

1984 Pest Management Guide for Stone Fruits in Oregon



Extension Circular 675 / Revised March 1984



OREGON STATE UNIVERSITY EXTENSION SERVICE

Health hazards

Each season there are accidents, and in some years deaths, attributable to the misuses of pesticides. In cases of accidents involving toxic pesticides see your doctor at once. Your doctor may call one of the Consultation or poison Control Centers listed below.

OREGON

Oregon Poison Control and Drug Information Center
The Oregon Health Sciences University
3181 S. W. Sam Jackson Park Rd.
Portland, Oregon 97201
Phone: (503) 225-8968
Oregon Toll Free 1-(800) 452-7165

Good Samaritan Hospital
3600 N.W. Samaritan Drive
Corvallis, Oregon 97330
Phone: (503) 757-5021

Bay Area Hospital
1775 Thompson Rd.
Coos Bay, Oregon 97420
Phone (503) 269-8166

Emergency Department
Sacred Heart Hospital
1200 Alder Street
Eugene, Oregon 97401
Phone: (503) 686-6931

Peaches, cherries, prunes, plums and apricots are among the more important commercial and garden fruit crops in Oregon. The control of diseases and insect pests of both the trees and the fruits is essential for profitable production. This publication contains recommendations for controlling the more serious diseases and insect pests attacking stone fruits. The recommendations in this circular are for the commercial fruit grower. Homeowners with a few fruit trees will find Oregon State University Extension Circular 631, *Spray Schedule for Home Orchards*, more suitable for their needs.

In the Hood River, The Dalles, Milton-Freewater, and Rogue Valley fruit growing districts local spray recommendations are made to meet conditions peculiar to those areas. Growers in these districts should consult their county Extension agents for plant disease and insect control recommendations.

Use pesticides safely

The first guide in the safe use of pesticides is to read the label on each pesticide container before each use and follow the directions given. If you are in doubt after reading the label, contact some qualified person such as your county Extension agent, field representative, or chemical company representative to help evaluate the hazard of the chemical and determine its proper use. All pesticides should be handled with care, but even the most hazardous can be used with safety provided that recommended safety precautions are followed. Many of the materials mentioned in this circular are dangerous poisons and require careful handling. The organic phosphate insecticides—demeton (Systox), parathion and Guthion—are extremely poisonous and require a special warning.

Malathion, Trithion, dimethoate, and diazinon are also organic phosphate insecticides, but are less hazardous than the three listed above. However, these and all other compounds recommended for orchard use always should be used with caution. Ingestion of any of these compounds may be fatal.

Watch for these symptoms

The pesticides mentioned above easily enter the body through contact with the skin, eyes, mouth, throat, and lungs. Repeated exposures to these compounds may, even without symptoms, increase your future susceptibility to poisoning. The initial symptoms of organic phosphate poisoning are giddiness, headache, nausea, vomiting, excessive sweating, and tightness of the chest. These are followed by or accompanied by blurring of vision, diarrhea, excessive salivation, watering of the eyes, twitching of muscles, especially in the eyelids, and mental confusion. One of the most characteristic signs is constriction of the pupils, but this may be preceded by dilation. Late signs are fluid in the chest, convulsions, coma, loss of urinary or bowel control, and respiratory failure.

The symptoms of poisoning by chlorinated hydrocarbon insecticides, such as Thiodan and endrin, are primarily due to their effect on the nervous system and include hyperexcitability, tremors, and convulsions. General symptoms are malaise, headache, fatigue, and possible lack of appetite and weight loss.

Take these precautions

1. If you plan to apply any of the more dangerous pesticides, make sure you and your physician know the types of compounds you are using. If you anticipate using the more toxic organic phosphate materials, your physician may suggest that you have a pre-seasonal blood test to determine your normal cholinesterase activity level and suggest periodic cholinesterase tests during the spray season. He will then be in a better position to deal with a sudden illness. If he should provide you with a supply of atropine tablets for organic phosphate poisoning, make sure he gives you directions for their use. Do not take them before definite symptoms occur. If you ever take atropine tablets, call your physician as soon afterward as possible. Do not resume flying or operating ground equipment after taking atropine. Any person who is ill enough to receive a single dose of atropine tablets, should be kept under medical observation for at least 24 hours, because atropine may produce only temporary relief of symptoms in what may prove to be a serious case of poisoning. Keep atropine tablets away from children. An antidote for treating organic phosphate poisoning, parliodixime chloride (2 PAM) available as Protopam Chloride, Ayerst Laboratories, has proved to be a valuable supplement to atropine in the treatment of severe and

moderately severe cases of organic phosphate poisoning. It is available to physicians and hospitals through regular pharmaceutical channels.

2. Wear protective clothing, preferably water-repellent, while spraying hazardous materials. Toxic pesticides can be absorbed into the body through the skin. Immediately rinse off thoroughly with soap and water any chemical accidentally coming in contact with your body. Make sure gloves, boots, and clothing are free from rips, tears, and worn areas, as pesticides entering through these areas are trapped against the skin, causing an extremely dangerous situation. Rubber gloves should be tied off, if possible, near the tops during mixing and spraying to prevent accidental pesticide entry. Change and launder clothing and bathe daily.

3. Wear a respirator mask when loading or mixing wettable powders or when applying dusts. *The respirator should be approved for the materials in question by the National Institute for Occupational Safety and Health (NIOSH) or the Mining Enforcement and Safety Administration (MESA).* If specific respirator brand or model is in question, consult the *Pacific Northwest Insect Control Handbook* for verification. Wear an approved respirator whenever the more volatile of the toxic compounds are being used, especially parathion and Phosdrin. Change the filters and pads at regular intervals.

