



FRUITS & VEGETABLES

Backyard Orchard: Apples and Pears

no. 2.800

by C.E. Swift, R. Hammon and H.J. Larsen¹

Quick Facts...

Wormy apples and pears are caused by the codling moth.

Spray apples and pears with malathion, permethrin, or spinosad every 7 to 14 days during the summer to have worm-free fruit.

If apples or pears are damaged by hail, apply a spray of streptomycin or a copper spray as soon as possible (within four to 18 hours) to help prevent fire blight.

Never spray insecticides when the tree is in bloom; they will kill the bees that pollinate the blossoms.

Pesticides in this publication are referred to by active ingredient. Trade names vary, and labels change on a regular basis, so check the ingredient list for active ingredients. Always read and follow label directions when purchasing or using any pesticide.

Insect control on fruit trees should begin with prebloom sprays (dormant or delayed dormant) for scale insects, aphids and mites. Applications of a dormant Superior or Supreme type horticultural oil in combination with an insecticide (malathion, endosulfan, or permethrin) will control these insects if applied during late winter or early spring, before buds open. Do not apply dormant oil if a heavy freeze is expected; damage to the tree could occur. Oil sprays must have ample time to dry before freezing weather. This usually takes at least 10 to 12 hours. Abide by the pre-harvest intervals of the products you use (see Table 1).

Oil sprays speed up spring bud development and reduce flower bud ability to withstand cold temperatures. It is therefore best to delay dormant oil sprays until the buds are starting to break.

Base the amount of spray on the size of the tree (except when mentioned otherwise). Sprays should be applied to thoroughly wet the leaves and fruit to obtain good coverage. Sprays applied until the leaves are wet (to drip) will require the gallons of spray listed below once the trees have a full canopy.

<u>Tree Diameter x Height</u>	<u>Amount of Prepared Spray</u>
20 x 20	4 gallons
15 x 15	3 gallons
10 x 10	2 gallons
5 x 5	1 gallon

A poorly pruned tree with dense foliage may need up to double these amounts to achieve good coverage of the tree interior.

For pears, apply a dormant spray to help control pear psylla. These insects are present in western Colorado, Fremont County and the Fort Collins area. When pear psylla egg-laying first begins, spray trees with a mixture of water plus Superior oil and either endosulfan, malathion, or permethrin. This usually occurs the first to second week in March.

To control scale insects, aphids and mites in areas of Colorado where psylla are not reported, apply dormant oil plus insecticide (malathion, endosulfan, or permethrin) before buds open. To control mites, aphids and scales on apples, apply a dormant spray of oil plus insecticide (malathion, endosulfan, permethrin).

To control codling moth, apples and pears need additional summer treatments of insecticide (permethrin, malathion or spinosad) which may be combined with summer weight horticultural oil. Codling moth control is very difficult in areas where egg laying pressure is great. Even weekly sprays may not be sufficient for complete control of codling moth in high pressure areas.

Colorado State
University
Cooperative
Extension

Putting Knowledge to Work

© Colorado State University
Cooperative Extension. 10/99.
Reviewed 3/06.
www.ext.colostate.edu

Table 1: Preharvest Intervals.

Material	Waiting Periods	
	Apple	Pear
Fire Blight Spray (streptomycin)	50 days	30 days
Copper hydroxide	0 days	0 days
Remedy	1 day	1 day
malathion*	7 days	7 days
permethrin (Bug Stop)	not after petal fall	14 days

*Check product label; products differ in waiting periods.

Avoid the use of sulfur within two weeks of any oil spray (e.g., dormant oil) especially when temperatures above 80 degrees are expected within several days after the sulfur application.

Avoid using Carbaryl, except for an early season thinning spray and one mid season rotational spray; this insecticide can thin fruit in early season and kill mite predators which leads to increased mite populations later in the season.

Late March: Delayed Dormant

Mites, scales, aphids and pear psylla.

