be an average date to start.	Phosmet
Aphids (4)	During late spring and summer if necessary.	Azadirachtin, diazinon, malathion*, endosulfan, insecticidal soap or summer oil
Spider mites (5)	Summer sprays as needed.	Dicofol, summer oil, or insecticidal soap
Root and crown rot	Summer sprays as needed.	See section on pest biology.

* Watch for mite build-up if this material is used.

1. On mildew-susceptible apples, fungicide sprays may be combined with codling moth sprays. Sulfur may cause foliar damage on some varieties especially when temperatures exceed 90° F.

2. Fruit insect trapping information can be obtained from your local USU Extension County Office.

3. The apple maggot is an uncommon pest problem in Utah and may not actually infest apple fruit. However, if traps show apple maggots visiting your trees you are required to spray if commercial orchards are within a specified distance. Pherocon AM traps are commercially available. See section on cherries for additional details. Obtain more information from your local USU Extension County Office.

4. If aphid problems appear they will usually occur during May or June on terminal branches. Make sure that you apply a delayed dormant spray the following spring if aphids are a problem.

5. Mites often cause damage during hot weather in July and August. Dicofol, the usual miticide for homeowner use, is being restricted in availability and there are often problems with resistance of mites to dicofol. Homeowners should first be certain their populations are high enough to warrant control. Visible damage should be occurring to the leaves before control is attempted. Careful applications of very light summer oils (ensure full emulsification!) Or insecticidal soap may help. Burning of foliage may occur. Do not translate recommendations from one plant type to another. Some ornamentals and fruit trees are damaged with oil treatments. Any type of spray treatment will also be harmful to the beneficial predatory mites which feed on spider mites, so only treat when absolutely necessary.

Pears

Pests	When to Spray	Materials
Pear psylla	Apply dormant application about 6 weeks before bloom (about mid-March) if adults are detected. If pear psylla persist and sticky honeydew is detected on leaves during late spring and summer.	Dormant oil + endosulfan Endosulfan
Scale insects or Mites	Applied delayed dormant before bloom between separation of bud scales and first white. Use oil at ½ recommended rate.	Dormant oil + diazinon
Fire blight	During bloom (1).	Streptomycin, fixed copper, or Bordeaux mixture
Codling moth (worms), Leafrollers	Starting 10 days after petal fall or based on trapping information (2). Repeat every 18-21 days with phosmet, every 10-14 days with diazinon, every 5 days with B.t. through August 20 or harvest.	Phosmet, diazinon, or B.t.
Spider mites	Summer sprays as needed.	Dicofol, insecticidal soap, or summer oil
Pear Sawfly (cherry or pear slugs)	When damage appears (4).	Malathion* or diazinon
Pear rust mite	Apply postharvest if mites are still present.	Endosulfan or carbaryl

* Watch for mite buildup if this material is used.

1. Treatments are usually only necessary when rain occurs during the bloom period. Start spray applications when the daily mean temperature (average maximum and minimum temperature from midnight to midnight) exceeds 62° F. Repeat sprays every 5 days during bloom. Fixed copper and Bordeaux mixture may cause russetting on pear fruit.

2. Fruit insect trapping information can be obtained from your local USU Extension County Office.

3. Mites often cause damage during hot weather in July and August. Both mites and psylla can cause leaves to turn dark. See note 5 under “Apples.”

4. See biology and description of pear sawfly damage at the back of this guide.

Peaches, Nectarines, and Plums

Pests	When to Spray	Materials
Twig-borer worms, aphids, scale and cat-facing insects	Apply delayed dormant, i.e. from first bud swell to first pink (peach) or green tip (plum).	Dormant oil + diazinon, endosulfan or phosmet
Powdery mildew (peaches only) (1)	When fruit is the size of a pea.	Benomyl or wettable sulfur (1)
Cat-facing insects (Lygus bug, stink bug)	Apply petal fall to shuck split if cat-facing injury in previous years was severe.	Endosulfan
Shot hole or coryneum blight (peaches only)	Shuck split Pre-harvest (only if rain is frequent) Leaf fall (most important application)	Chlorothalonil, ziram, or captan Captan Chlorothalonil, Bordeaux mixture, fixed coppers, basic copper sulfate, captan, or ziram
Oriental fruit moth (worms)	Best timed with traps (2); or apply at shuck fall. OFM is only a problem in some areas; check with local USU Extension Office.	Phosmet or diazinon
Twig borer (worms)	Best timed with traps (2); or apply in mid-June and again in late July to early August.	Diazinon, phosmet, endosulfan, or methoxychlor
Aphids	Late spring and summer months; look for curled leaves on branch terminals.	Azadirachtin, diazinon, malathion*, endosulfan, insecticidal soap or summer oil
Peach silver mite	Summer sprays as needed; look for silvery appearance of leaves	Wettable sulfur or endosulfan
Spider mites (3)	Summer sprays as needed.	Dicofol, summer oil, or insecticidal soap
Peachtree borer (crown borer)	Best timed with traps (2) or apply first week of July (3 weeks earlier in Utah's Dixie); spray lower parts of trunks only; reapply first week of August. Late September if above spray was missed.	Chlorpyrifos for peaches or else endosulfan (4) PDB crystals (5)
Walnut husk fly (peach only)	Best timed with trap catches (2); or apply 2-4 times (7-10 day intervals) beginning in late July if adult flies are present.	Malathion*, diazinon, or pyrethrin
Perennial canker	No sprays recommended.	See section on pest biology.