4. Paper bags, cardboard boxes, and plastic containers should be burned after making sure that smoke does not drift over nearby homes, people, livestock, and the person doing the burning. Pouring used crankcase oil over the containers before lighting them will aid combustion. Rinse metal or glass containers with water at least three times upon emptying, with the rinse water being added to the spray tank. This practice prevents wastage and hazardous residues that may remain in the container. Break glass jars and crush or punch metal containers with holes for permanent disposal. Never measure or leave mixtures of insecticides in beverage bottles or in labeled cans or boxes that have formerly contained food products. Tragic, preventable poisonings occur when children get hold of "empty" pesticide containers or obtain food containers filled with pesticide.

5. Keep your pesticide storage shed or room locked.

6. Do not eat, drink, smoke, or chew tobacco while handling, mixing, or spraying pesticides.

7. Always use pesticides according to directions and apply at the recommended rate.

8. Experience shows that poisoning occurs most often in hot weather. Spray with the more toxic materials during cooler periods when possible. Be extremely careful when spraying during periods of high temperatures.

9. Apple thinners and others have been poisoned by working in orchards treated with parathion less than 48 hours earlier. Therefore, it is advisable to wait longer than 48 hours before beginning work in treated orchards. If possible, wait a week. Environmental Protection Agency and Occupational Safety Administration re-entry standards are pending for many pesticides, particularly the organo-phosphate insecticides. These re-entry periods are likely to include regional differences. Consult with county Extension agents in your area should questions about re-entry arise.

10. Bury spilled pesticide and wash the contaminated area with soap and lots of water. The breakdown of these insecticides can be sped up by using a weak lye solution.

11. Cover crops treated with most pesticides should not be used as pasture or fed to livestock.

12. Do not feed pesticide-contaminated apple or pear pomace to livestock.

13. There have been a number of cases of irritation of skin, eyes, and respiratory tract from the use of ziram. These cases have occurred to sprayers from direct contact with the materials and to thinners and pickers whose only exposure was to residues on fruit.

14. Agricultural workers should avoid eating unwashed chemically treated fruit and vegetables in the field. The time limitations from application to harvest have been established to protect the pickers, growers, and field representatives.

15. Avoid pesticide drift to non-target areas and organisms. Although drift within the orchard is beneficial in that it aids pesticide distribution on and among trees to the pest organisms, drift from the

orchard can be both wasteful and hazardous. Take the proper precautions to minimize spray drift by observing the following:

Calibrate spray application equipment accurately.

Coarse spray droplets do not drift as far as fine ones; use the coarsest spray that will give effective and economic coverage.

High wind velocities create hazards by making drift control impossible.

Very high temperatures and temperature inversions impair and can prevent pesticides from settling to the trees and ground within the treatment area.

Downhill air movement in the early morning on a calm day can carry spray a considerable distance from the target area.

What to do for poisoning

1. In severe cases or organic phosphate poisoning, breathing may stop. In such a situation, *artificial respiration is the most important first aid until breathing has resumed.*

2. Get the patient to a hospital or physician as soon as possible. Give artificial respiration on the way if the patient turns blue or stops breathing. If you know which pesticide may be involved, *take along a label for the doctor's information.* If the label cannot be removed easily, carefully take along the entire pesticide container.

3. Never try to give anything by mouth to an unconscious patient.

4. If a pesticide has been splashed into your mouth or swallowed, immediately rinse your mouth with plenty of water. It is sometimes dangerous to cause vomiting after swallowing certain pesticides. It is, therefore, very important to have first read and understood the label directions for this situation. If vomiting is recommended, induce it by giving a tablespoon of salt dissolved in one-half glass of warm water. If the person is a child, induce vomiting by stimulating throat with blunt end of a spoonhandle—keeping head in an inverted position.

5. Where excessive amounts of the pesticide, especially in concentrate form, have come into contact with the skin, immediately remove all clothing and bathe with generous amounts of soap and water, rinsing thoroughly.

6. If the eyes have been contaminated with spray, especially with insecticide concentrate, flush them immediately with copious amounts of water, preferably with running or flowing water, and immediately consult a physician.

7. Lie down and keep warm.

This warning statement was prepared with the assistance of staff members of the Office of Research and Monitoring, Environmental Protection Agency, Wenatchee, Washington, and the Occupational Health Section, State Board of Health, Portland, Oregon.

Bees are necessary—don't kill them

Bees are essential for fruit set. Protect these pollinating insects in orchards. The following suggestions are made to give maximum protection to bees:

1. Avoid using insecticides immediately before or during the bloom period.

2. Do not introduce bees into the orchard until there is 10 percent bloom.

3. If for some reason insecticides are needed during the bloom period, make application in the evening after bee activity has ceased, choosing one that is least hazardous to bees.

4. Have the beekeeper move bees from the orchard as soon as the peak of blooming period has passed.

5. Competing bloom, such as mustard in the orchard cover, is usually more attractive to honeybees than fruit blossoms. Insecticide residues settling on these cover crops are frequently the cause of heavy bee loss. From the standpoint of bee protection and increased pollination, it is desirable to mow competing bloom before the period of fruit pollination.

Residue tolerances

In preparing these spray programs, full consideration has been given to residue tolerances established by the Federal Food and Drug Administration. The suggested minimum number of days between last application of a pesticide and harvest is based on the best information available. All tolerances are subject to change, and unusual local conditions or spray practices may affect the persistence of residues. Regulations exempt petroleum oils, sulfur, lime sulfur, and bordeaux from requiring a tolerance, since they are not classed as poisonous or deleterious substances.