What: Scale Insects, mites and aphids overwinter on apple and pear trees. Psylla can be present on pear trees as early as January. A spray applied in late March just after pruning will help control these pests. Spray apples and pears with a mixture of dormant oil plus insecticide (permethrin or endosulfan). Pear psylla can also be controlled later in the season by sprays of 1.5 percent summer oil or of kaolin clay.

How: In each gallon of water, mix 5 tablespoons Superior or Supreme oil and an insecticide (endosulfan, permethrin, or malathion; see label for rates) in each gallon of spray. Apply to drip to insure good coverage.

Prebloom (Before Bloom)

Powdery mildew on Jonathan, Rome, McIntosh, Golden Delicious, Akane, Granny Smith, Yellow Transparent and Lodi apples.

What: Powdery mildew shows up as a grayish-white powdery coating on terminal shoots and leaves. Do not confuse this with the normal hairiness of twigs and leaves. Powdery mildew is mostly a problem on Jonathan, Rome, Akane, Granny Smith, Gala, Fuji, Braeburn and Yellow Transparent (Lodi) apples and does damage Golden Delicious. Red Delicious occasionally are attacked. Apply fungicide at pink (prebloom), petal fall and at two-week intervals from the end of May to mid-June (young, nonbearing fruit trees until late July).

If powdery mildew is not controlled on highly susceptible varieties, there may be a poor bloom the following year. Flower buds are injured by the disease fungus and infected buds are killed by moderately cold winter temperatures (10 to 15 degrees below zero F).

How: In each gallon of water, mix potassium bicarbonate (Remedy; see label for rate) plus 2 to 4 teaspoons of Supreme oil per gallon of water.

Note: Avoid the use of sulfur within two weeks of any oil spray (e.g., dormant oil) especially when temperatures above 80 degrees are expected within several days after the sulfur application.

Blossom Period

Fire blight.

Bartlett pear and Jonathan, Lodi, Rome, Gala, Fuji, Braeburn and Yellow Transparent apples are susceptible to fire blight infection. Delicious and Winesap apples and Moonglow, Magness, Harrow Delight, Harvest Queen, Potomac and Maxine (Starking Delicious) pears are resistant.

What: Potential fire blight infection periods are those of 18 hours or more in which the average hourly temperatures are 65 to 90 degrees with rain or relative humidity above 65 percent. For areas prone to fire blight (Colorado's Front Range), apply protective sprays at three- to five-day intervals during bloom period.

How: Use 1 teaspoon streptomycin per 1 gallon of water (100 ppm), or a 53 percent fixed copper sulfate at 1 teaspoon per gallon of water.

Petal Fall

Powdery mildew on apples.

See discussion and control recommendations under "Prebloom."

Late Spring and Summer Sprays

Codling moth, powdery mildew, fire blight, apple maggot.

What: Spray with an insecticide (malathion, spinosad, etc.) or summer weight horticultural oil, or a combination of oil plus one of the other insecticides to control codling moth (larvae cause wormy apples) and apple maggot (in those Front Range locations where apple maggot is found). Moths usually start flying at bloom time. Eggs laid by these moths begin to hatch about two weeks after petal fall, depending on the weather. Apply the first codling moth spray at this time to prevent larvae from entering the fruit. Because insecticide residues last 7 to 10 days and moths are continuously present throughout the summer, apply a spray every 7 to 10 days to prevent later broods of codling moth larvae from entering apple and pear fruits. Adult apple maggot flies typically begin emerging around late June or early July, begin laying their eggs beneath the fruit skin about 10 days after emergence begins, and continue egg deposition until late August or early September. Apple maggot sprays need to be continued until early September.

Check the insecticide label to determine when to stop spraying before harvest to allow the pesticide residue to degrade. The wettable powder formulations are preferable where agitation of the spray mixture is possible. Otherwise, use liquid formulations during the evening when it is cool. The carrier in liquid formulations can burn foliage on hot days.

A high quality horticultural spray oil (summer weight) on a 7- to 10-day interval at 1.5 percent concentration (4 tablespoons per gallon of water) has been found to provide moderate to good control of codling moth and mites on both apples and pears in moderate to low pest pressure situations. Horticultural oils will suppress, but not control, codling moth in high pest pressure situations. Unfortunately, this option will not control apple maggot.