* Watch for mite buildup if this material is used. Only for use immediately before harvest.

1. Powdery mildew causes "peach rusty spot" on some cultivars of peach when grown near mildew susceptible apples. Benomyl is preferable to sulfur for controlling powdery mildew, as sulfur sprays must be repeated frequently, and may cause burning if applied in hot weather.

2. Fruit insect trapping information can be obtained from your local USU Extension County Office.

3. Mites often cause damage during hot weather in July and August. See note 5 under "Apples" for more control information.

4. Chlorpyrifos is the preferred control but is registered only for peaches. Few specific chlorpyrifos formulations are registered in Utah. Treat the trunk from lower scaffold limbs to the soil only during the first week of July or based on trap catch information from your county extension agent. Will need to repeat application during the first week of August.

5. PDB (paradichlorobenzene) Clean area around each tree trunk and then apply. Place crystals around the trunk, 2 inches from the bark. Cover the PDB crystals with 2 inches of soil. Remove the soil after 6 weeks, following crystal treatment. Fall treatment is preferred to spring, as it destroys the worms before damage becomes extensive. Treat immediately after Elberta peach harvest in the fall. [These are not naphthalene mothballs. Use ½ oz around trees 1-3 years old; ¾ oz around trees 4 years old; 1 oz around trees 5 years old; and 1.5 oz around trees older than 5 years.]

Apricots

Pests	When to Spray	Materials
Twig borer (worms), scale, mites, and aphids	Apply delayed dormant (from separation of bud scales to first sign of white in bud tips).	Dormant oil + diazinon, phosmet or endosulfan
Twig borer	Best timed with traps (1) or apply after petal fall and again in early to mid-June, if needed.	Phosmet, diazinon, endosulfan or methoxychlor
Shot-hole or coryneum blight	Petal fall to shuck-split.	Chlorothalonil or ziram
Peachtree borer	Best timed with traps (1) or apply early July and early August; 3 weeks earlier in Utah's Dixie. Late September if above spray was missed.	Endosulfan (2) PDB crystals (3)
Shot-hole or coryneum blight	Leaf fall.	Chlorothalonil, Bordeaux mixture, fixed coppers, basic copper sulfate, or ziram

1. Fruit insect trapping information can be obtained from your local USU Extension County Office.
2. 30 day pre-harvest interval.
3. See note 5 under "Peaches."

Cherries

Pests	When to Spray	Materials
Aphids, San Jose scale, Mites, Leafrollers	Apply dormant or delayed dormant (bud swell to green tip) spray.	Dormant oil + diazinon or chlorpyrifos
Aphids (1)	After bloom as necessary.	Azadirachtin, diazinon, insecticidal soap or summer oil
Powdery mildew	From petal fall to fruit sets as needed.	Benomyl or sulfur
Western cherry fruit fly, Apple maggot (3)	Best timed with trap catches (2) or begin treating when cherries begin to change from green to salmon colored, and continue until harvest (note pre-harvest interval of material).	Dimethoate** every 14 to 21 days, phosmet** every 14 days, diazinon every 10 days, malathion* every 3 days (for use immediately before harvest)
Perennial canker	No sprays applicable.	See section on pest biology.
Root rots	No sprays available.	See section on pest biology.
Spider mites (4)	Summer sprays as needed.	Dicofol, insecticidal soap or summer oil
Pear sawfly (cherry or pear slugs)	When damage appears (5).	Malathion* or diazinon

* Watch for mite buildup if this material is used.

** Not for use on sweet cherries.

1. Aphid problems usually appear during spring or late summer on new growth or terminal shoots. Aphids cause leaves to roll and they excrete a sticky honeydew. Best control can be achieved before leaf curl. Make sure that you apply a delayed dormant spray the following spring if aphids are a problem.