DISEASES OF STONE FRUIT

Brown rot

Brown rot (caused by the fungi *Monilinia fructicola* and *M. laxa*) causes both a blossom blight and a fruit rot in all stone fruits. Up to 50 percent of the blossoms may become infected and die. The prevention of blossom blight requires the application of sprays at blossom time; the control of fruit rot requires spraying or dusting as the fruit approaches maturity. The amount of blossom blight directly influences the amount of brown rot fruit rot that occurs. Severe blossom blight may result in increased fruit rot.

The fungus spores, which originate the brown rot disease each spring, may come from these sources:

1. Affected fruits which fell to the ground the previous year. These fruits are often called "mummies" because of their hard, dried-up condition. If they become covered with earth during the fall and winter, they may produce mushroom-like growths and liberate spores in the spring.

2. Affected fruit "mummies" that overwinter in the tree and produce spores in the spring.

3. The fruiting bodies in wood that was killed by the blossom blight fungus the previous spring (peach, sour cherry, prune).

Control of blossom blight

Brown rot blossom blight in peaches, cherries, prunes, and apricots can be controlled best by spraying when the blossoms are showing pink through petal fall. Applications during the blossoming period (popcorn, full bloom, and petal fall stages of blossom development) are necessary.

The fungus that causes blossom blight of cherry kills the blossoms and other flower parts. These often adhere to spurs and twigs until harvest time and can be a major source of fungus spores for the fruit rot phase of the disease.

On peach and sour cherry, but not on prune or sweet cherry trees, the fungus penetrates the wood after killing the blossoms, resulting in the death of young twigs and branches. By the following spring the fungus in the wood produces fruiting bodies containing spores that are probably the main source of inoculum for peach blossom blight. Cutting out the twigs and branches killed by the fungus will aid in blossom blight control. The cutting should be done when the leaves are still on the tree and when the affected branches can be seen readily.

Blossom blight of prune is a much less serious disease than it is for cherry or peach blossoms but, in some seasons, can cause losses. Growers in some areas follow an annual blossom spray program; others, in areas where the disease is not a problem, do not. The growers who apply annual bloom sprays report good control of blossom blight by three bloom applications of dichlone at ½ pound per 100 gallons.

Control of brown rot in fruit

The severity of brown rot in ripening fruit varies from year to year depending on the season. During the green fruit stages no significant amount of brown rot is likely to appear unless there is considerable rainfall. As the fruit ripens, the danger from brown rot becomes greater, especially if there is wet weather or high humidity. Much of the brown rot infection in ripening fruit originates in the orchard, but it may also spread rapidly in lugs of fresh fruit shipments after harvest if the fruit is held very long in storage or in transit. This is especially true in the case of prunes or peaches shipped fresh to distant markets.

The best known materials for the control of brown rot in the ripening of fruit are wettable sulfur, sulfur dusts¹, captan, ferbam, or ziram sprays. (Do not use captan or ziram on prunes.) These are about equally effective and the growers may use whichever they prefer or are equipped to use. If a sulfur dust is preferred, use 325-mesh or finer at the rate of 50 pounds per acre.

Other precautions recommended

In addition to a well-planned and executed spray program, certain other practices will help materially in reducing the amount of brown rot in peaches after picking. These practices are:

Exercise the greatest care in picking and handling to avoid punctures and skin abrasions on the fruit. *Any break in the skin of the fruit enables brown rot to gain entrance more easily.* Discard all fruit with brown rot spots.

Coryneum blight in peaches and apricots

This disease may cause serious damage to peach and apricot trees and fruit, particularly in western Oregon. In eastern Oregon, severe infection of fruit has occurred in recent years. The blight is caused by the parasitic fungus *Stigmata carpophila* (*Coryneum beijerinckii*). It blights the buds and produces small sunken spots on the fruiting wood during the fall and winter, followed by a severe spotting of the fruit, leaves, and twigs in the spring and early summer. Infected peach leaves are often partially shed throughout the early growing season. On 2- to 4-year-old wood, dark gnarled cankers develop. These act as holdover sources of spore infection.

Because of the gummy material the canker produces, such infected areas may have a glazed or varnished appearance. In apricots, buds are blighted and often killed, but very few twig infections can be found.

The most important control measure, consisting of a fall bordeaux spray at 8-8-100, or a ziram spray, prevents bud and twig infections, many of which occur after fall and spring rains. In the spring, apply a sulfur spray or dust at the husk-fall stage to protect the young fruits from infection. On apricots use ziram instead of sulfur.

Peach leaf curl

This fungus attacks all varieties of peaches, injuring many of them critically. If unsprayed for a number of years, infected trees often die. Peach leaf curl, caused by the fungus *Taphrina deformans*, can be prevented by two applications of bordeaux, lime sulfur, Cyprex, ferbam, ziram, Kocide 101, or Bravo 500, if applied thoroughly during the dormant season. Apply in mid-December and again in mid-January, before the buds swell in the spring.

Cherry bacterial canker (dead bud phase)

The killing of dormant buds in cherry trees in the Willamette Valley, commonly known as the dead bud disease, is now known to be caused by the same bacterium that causes the bacterial canker disease of cherry. For this reason, the dead bud disease is considered as the dead bud phase of the bacterial canker disease.