If powdery mildew was noted earlier or if Rome, Jonathan or McIntosh apples are in the orchard, spray at 10- to 14-day intervals with potassium bicarbonate, thiophanate methyl, or flowable sulfur. Mildew sprays generally can be stopped by early July. Young, non-bearing mildew-susceptible varieties need protection until late July. Avoid sulfur products when daily temperatures exceed 80 degrees or within 14 days of any spray containing oil. Also avoid using thiophanate methyl more than twice in a season and make sure that two other sprays with other materials separate any thiophanate methyl sprays.

If apples or pears are damaged by hail, apply a spray of streptomycin or a copper spray as soon as possible (within four to 18 hours) to help prevent fire blight. Do not use copper sprays on Golden Delicious or Anjou pears because russetting may occur. Streptomycin cannot be used within 30 days of harvest on pears or within 50 days of harvest on apples. Copper sprays can be used to the day of harvest, but can cause severe fruit russet if applied when fruit is present (especially on Anjou pears).

Remove branches infected with fire blight as soon as possible to reduce the possibility for disease spread. Cut affected branches 6 inches below the lowest evidence of infection (sunken or reddened bark, ooze, etc.). Peel bark from the cut toward the branch tip for 6 inches or so and examine for evidence of red-brown discoloration of the cambium and bark. This is the true limit of the infection. If the cut was not below the infection limit, sterilize the pruning equipment by dipping in a 70 percent alcohol solution or spray with Lysol disinfectant spray and make a second cut 6 to 12 inches below the first cut. Repeat the examination process to be sure all the infected tissue is removed. Disinfect the cut and tools before moving to a different tree or branch. Allow the cut to air dry and **do not** seal with pruning paint. Control sucking insects during the summer months to prevent shoot or fruit fire blight infections.

Visible signs of crown rot infection include poor growth, reduced leaf size, prematurely bronzed or reddened leaves, small and brightly colored fruit, and a weak rooting structure.

How: Several insecticides can be used for codling moth control: malathion, permethrin, spinosad. Add 3 tablespoons of high quality summer weight oil in each gallon of spray to enhance insecticide performance (not on Golden Delicious). Alternatively, use 4 tablespoons of this oil by itself in each gallon of water for moderate control of codling moth and mites in low to moderate pest pressure situations. For powdery mildew, use sulfur, potassium bicarbonate, or thiophanate methyl at the rates on their labels. Avoid using sulfur or oil within two weeks of each other because of risk of plant injury. For fire blight prevention, use rates of streptomycin or copper as indicated under “Blossom period.”

Fall Treatment

Crown rot.

What: Visible signs of crown rot infection include poor growth, reduced leaf size, prematurely bronzed or reddened leaves, small and brightly colored fruit, and a weak rooting structure. Crown rot causes a dark brown discoloration just under the bark at the soil line. The discoloration is described as similar to chocolate swirl ice cream because the dark, diseased tissue is interspersed with swirls and stripes of living, white or yellowish tissue. To check for discolored tissue, cut away bark at ground line with a sharp knife, but be careful to avoid girdling the tree. Overwatering often is a major contributing factor for this disease and should be avoided. Drench the base of infected trees with copper sulfate after removing soil to expose and dry the diseased tissue. After treatment, replace the soil prior to winter to avoid additional damage due to winter injury.

How: Use a copper fungicide material according to the rates on the label. Spray infected trees from ground level to a height of 2 to 3 feet, thoroughly saturating the lower trunk and soil. Alternatively, excavate the affected crown area of the tree and allow drying out during the summer, carefully replacing the soil around the crown area of the tree with a sandy soil or pea gravel overlaid with weed fabric covered with regular soil. Be sure to have the crown covered before winter. Avoid over watering in the future.