2. Fruit insect trapping information can be obtained from your local USU Extension County Office.

3. Both the western cherry fruit fly and apple maggot infest cherries in Utah. Trapping with Pherocon AM traps is required and trees must be protected to prevent spread to commercial orchards. Pherocon AM traps may be commercially available now, or inquire of your county extension agent. See section on apples for additional details. If, for some reason your cherries are infested, pick and destroy them at harvest time. That will help reduce populations next year as the insect pupates in the soil under the tree.

4. See note 5 under “Apples.”

5. See biology and description of pear sawfly damage at back of this guide.

Walnuts and Pecans

Pests	When to Spray	Materials
Spider mites (1)	Spring or summer as needed.	Dicofol, insecticidal soap or summer oil
Aphids	In spring when aphids average 12-15 per leaf.	Diazinon, malathion*, azadirachtin, insecticidal soap or summer oil
Walnut husk fly (2)	Best timed with trap catches (2) or about August 1st and 15th.	Malathion*, diazinon or pyrethrin

* Watch for mite buildup if this material is used.

1. See note 5 under “Apples.”

2. If peach fruits on trees adjacent to infested English or black walnuts were infested with husk fly maggots during recent years, spray such nearby peach trees at the same time. Applications to walnuts are not required after husk split.

Grapes

Pests	When to Spray	Materials
Powdery mildew	When new growth is 6", 12", and 18".	Benomyl or sulfur (1)
Leafhoppers	Whenever pests appear.	Diazinon, two applications at 5 day intervals
Western grape leaf skeletonizer	When pest is detected; St. George area only.	Carbaryl or cryolite (2)

1. Sulfur dusts should be applied lightly on both sides of vines. Do not apply when temperatures are 90° F or warmer.

2. Few formulations registered in Utah. Do not apply after fruits start to form.

Strawberries

Pests	When to Spray	Materials
Leafrollers	Just before bloom.	Diazinon
Spider mites (1)	When mites appear.	Dicofol or insecticidal soap
Powdery mildew	When disease first appears	Benomyl or sulfur
Gray mold, blossom blight	When disease appears during wet periods. In areas with a history of disease begin treating at first bloom and repeat at intervals recommended on the label, especially during wet weather.	Benomyl or captan (2)
Root weevils	During late spring and summer when damage appears.	Weevil bait, granular diazinon, water in malathion*, or parasitic nematodes

* Watch for mite buildup if this material is used.

1. See note 5 under “Apples.”

2. Because the gray mold fungus may become tolerant to benomyl, it is best to alternate between benomyl and captan.

Raspberries

Pests	When to Spray	Material
Spider mites (1)	When mites appear.	Dicofol or insecticidal soap
Powdery mildew (uncommon)	Dormant season	Lime sulfur. Do not use this product during warm weather, as burning will occur.
	When mildew appears	Benomyl
Rose stem girdler (2), Raspberry crown borer	Mid-April and May	Diazinon, apply as a crown drench
Root weevils	Late June, mid-July	Weevil bait, granular diazinon, water in malathion*, or parasitic nematodes

* Watch for mite buildup if this material is used.

1. See note 5 under “Apples.” Oils should not be used on raspberries.

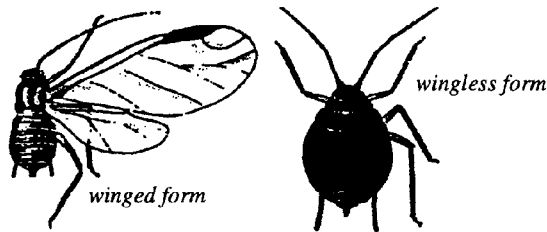
2. Remove and burn infested canes before April. Spray canes first part of May.

Pest Biology and Descriptions

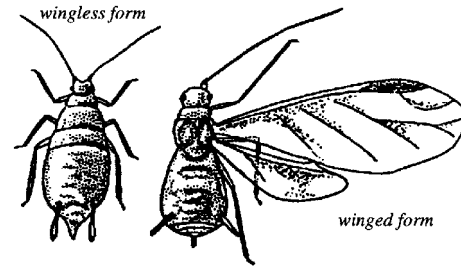
(in alphabetical order)

Aphids:

Many species of aphids attack foliage of fruiting plants, but few attack the fruit themselves. Watch for sticky leaves, due to the honeydew excreted by the aphids, or ants in trees, which may indicate an aphid infestation. Aphids are small, soft-bodied, and often occur in clusters. The homeowner can sometimes ignore aphid infestations.