Dead bud has been a serious problem in the Willamette Valley for many years and has resulted in the loss of many thousands of dollars. In recent years, the losses in some seasons have exceeded 30 percent of the expected Royal Ann cherry crop. Dead bud is first noticed as dying buds on spurs in the spring. Infected buds usually start to die in February. As the disease progresses within the tree, both leaf and flower buds become infected. Dead bud usually starts in the lower cherry limbs and moves up into the tree and to adjacent trees in successive years. Often trees in the lower parts of the orchard where air drainage is poor are the first to become infected. If all the buds on a spur are killed, the spur will die back the following season. Cankers are seldom formed, but a slight gumming may be produced by the diseased buds. Repeated death of buds may result in misshapen growth. Stems sometimes enlarge or flatten as if several were fused. In severe cases, 90 percent or more of the buds on a tree may be killed.

The varieties Royal Ann, Bing, Lambert, and Van are quite susceptible to dead bud. Black Republican and Mazzard seedlings are somewhat less susceptible.

¹ On apricots, sulfur has been found to have a detrimental effect when used in any form and is, therefore, not recommended on this fruit.

Control of dead bud can be obtained by sprays of bordeaux 12-12-100 or Kocide 101, 6 lb. plus 1 pint supreme or superior type oil per 100 gallons water. Thorough spray coverage of the trees is necessary for disease control. Use the recommended amounts of bactericide per acre. Do not operate sprayer faster than 2 miles per hour. Times of the spray applications are as follows:

- (1) late August (if infection is severe)
- (2) during October
- (3) as soon as possible after January 1

Cherry powdery mildew

This fungus disease appears as a white mold on the surface of leaves and in very severe cases on the fruit. Often mildew is first noticed on the young shoots of trees in areas where there is poor air circulation because of location or tall cover crops. There has been no research in Oregon on the application of fungicides for the control of this disease. Where growers wish to apply fungicides, the recommendations of Washington State University may be used as a guide. Wettable sulfur at 4 to 6 pounds or Benlate 50 WP at 4 oz. per 100 gallons of spray, or sulfur dust at 50 pounds per acre at shuck fall, and again 15 to 20 days later are suggested.

Cherry leaf spot

This disease is caused by the parasitic fungus *Coccomyces hiemalis*. Sprays of dusts applied at petal fall, shuck fall, and again 2 weeks later control leaf spot. Captan, ferbam, dichlone, ziram, Cyprex, and Bravo 500 are recommended. Thorough coverage of all foliage is necessary for cherry leaf spot control.

INSECT PESTS OF STONE FRUITS

Aphids on prunes and plums

At least three species of aphids attack prunes. These include the leafcurl plum aphid, the hop aphid, and the thistle aphid. Aphids cause leaves to curl, and in severe infestations the damage will result in partial defoliation. An application of oil plus an insecticide, used for San Jose scale control during the dormant season, will kill overwintering aphid eggs on trees. The aphids can be controlled by a spray application during the petal-fall stage after overwintering aphid eggs have hatched. Use 1 pound Thiodan 50 WP, 1 pound diazinon 50 WP, or 1 pound parathion 25 WP, or 2 pounds malathion 25 WP, or 1 pint Systox 2 EC per 100 gallons of water.

Black cherry aphid on cherries

The black cherry aphid frequently causes severe injury to the terminal growth of sweet cherries. The leaves, particularly on the terminal growth, are curled and covered with a sticky honeydew. Overwintering eggs usually hatch in early March or about the time buds begin to swell.

Dormant sprays

Dormant oil sprays at the rate of 1 to 2 gallons per 100 gallons of water with the addition of an organophosphate insecticide applied in the dormant period have been effective.

Lime sulfur-oil combinations sprays or oil sprays will aid in control of newly hatched aphids when applied in delayed dormant period before winterbuds open. These sprays may cause injury if applied beyond the delayed dormant period.

Popcorn and petal fall sprays

The following chemicals will control aphids, leafrollers and the bud moth: Use 1 pound parathion 25 WP, or 1 pound diazinon 50 WP, or 1 pound Thiodan 50 WP per 100 gallons of water. Malathion 5 percent dust at the rate of 50 pounds per acre will control the black cherry aphid and may be combined with sulfur for brown rot control. *To avoid bee losses, these insecticides must not be applied during the bloom period. See minimum days between last application and harvest.*

Bud moth on cherries, plums and prunes, and peaches

These insects are found most frequently on prunes, but may damage all orchard fruits. They spend the winter as small, dark brown larvae and become active in the late winter and spring, about the time the buds begin to swell appreciably, burrowing into the

expanding buds and terminal shoots. Later in the season a new generation feeds on the fruit and foliage, often attaching a leaf to the surface of the damaged fruit.

Cherry fruit fly

The cherry fruit fly is the most serious insect pest of cherries. To be acceptable to buyers, cherries must be free of worms. This is possible if the recommended insecticides are thoroughly applied at the proper times.

Cherry fruit flies overwinter as pupae in small, hard, brown cases called puparia buried from 1 to 3 inches in the ground under infested cherry trees. The flies emerge from the soil, usually during the last week in May or first week in June. About 8 to 10 days after emergence, the female flies begin to lay eggs under the skin of the cherry. These eggs hatch in from 5 to 7 days and the maggots mature in about 14 to 20 days. When full grown, the maggots drop to the ground and form their puparia in the soil.

Insecticides are applied to kill the flies before they lay eggs. Therefore, it is important that they be applied soon after the flies emerge. Repeated applications of insecticides are necessary because the flies continue to emerge for 5 to 6 weeks. Flies will rest not only on cherry foliage, but on interplanted trees and shrubs along fence rows.

Cherries for processing

The decision whether to follow a spray or dust program will largely depend on the equipment available to the grower. Any of the following programs are satisfactory.