References

For additional information, see the following fact sheets which are all available from your local Colorado State University Cooperative Extension county office or The Cooperative Extension Resource Center, (970) 491-6198:

2.804, *Backyard Orchard: Stone Fruits.*

2.907, *Fire Blight.*

5.507, *Spider Mites.*

5.519, *Apple and Pear Insects.*

5.560, *Pear Slugs.*

5.569, *Insect Control: Horticultural Oils.*

For information on mixing small quantities of sprays, visit www.coopext.colostate.edu/TRA/PLANTS/smquant.html

This fact sheet contains up-to-date information for homeowner control of insect and disease problems on tree fruits. Insect and disease controls have been combined in an easy-to-follow format. Recommended chemicals usually are readily available to homeowners. In some cases, the concentration of the product listed and what is available locally may differ.

*Always read the label directions. Labels often are updated yearly or more often. If there is a conflict between recommendations in this fact sheet and the product label, **always follow the product label.***

Restricted use chemicals — for use by certified applicators only — are not included.

Table 2. Pesticides for use on apples and pears. Not all trade names may be mentioned. Always read and follow label directions before using any pesticides.

Common Name	Trade Name(s)	Crops	Pests	Comments
<u>Insecticides:</u>				
carbaryl	Sevin Concentrate (Garden Tech), Sevin Ready-To-Spray (Garden Tech)	apple, pear (not concentrate)	Codling moth (CM), apple maggot (AM), oriental fruit moth (OFM), etc.	Use during first 4 to 6 wks after bloom can thin fruit; avoid using more than once in mid- to late season as carbaryl use can lead to spider mite problems.
endosulfan	Thiodan Garden Dust (Hi Yield)	apple, pear	CM, OFM, etc.	Highly toxic pesticide; use with GREAT caution if children or pets will be playing under the trees. REI: 24 hours (commercial formulations have a 72 hr REI)
esfenvalerate	Bug-B-Gone RTU (Ortho)	apple, pear	CM, AM, OFM, pear psylla, pear slug	REI: when dry; apply on 7day intervals.
malathion	55% Malathion Spray (Hi Yield), Malathion Plus (Ortho)	apple, pear	CM, AM, OFM, aphids, leafrollers, thrips, pear psylla, pear slug, etc.	REI: when dry. Apply on 7 day intervals. NOTE: not all malathion products are useable on apple & pear – check label before purchase.
permethrin	Bug-Stop Multi-Purpose Insect Control Concentrate (Spectracide)	apple, pear	Aphids, CM, OFM, leafhoppers, pear psylla, plum curculio	Do not use after petal fall on apple or after delayed dormant on pear.
petroleum oil	Volk Oil Spray (Ortho)	apple, pear	CM eggs, San Jose scale, aphid eggs, mites & mite eggs, pear psylla	Can cause plant injury if applied at concentrations higher than 2%.
spinosad	Borer, Bagworm, Leafminer, & Tent Caterpillar Spray (Fertilome)	apple only	CM, AM, OFM	
<u>Fungicides:</u>				
captan	Captan Fungicide 50% WP (Hi Yield), Captan 50%, Fruit & Ornamental (Bonide)	apple	apple scab	
copper hydroxide	Copper Fungicide	apple, pear	fire blight	Do not use on pear after petal fall.
potassium bicarbonate	Remedy (Bonide)	apple, pear	powdery mildew, leafspots	
sulfur	Dusting Sulfur 90W (Ferti-Lome), Wettable Dusting Sulfur (Ferti-Lome)	apple, pear	powdery mildew	24 hr REI.
thiophanate methyl	Bonomyl Turf & Ornamental (Bonide), Halt (Bonide)	apple, pear	powdery mildew, apple scab, cedar apple rust	Repeat at 7-10 day intervals, 1 day PHI.
<u>Bactericides:</u>				
streptomycin sulfate	Fire Blight Spray (Ferti-Lome)	apple, pear	fire blight	Note long PHI's: 50 days (apple) & 30 days (pear).

¹C.E. Swift and R. Hammon, Colorado State University Cooperative Extension Tri River Area horticulture/agronomy agents respectively, Grand Junction; and H.J. Larsen, Cooperative Extension fruit disease specialist, Orchard Mesa Research Center, Grand Junction.

Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating. Fort Collins, Colorado. Cooperative Extension programs are available to all without discrimination. No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.