Black Cherry Aphid, much enlarged

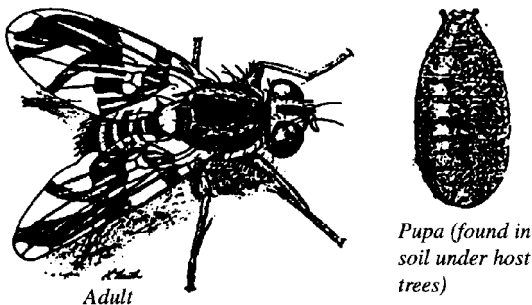


Green Peach Aphid (actual size: 2 mm)

Apple Maggot:

The apple maggot belongs to a family of fruit flies that can infest a wide variety of fruits. Its native host in the western U.S. is the wild or black hawthorn. In Utah, the apple maggot can be a pest of cherries, but may become a pest of apples as well. This is particularly important to the commercial orchard industry and home orchardists are required to adequately trap for apple maggots and to protect their trees in regions where it poses a threat to the commercial fruit industry. Because the insects drop out of unpicked fruit and go into the ground to pupate until the following spring, it is a serious mistake to leave unpicked fruit. The flies are most easily detected by the home orchardist with the Pherocon AM trap. This is a yellow card covered with a sticky material and bait. Even if only a few flies are caught, one must assume an infestation

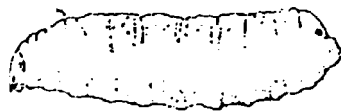
and spray. Use at least three Pherocon AM traps even in small orchards; more if larger. Follow directions carefully for placement of the trap. Watch for very small flies, about 1/8" long, with 1/4" wing spreads and clear wings with brown to black patterns in them. Your extension agent has bulletins illustrating these patterns. If you have hawthorns nearby, you will see some apple maggots until quite late in the growing season. The proper procedure for removal of hawthorn is given in fact sheet #6 "Hawthorn Removal for Apple Maggot Control Near Commercial Orchards" available from your County Extension office. See also Western Cherry Fruit Fly.



Adult

Pupa (found in soil under host trees)

Larva (found in fruit)



Apple Maggot (adult actual size: 4-5 mm long)

Blossom Blight:

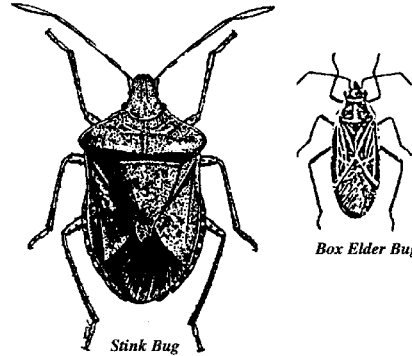
An infection of blossoms caused by various fungi including *Botrytis* on strawberries, and *Botrytis* and *Monilinia* on stone fruits. See also gray mold.



Blossom Blight and Rot

Cat-facing Insects:

True bugs (lygus bugs, box elder bugs, stink bugs) feeding on embryonic fruit just before or after petal drop can affect fruit development and leave deep, unsightly depressions in the fruit. The problem is particularly important with stone fruits such as peaches and nectarines.



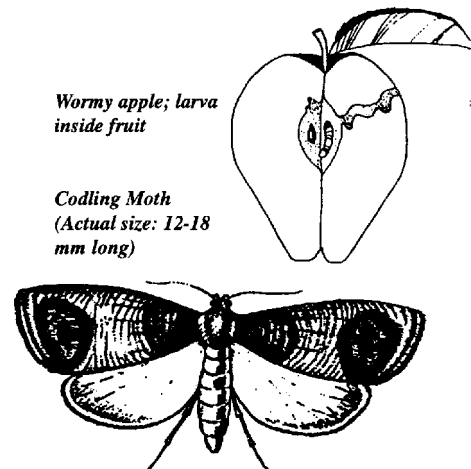
True Bugs

Coryneum Blight:

A fungal disease affecting peaches, apricots, and occasionally sweet cherries. Attacks dormant leaf buds, blossom buds, leaves, fruit, and twigs. First lesions are small, round, purplish-black spots, becoming raised and scuffy on fruit as it develops. On peaches, affected buds may die and appear to be “varnished.” Infections may girdle twigs resulting in dead terminals. The infections in leaves fall out, leaving “shot holes.” Apricot fruit is commonly affected, with dark brown raised spots, whereas peach fruit is only occasionally infected.