Dust program

Malathion. In some instances growers may wish to apply malathion as one of the dust applications to control orchard pests in addition to the cherry fruit fly. In such cases use a 5 percent dust at the rate of 50 pounds per acre, but do not apply closer than 3 days before harvest.

ULV program

Malathion. Ultra low volume (ULV) application by aircraft only. Use 12 to 16 ounces technical malathion per acre. Five applications at weekly intervals may be required. If rain occurs, more applications may be necessary. Consult your county Extension agent or field representative. Both spray or dust applications should be made at 10-day intervals beginning with the first emergence of the fly and continuing until harvest of the fruit. The date first flies emerge is variable. Usually it is in late May or early June, and is announced by county Extension agents. All sprays should be complete cover sprays and all parts of the tree should be thoroughly sprayed or dusted.

Spray program

Dimethoate 2.67, use 4 to 6 pints as a dilute spray at first adult emergence. Dimethoate has given season-long control with one application. Phytotoxicity can occur and varies from insignificant marginal leaf burn to leaf yellowing. Minor defoliation has occurred in extreme situations. Use the 4-pint rate on young trees. Do not tank-mix with Cyrex. Do not harvest fruit within 21 days of application. Apply only once per season.

Diazinon. 1 pound 50 WP or 1/2 pint diazinon 4 EC per gallon in 100 gallons water. Do not apply closer than 10 days before harvest. This insecticide also controls black cherry aphid.

Methoxychlor. 2 pounds 50 WP per 100 gallons of water. Do not apply methoxychlor closer than 7 days before harvest.

Sevin. 2 pounds 50 WP or its equivalent in other formulations per 100 gallons of water. Do not apply Sevin closer than 1 day before harvest.

Parathion. 1 pound 25 WP or 1 pint parathion 2 EC per gallon in 100 gallons of water. Do not apply closer than 14 days before harvest. This material is very toxic to humans. Follow manufacturer's precautions carefully.

Cherries for fresh market

Cherries sold on the fresh market are not always washed. To avoid toxic and unsightly residues, recommendations differ from those for processing cherries. Any of the following programs are recommended.

Dimethoate 2.67, use 4 to 6 pints as a dilute spray at first adult emergence. Dimethoate has given season-long control with one application. Phytotoxicity can occur and varies from insignificant marginal leaf burn to leaf yellowing. Minor defoliation has occurred in extreme situations. Use the 4-pint rate on young trees. Do not tank-mix with Cyrex. Do not harvest fruit within 21 days of application. Apply only once per season.

Diazinon. 1/2 pint 4 EC per 100 gallons of water. Repeat applications at 10-day intervals until harvest. Do not apply within 10 days of harvest.

Malathion. Ultra low volume (ULV) application by aircraft only. Use 12 to 16 ounces technical malathion per acre. Five applications at weekly intervals required. If rain occurs, more applications may be necessary. Consult your county Extension agent or field representative. Do not apply within 1 day of harvest.

NOTE: Growers who prefer to dust may use the same materials suggested under "Cherries for processing."

Regardless of the formula used, the sprays or dusts should be complete cover applications, and all parts of the tree should be thoroughly sprayed or dusted.

If air carrier sprayers are used, the following amounts of insecticides per acre are suggested:

diazinon 50 WP - 2 pounds

diazinon 4 EC - 2 pints

parathion 25 WP - 4 pounds

Regardless of the spray or dusts used or the program followed, make the first application when the first flies begin emerging. The date of beginning emergence will be announced by the Agricultural Experiment Station through the Oregon State University Extension Service.

If any of the spray or dust applications for cherry fruit fly control are followed by heavy rains, repeat them.

Spray or dust interplanted trees at the time the cherry trees are treated. While the cherry fruit flies deposit their eggs only in cherry fruits, they often rest on various types of foliage.

Cherry slug

This pest occurs as a greenish-brown, slimy, slug-like larva, which skeltonizes the foliage of cherry. The cherry slug is seldom a pest in orchards where a spray program is followed. It is easily killed and any of the insecticides recommended and used for cherry fruit fly will give good control.

Fruit tree leafroller

This insect occasionally attacks stone fruits, particularly cherry and prune. It overwinters in the egg stage. The eggs hatch in the spring about the time buds begin to open. The larvae damage buds and developing fruit.

Dormant spray on cherries, prunes and plums

Use 4 gallons of dormant oil emulsion to destroy the overwintering egg masses, or 2 gallons supreme or superior type oil per 100 gallons of water.

Pre-pink spray on cherries, prunes and plums

Use 1 pound diazinon 50 WP or 1 pound Thiodan 50 WP or 1 pound parathion 25 WP per 100 gallons of water. See *minimum days between last application and harvest*.

Green peach aphid on peaches

The green peach aphid is the most common species of aphid found on peaches. It overwinters as eggs on the buds, between the bud and the stem, or just beneath the bud. When first laid, the eggs are olive green, but within a few weeks turn black. The eggs begin hatching before the blossom period. The aphids damage blossoms and foliage. Use 1 pound parathion 25 WP or 1 pound diazinon 50 WP, or 2 pounds malathion 25 WP or 1 pound Thiodan 50 WP or 1 pint Systox 2 EC per 100 gallons of water. See *minimum days between last application and harvest*.

Lecanium scale

Lecanium scale is more frequently a pest of peaches and prunes but may also be found on cherries. These insects overwinter on limbs and twigs of trees and appear as rather large, dark brown, strongly-humped scales. The standard method of control is to apply

an oil emulsion spray in the early spring as the buds begin to swell. Injury may occur if oil sprays are used after buds start to open. The lime sulfur plus oil and polysulfide plus oil combinations are also effective. Bordeaux mixture may be combined with dormant oil for both peach leaf curl and lecanium scale control.

If a dormant spray was not applied, reasonably good control can be obtained by application of 1 pound diazinon 50 WP, or 1 pound parathion 25 WP or 2 pounds malathion 25 WP per 100 gallons of water, to control the crawler stage of this insect. This is a summer spray and should be applied after most or all the scale eggs have hatched. Usually this is about mid-July. Double-sided, sticky cellophane tape can be wrapped around twigs infested with scale. A "crawler" spray should be applied when small scale crawlers begin to be stuck on the tape. See *minimum days between last application and harvest*.

Oriental fruit moth

The oriental fruit moth, a potentially serious orchard pest, has been found in small numbers in a few localities in the vicinity of Portland and Salem. The oriental fruit moth is primarily a pest of peaches and quince, but will infest cherries, apricots, apples, pears, plums, and other host plants.

The adult moth is grayish brown in color with a wing expanse of about half an inch. Larvae are pink in color and about half an inch long when full grown. The insect spends the winter as full-grown larva inside a cocoon. Cocoons may be found under loose bark, bark crevices, mummified fruit, or hollow weed stems near the tree.

Moths usually begin emerging in early May and reach a peak the first week of June. Eggs are laid on the underside of foliage, usually near the terminal end of twigs. Larvae emerging from the eggs mine the young succulent twigs, causing the tips to wilt. Infested twigs die and produce a condition known as "flagging."

Later in the summer, after twigs harden, larvae infest fruit. Three broods occur in the Willamette Valley per year. The first brood infests twigs and the others attack fruit. In irrigated orchards where twig growth is succulent, larvae may infest twigs during the entire summer. Fruits on later maturing varieties are more susceptible to injury.

Where this insect is a pest, cover sprays can be timed using pheromone traps. Guthion (azinphosmethyl) has been a very effective insecticide. It should be applied just before a peak flight occurs.

Use 1 pound parathion 25 WP or 2 pounds Sevin 50 WP or 0.75 pound Guthion 50 WP or 1-1 1/2 pound Imidan 50 WP per 100 gallons of water. Guthion and Imidan are effective against the peach twig borer when applied at the petal-fall stage. Parathion will aid in the control of aphids, spider mites, and bud moth.

Pydrin, Ambush, and Pounce can also be used to control oriental fruit moth. They are also effective against peach twig borer and leafrollers.

Parathion is not recommended for use in residential areas. See *minimum days between last application and harvest*.

Western peach tree borer (peach and prune root borer)

This insect can be a serious pest on both peaches and prunes. The adult is a dark blue, clear-winged moth. The female sometimes has a bright orange band around the body. The larva does the damage. The presence of the insect is indicated by blobs of pitchy sawdust about the base of the tree.

This insect can be controlled with trunk sprays of Thiodan, Lorsban, Guthion, or Pydrin. Make the first application about July 10 to 15, the second about 3 to 4 weeks later. If the infestation is not heavy, the first spray will give adequate control. Apply insecticides as a coarse spray at 60 to 80 pounds pressure to lower scaffold limbs and around the trunk. Allow some of the spray to puddle around the base of the tree. Trees 4 to 6 inches in diameter will require about 1 pint to 1 quart of spray per tree. If there is the possibility of fruit contamination, do not use Thiodan within 7 days (prunes) or 30 days (peaches) of harvest. Lorsban 4E, 3 quarts in 100 gallons of water, can be applied to peach trees only. Don't apply within 14 days of harvest. Use only once.

Peach-twig borer

This insect may attack peaches, prunes, and apricots. It hibernates over the winter in tiny chimney-like hibernacula, which the larvae construct in the crotches of peach branches and twigs. About the time the peaches begin blooming in the spring, the larvae

become active and enter the developing twigs, killing them back 3 or 4 inches. One larva may attack several twigs. A second generation may cause serious injury to the fruit as well as twigs.

A dormant oil spray plus an organophosphate insecticide will control this pest. It can also be effectively controlled by spraying trees in the prebloom period, using 1 pound diazinon 50 WP or 1 to 2 pounds Thiodan 50 WP or 2 pounds Sevin 50 WP or 3/4 pound Guthion 50 WP or 1 to 1 1/2 pounds Imidan 50 WP per 100 gallons of water. Pydrin, Pounce, and Ambush are also effective insecticides. A summer spray timed by using pheromone traps and applied when an average of two moths per trap per week are caught will give good control.

Pear thrips

Pear thrips can cause more damage to prunes than to pears or other fruits, but have caused localized damage to cherries. The slender, dark brown thrips emerge from the ground in the early spring, feed in the developing buds, and cause deformed leaves and blossom drop. If infestations are severe, crop loss may occur.

Effective controls are no longer Federally registered.

San Jose scale

San Jose scale has been one of the most serious orchard pests. It does most harm to apples and pears, but may damage sweet cherries, peaches, and prunes. It spends the winter as half-grown, ash-gray or blackish, pimple-like scales on the bark. The bark usually shows a purple stain around each scale, especially on young trees and new growth. Infested trees become devitalized and frequently have dead twigs. Infested fruit shows bright red spots. Dormant and delayed dormant sprays of supreme or superior type oils plus an organophosphate insecticide have been most effective in controlling San Jose and other scales. It is important that spraying be done thoroughly to cover all parts of the tree. If dormant spray has not been applied, crawlers can be controlled as suggested for lecanium scale. Crawlers of San Jose Scale appear somewhat earlier, usually most abundant about mid-June.