Codling Moth:

Codling moths are the adults of the common “worms” which infest apples and pears. These moths become active in the late spring at which time they lay their eggs. The key to successful control is the proper timing of the sprays. Such timing is related to temperature and varies from year to year. The first spray in northern Utah should be during late May or early June. The home orchardist should contact the county agent to learn more precisely when sprays should be applied. For additional details on the life cycle of the codling moth and method of trapping adults, see the fact sheet entitled “Biology & Control of Codling Moth on Apple in Utah.” This fact sheet is available from County Extension offices.



Codling Moth

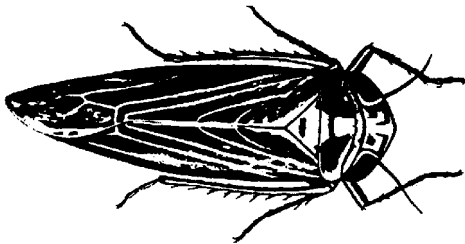
Crown Rot:

Caused by a water mold fungus, Phytophthora, which attacks fruit trees as well as many woody ornamentals. Extensive root damage may occur before any of the following above-ground symptoms appear: slow growth, sparse foliage, yellowing of foliage, small fruit, wilting in hot weather or death of the plant. The disease can be confirmed by exposing large roots or crown and looking for a dark, sunken canker. Root rot is favored by high soil moisture or standing in water. Plant only in well drained areas with good quality trees. Do not replant in areas where root rot occurred previously. Select rootstocks with known resistance such as dwarfing apple root stocks M-7A, M-9 and M-26; avoid M M 104 and M M 106. Mazzard root stocks for sweet cherry are more resistant than Mahaleb rootstocks. Infected trees are difficult to cure, but treatment of the exposed infected area with fixed copper at 2 tablespoons per gallon or painting with 2% copper in water soluble latex paint may stop progress of the canker. Ridomil or Aliette are systemic fungicides that work effectively if excessive soil moisture is prevented. They are only available in commercial quantities.

Gray Mold:

A disease caused by the fungus Botrytis that infects flowers or fruits of strawberries, stone fruits and grapes. High humidity, rain or sprinkler irrigation favor the development of a fuzzy gray mold. It can usually be controlled by increasing air circulation.

Leafhoppers:

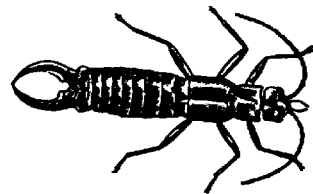


Leafhopper (greatly enlarged)

The white apple leafhopper, rose leafhopper, and grape leafhopper are among those that suck leaf sap reducing plant vigor and sometimes spotting fruit with excrement. They can also be a severe nuisance to fruit pickers when present in high numbers in the late summer to early fall. The adults are usually wedge-shaped with the wings meeting in a sharp peak over the back. Best control is achieved when leafhoppers are still in the immature stage (nymphs), before they reach adulthood. Look on undersides of leaves for leafhopper nymphs.

Earwigs:

Earwigs may be responsible for eating parts of fruit, especially berries. They usually gain entry by wounds or openings caused by other pests or factors. However, on deciduous fruit they are common predators of other insects.

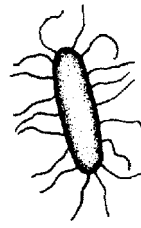


Earwig (actual size: 13 mm long)

Fire Blight:

Pears and some varieties of apples are very susceptible to the bacterial disease fire blight. Blossoms, terminal twigs, and sometimes entire limbs or trees are killed. The bacterium overwinters in sunken cankers, which should be removed during regular pruning operations. Cut 12 inches below the canker into healthy wood to be certain that the bacteria are removed.

Bloom time is the most susceptible period and flowers should be protected with streptomycin or fixed copper. Environmental conditions favoring infection are rainy days during bloom when mean temperature (average of daily maximum and minimum) exceeds 60° F.



Fireblight bacterium



branch infected by fireblight

Fire Blight

Leafrollers:

Leaves which are folded over and tied with silk, and have a feeding caterpillar or a pupa inside may be leafrollers, a member of the moth family.

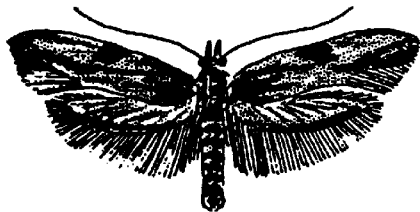
Mites:

Mites are very small arthropods that can cause serious problems for your fruit trees. Few pesticides are available; resistance makes others ineffective. There are many helpful, beneficial, predatory mites, but some mites are damaging to fruit production. It takes a specialist to distinguish between them. Pest mites feed on the leaves, either the upper or lower surface. The leaves may become bronze or be covered with fine silk webbing. Low populations may be ignored by the homeowner and may, in fact, be kept in control by predators. Mite outbreaks often follow insecticide applications. Defoliation may result from severe attacks. **Miticides should not be used repeatedly.** Resistance in mites is a serious problem and acceptable miticides are rather scarce.



Two-spotted spider mite, very much enlarged

Peach Twig Borer:

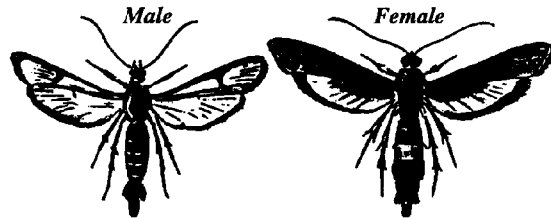


Peach Twig Borer Moth

The damage is caused by small brown worms that burrow inside the twigs at about blossom time. A second generation of these worms enters the fruit later in the season. Infested twigs die back and small masses of gum exude from the tunnel openings. Control is required only if twig die back is noted in May.

Peachtree Borer:

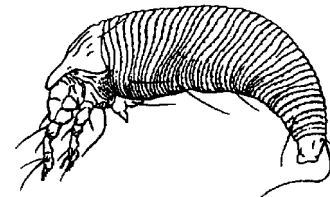
The peachtree and lesser peachtree borer destroy the cambium, just below the bark of the peach, plum, prune, cherry, almond, or apricot trees. They can be difficult to control because of the protection given them once they have entered the tree. Homeowners should watch carefully for these pests. The adults are clear-winged moths which begin activity in late June or early July. The females lay their eggs mostly in the soil a few inches from the trunk. Trees may be girdled and may die due to the boring activity of the larvae.



Peach Tree Borer Adults, Clear winged moths

Peach Silver Mite:

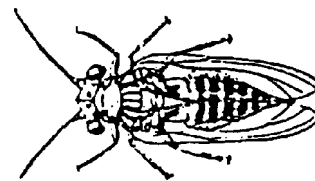
These mites cause yellow spotting of leaves and upward curling of leaves along their length. Peach trees with glands that secrete a syrup over new leaves are less susceptible when the leaves are young but after gland secretions halt, both glandless and glanded varieties are susceptible. The leaves are silvered by the feeding which may have occurred up to 10 days earlier. Trees are stressed, fruit size reduced, and the fruit may drop due to peach silver mite damage.



Peach Silver Mite (Actual Size: 0.13 mm long)

Pear Psylla:

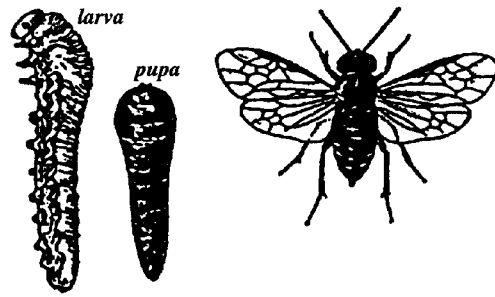
The adults are 2-5 mm long and resemble small cicadas. Nymphs may suck and secrete enough honeydew to stimulate growth of sooty fungus on the leaves and fruit. Leaf drop and damage to buds may occur in heavy infestations. The pear psylla may transmit pear decline, a disease of pears that may eventually kill the tree. Root stocks resistant to pear decline are available. Sample for psylla early in the spring by beating the branches over a light colored pan. Resistance to many insecticides has occurred in pear psylla. Best control is achieved with dormant spray to kill overwintered adults before new eggs are laid.



Pear Psylla

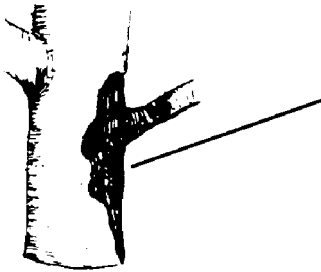
Pear Sawfly (also known as Cherry Slug or Pear Slug):

Cherry slugs feed on the leaves and remove one layer of the leaf tissue to create membranous, dried skeletonizing of the leaf. Cherry slugs are larvae of sawflies. The slugs are often controlled by insecticides applied for other pests. Trees can tolerate low populations reasonably well. Cherry slugs may infest pears, plums and several ornamentals.