Shot-hole borers

Shot-hole borers most frequently attack trees that are in an unhealthy or sour-sap condition. The small, dark-colored beetles bore into the sapwood, making tunnels where they lay their eggs. Small, round holes in the bark are characteristic of attack by these beetles. At times the point of attack is just beneath a bud or fruit spur that is weakened or killed. Injury often occurs along the margin of an orchard next to an old pile of prunings or another orchard which is heavily infested.

Damaged by shot-hole borers largely can be prevented by keeping the orchard in a healthy, vigorous growing condition. Prunings should be destroyed promptly. The use of 1 pound parathion 25 WP per 100 gallons of water aids in control. Shot-hole borers occasionally attack young trees. Thiodan can also be used, 1 1/4 lb. 50 W per 100 gals. water.

Sprays should be applied when adult beetles are active, usually in late April and May and again in early September. See *minimum days between last application and harvest*.

Mites

Several species of mites are considered to be among the more serious orchard pests. They feed on plant juices and contribute to a devitalized condition of the trees and premature leaf drop. Some species overwinter as eggs on the trees, others as adults in crevices of the bark or under the debris on the ground.

Dormant sprays of oil or oil-lime sulfur are helpful in controlling European red and brown mites because the species overwinter as eggs on the tree.

The spider mites overwinter as fertilized adult females on the orchard floor or under bark scales and are usually well controlled by the dormant and delayed dormant sprays for European red and brown mite. Sulfur sprays or dusts used in plant disease control may aid in mite control. Neither the dormant spray nor the sulfur applications can be depended on for full season control.

In parts of the state, some miticides are no longer effective against spider mites. If you are in doubt concerning the effectiveness of these materials in your area, check with your county Extension agent.

Thrifty trees, growing under conditions of adequate moisture, are less seriously damaged by mites than trees that are dry and in poor condition.

Syneta leaf beetle

This insect occurs in April and May on foliage, fruit clusters, and in open blossoms as a creamy-white beetle about one-fourth inch long. It eats holes in the leaves and blossom petals and gnaws out small cavities in fruit stems. The syneta beetle is especially injurious to cherries.

Apply 1 pound Thiodan 50 WP per 100 gallons of water immediately after bloom. An alternative spray is 2 pints of either Guthion or azinphosmethyl per 100 gallons or Imidan 50 W 2 lb. per acre, applied at the popcorn stage after the beetles have entered the

orchard. However, this spray must be applied from 5 to 7 days prior to bloom to prevent bee poisoning.

Western spotted cucumber beetle

This insect has become a serious pest of peaches in western Oregon. Irregular-shaped pits are eaten in the green and ripening fruit. Damaged fruit usually rots, causing complete loss. A sulfur dust containing methoxychlor will control this insect. Parathion as suggested for control of oriental fruit moth is effective against the western spotted cucumber beetle. A spray with 2 pounds Sevin 50 WP per 100 gallons of water or a 5 percent Sevin dust is also effective and may be applied within 1 day of harvest. See *minimum days between last application and harvest*.

CHERRY SPRAY SCHEDULE

Pest	Material*	Amt./acre	Amt./100 gal.	Minimum days from last application and harvest	Remarks
1. (a) Dormant spray (October and January)					(See footnote 1)
Dead bud	1. bordeaux	48-48-400	12-12-100	—	Spray thoroughly. Use recommended amounts per acre. Do not operate sprayer faster than 2 miles per hour. No residue problem when applied at this time. Do not graze sheep in orchards sprayed with copers.
Bacterial Canker ¹	2. Kocide 101 + superior or superior-type oil	24 lb. 4 pt. 4 pt.	6 lb. 1 pt. 1 pt.	— — —	
1. (b) Dormant and delayed dormant sprays (before buds open and before eggs hatch)					
Scale insects	1. superior type oil	8 gal.	2 gal.	—	Emulsifiable concentrates or flowable formulations combine with oil better than wettable powders. Be sure adequate agitation is provided. Where San Jose scale is a problem, the oil plus diazinon or supracide are the preferred materials.
Mite eggs	+				
Black cherry and other aphids	diazinon 4 EC or Supracide 2 E	1 gal. 1 gal.	1 qt. 1 qt.	— —	
	2. ethion-oil premix 3. Trithion-oil premix	4-8 gal. 4-8 gal.	1-2 gal. 1-2 gal.	— —	
	4. superior type oil	8-10 gal.	2-2½ gal.	—	
2. Popcorn stage (blossom buds white just before opening)					(See footnote 2)
Brown rot blossom blight	1. Benlate 50 WP 2. captan 50 WP 3. Bravo 500	1 lb. 8 lb. 4.5-8 pt.	¼ lb. 2 lb. 1.125-2 pt.	— — —	Apply only one spray of Benlate or Topsin M. Frequent applications of these fungicides may increase the incidence of fungus strains tolerant to both. See footnote 4. See footnote 5. See footnote 2. See remarks above.
	4. coppers—fixed	Follow manufacturer's directions			
	5. Cyprex 65 WP	2 lb.	¼ lb.	—	
	6. ferbam 76 WP	6 lb.	1½ lb.	—	
	7. Funginex 18.2 EC	48 fl. oz.	12 fl. oz.	—	
	8. Kolo-100	14 lb.	3½ lb.	—	
	9. Quintar 5F	25.6 fl. oz.	6.4 fl. oz.	—	
	10. Rovral 50 WP	1-2 lb.	.25-.50 lb.	—	
	11. Topsin M 70 WP	1½-2 lb.	½ lb.	1 day	
	12. ziram 76 WP	6 lb.	1½ lb.	—	
Aphids, bud moth leafrollers	1. diazinon 50 WP 2. Thiodan 50 WP 3. parathion 25 WP	4 lb. 4-5 lb. 4 lb.	1 lb. 1-1¼ lb. 1 lb.	10 21 14	

* Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides.