Cherry or Pear Slug

Perennial Canker:



Perennial Canker

Also called Cytospora canker, die back, or gummosis. The disease is caused by a fungus usually on peach, cherry, apricot, plum, and many ornamentals. Light amber gum may exude from infected limbs. Cankers are usually oval on large limbs and enlarge yearly or advance down branches. Tiny black fruiting bodies appear on the canker in wet weather. A healthy, vigorous tree resists infection. Water, fertilize, and prune, removing dead branches by cutting at least 4 inches into healthy wood. Remove abandoned trees or orchards. Avoid injury to trees. Control twig and tree borers since their damage may allow entrance of the fungus.

Powdery Mildew:

Fungus which attacks leaves, flowers and fruit causing a white powdery residue, distortion, stunting, russeted fruit and reduced yield. Certain apple varieties (Jonathan, Idared, Winesap, Rome) are commonly attacked but others may be affected in bad years. Berries, grapes, peaches and cherries may also be affected. Expression of the disease may depend upon the type of fruit affected. Warm days and cool nights favor the disease. The spores are spread by wind, dripping dew, rain and irrigation. Pruning affected twigs may be helpful, but fungicides are usually necessary. Plant fruit species or varieties that are known to be resistant. Control is effective if justified by the expense and started before mildew is present and **continued** on a regular basis.

Raspberry Crown Borer:

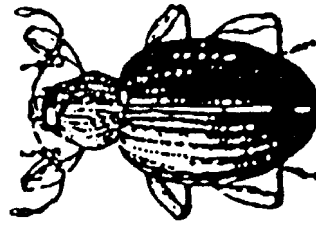
The moths lay eggs in the summer and fall and the larvae burrow into canes to spend the winter. Damage occurs too far down the cane for pruning to help. Good sanitation, such as removing and burning wilting canes in June and July can help prevent future problems in healthy plants, in addition to chemical control. The pest has a 2 year life cycle.

Root Rot:

See crown rots.

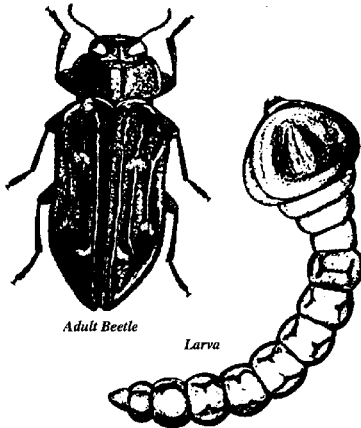
Root Weevils:

The adults are very hard, often seemingly hollow beetles with pronounced “snouts.” They feed on foliage, often at night, causing, scalloping of leaf edges. The larvae feed on roots and have a typical grub appearance.



Strawberry Root Weevil

Rose Stem Girdler:

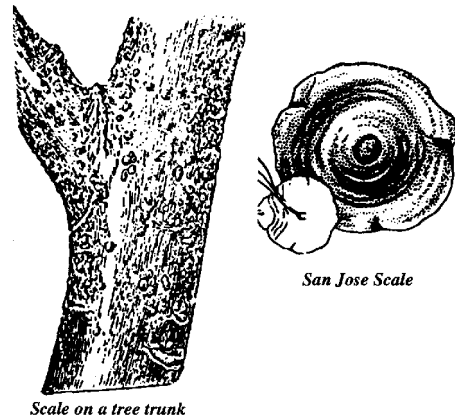


Rose Stem Girdler

The rose stem girdler is a flatheaded beetle, the larva of which burrows in either first year (vegetative) or older (fruiting) raspberry canes. If the bark is pulled away the tunnels dug by the girdling beetles will be exposed. The adult beetles fly in early spring (April-May), lay their eggs, and when the young larvae reach the fourth instar (stage) they start to burrow upward in the canes to spend the winter. The canes are killed and break off easily during July and September. Pruning helps.

San Jose Scale:

Look for crusted scales on branches and tiny red circles with white centers on apple and pear fruits. Armored scales under the shield feed on plant sap. They disperse after overwintering as young crawlers. Females produce young that crawl from under the scale before settling to feed. Feeding can reduce tree vigor and blemish fruit. If heavy infestations are not controlled, a tree can be killed.



San Jose Scale

Shot-hole Blight:

See Coryneum Blight.

Strawberry Blossom Blight:

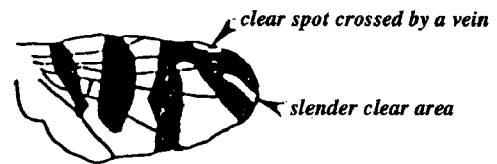
See blossom blight and gray mold.

Walnut Husk Fly:

The walnut husk fly is a tephritid fly like the apple maggot and western cherry fruit fly. It lays eggs in the husk after the husk has softened a bit. There is a 2 week period between fly emergence from the soil pupation site and the start of egg deposition. The flies are about the size of a house fly and have patterned wings with slightly different markings than the other tephritids.

Western Cherry Fruit Fly:

Western cherry fruit fly maggots are now common in cherries in Utah and without treatment an entire crop can be lost. A very similar fly, the apple maggot, also infests cherries. The adults can be distinguished by wing pattern. It is not possible to tell apple maggot from western cherry fruit fly maggots by simple examination. The same Pherocon AM trap used for apple maggots appears best for use by home orchardists. Cherry growers must spray if they see adults of either fly, but apple growers need be concerned only with apple maggot.



Western Cherry Fruit Fly



Apple Maggot



Walnut Husk Fly

Wing Patterns

Western Grape Leaf Skeletonizer:

The moth's larvae often feed side by side on the leaf. Either one surface of the leaf or entire leaf may be consumed. If other grape pests are being controlled, the skeletonizer usually does not appear as a problem. The insect is a problem in southern Utah.

Pesticides Listed

(listed in alphabetical order)

Generic pesticide names have been used in this bulletin. The following list indicates at least some of the trade or brand names that the product may bear. Be sure to check the active ingredients because some products have retained their trade name, but changed the ingredients. The chemical formulation you buy and use must be properly labeled for the crop you treat.

I = Insecticide and F = fungicide.

Azadirachtin: Align (botanical, caution label). I

Bacillus thuringiensis (B.t.): Biospray, Dipel, Javelin, Thuricide (biological insecticide). Kills caterpillar insects by acting as a stomach poison. Good coverage of foliage is required to be effective. I

Bait: A type of formulation to be placed to attract feeding pests. The pests for which the bait is effective will be listed. Pay special attention to any directions or placements of the baits as they may be designed to take advantage of important behaviors of the pests.

Benomyl: Benlate (benzimidazole; caution label). F

Bordeaux mixture: Mixture of hydrated lime and copper sulfate or a fixed copper fungicide with 27.5% copper content. F

Captan: Orthocide (chlorinated dicarboximide; danger label). F

Carbaryl: Sevin (carbamate; caution or warning label). I

Chlorpyrifos: Lorsban, Dursban (organophosphate; caution or warning label). I

Cryolite: Kryocide (inorganic; caution label). I

Diazinon: Diazinon (organophosphate, caution or warning label). I

Diazinon plus oil: An oil formulation of diazinon. Be certain the oil is compatible with your planned use (organophosphate and oil; caution or warning label). I

Dicofol: Kelthane (chlorinated hydrocarbon, caution or warning label). I

Dimethoate: Cygon (organophosphate, warning label). I

Dormant Oils: Votck oil, Horticultural Spray Oil (see spray oils). Dormant oils have viscosities of 90-150 seconds (Saybolt). I

Dusting Sulfur: Finely ground sulfur mixed with 1-5% clay or talc to improve flowing and dusting properties (elemental sulfur; caution label). F

Endosulfan: Thiodan (organochlorine; warning or danger label). I

Fixed Copper: Basic copper sulfates, copper oxychlorides, and oxides of copper (inorganic derivatives; caution label). F

Funginex: Triforine (caution label). F

Insecticidal Soaps: Chemical salts of fatty acids, harmless to humans but capable of burning plant foliage. Requires good coverage to be effective. Safer Insecticidal Soap, DeMoss Cryptocidal Soap, M-Pede. I

Malathion: Cythion (organophosphate; caution label). I

Methoxychlor: Marlate (chlorinated hydrocarbon; caution label). I

PDB Crystals: 1,4-dichlorobenzene, Paracide (chlorinated hydrocarbon; warning label). I

Phosmet: Imidan (organophosphate, warning label). I

Pyrethrin: Pyrellin (botanical; caution label). I

Spray Oil: Albolineum, mineral oils, white oils, 90-par, Volck oils. Oils are classified according to viscosity as dormant or summer oils (petroleum oils; caution label). I

Streptomycin: Agri-Mycin 17, Agri-Step, Plantomycin (bactericide; caution label)

Summer Oil: Horticultural spray oil, Sunspray oil (see spray oils). Summer oils have viscosities of 60-90 seconds (Saybolt). I

Triforine: Funginex. F

Wettable Sulfur: Sulfur, Wettable Dusting Sulfur, are ground elemental sulfurs mixed with wetting and emulsifying agents to allow mixture with water (elemental sulfur; caution label). F

Ziram: Ziram (dithiocarbamate complex with zinc; caution label). F

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