CHERRY SPRAY SCHEDULE (Continued)

Pest	Material*	Amt./acre	Amt./100 gal.	Minimum days from last application and harvest	Remarks	
Syneta beetle, bud moth, leafrollers	1. Guthion 50 WP	2 lb.	½ lb.	15	Imidan is the preferred material for syneta beetle control.	
	2. Imidan 50 WP	2 lb.	½ lb.	7		
Aphids, lecanium scale	1. malathion 8 EC	3 pt.	¾ pt.	3		
3. Full blossom stage						
Brown rot blossom blight	1. Bravo 500	4.5-8 pt.	1.125-2 pt.		See footnote 4.	
	2. captan 50 WP	8 lb.	2 lb.	—		
	3. coppers—fixed	Follow manufacturer's directions				
	4. Cyprex 65 WP	2 lb.	½ lb.	—		
	5. ferbam 76 WP	6 lb.	1½ lb.	—		
	6. Funginex 18.2 EC	48 fl. oz.	12 fl. oz.	—		
	7. Kolo-100	14 lb.	3½ lb.	—		
	8. Quintar 5F	25.6 fl. oz.	6.4 fl. oz.	—		
	9. Rovral 50 WP	1-2 lb.	.25-.50 lb.	—		
	10. sulfur dust	50 lb.		—		
	11. ziram 76 WP	6 lb.	1½ lb.	—		
4. Petal fall spray (when most of the petals are falling)						
Brown rot blossom blight	1. Bravo 500	4.5 pt.	1.125-2 pt.		See footnote 2.	
	2. captan 50 WP	8 lb.	2 lb.	—		
	3. Cyprex 65 WP	2 lb.	½ lb.	—		
	4. Quintar 5F	25.6 fl. oz.	6.4 fl. oz.	3		
	5. ferbam 76 WP	6 lb.	1½ lb.	—		
	6. Kolo-100	14 lb.	3½ lb.	3		
	7. Rovral 50 WP	1-2 lb.	.25-.50 lb.	—		
	8. ziram 76 WP	6 lb.	1½ lb.	7		
	9. sulfur dust	50 lb.		—		
Leaf spot	1. Bravo 500	4.5-8 pt.	1.125-2 pt.			
	2. captan 50 WP	8 lb.	2 lb.	—		
	3. Cyprex 65 WP	2 lb.	½ lb.	—		
	4. ferbam 76 WP	6 lb.	1½ lb.	—		
	5. Quintar 5F	2 lb.	½ lb.	3		
	6. ziram 76 WP	6 lb.	1½ lb.	7		
	7. sulfur dust	50 lb.		—		
Syneta beetle, aphids, leafrollers	1. Thiodan 50 WP	4 lb.	1 lb.	21	Remove bees from orchard before treating. All materials are toxic to bees, diazinon and parathion for up to 7 days post treatment.	
Aphids, Leafrollers	1. diazinon 50 WP	4 lb.	1 lb.	10		
	2. parathion 25 wP	3 pt.	1 lb.	14		
Aphids	1. malathion 8 EC	3 pt.	¾ pt.	3		
5. Shuck fall spray (as soon as shucks fall from fruit)						
Leaf spot	1. Bravo 500	4.5-8 pt.	1.125-2 pt.		Add a spreader to all sprays.	
	2. captan 50 WP	8 lb.	2 lb.	—		
	3. Cyprex 65 WP	2 lb.	½ lb.	—		
	4. ferbam 76 WP	6 lb.	1½ lb.	—		
	5. Quintar 5 F	25.6 fl. oz.	6.4 fl. oz.	3		
	6. Rovral 50 WP	1-2 lb.	.25-.50 lb.	—		
	7. ziram 76 WP	6 lb.	1½ lb.	7		
	8. sulfur dust	50 lb.		—		
6. Two weeks later spray (2 weeks after shuck fall)						
Leaf spot	1. Bravo 500	4.5-8 pt.	1.125-2 pt.		Add a spreader to all sprays.	
	2. captan 50 WP	8 lb.	2 lb.	—		
	3. Cyprex 65 WP	2 lb.	½ lb.	—		
	4. ferbam 76 WP	6 lb.	1½ lb.	3		
	5. Quintar 5 F	25.6 fl. oz.	6.4 fl. oz.	7		
	6. ziram 76 WP	6 lb.	1½ lb.	—		
	7. sulfur dust	50 lb.		—		

* Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides.

CHERRY SPRAY SCHEDULE (Continued)

Pest	Material*	Amt./acre	Amt./100 gal.	Minimum days from last application and harvest	Remarks
7. Later sprays (First sprays for fruit fly should be made when flies first emerge. This date is variable from year to year and is usually announced by the Agricultural Experiment Station and Extension Service in your area.)					
Brown rot on fruit	1. wettable sulfur	24 lb.	6 lb.	—	Apply 14 days and 7 days before harvest if rains occur. Add a spreader to ferbam, ziram or captan.
	2. ferbam 76 WP	6 lb.	1 ½ lb.	—	
	3. ziram 76 WP	6 lb.	1 ½ lb.	7	
	4. captan 50 WP	8 lb.	2 lb.	—	
	5. sulfur dust	50 lb.			
Cherry fruit fly	1. dimethoate 2.67 EC	4-6 pt.	1-1 ½ pt.	21	Use only once per season. Apply by ground application only. Phytotoxicity can occur, varying from marginal leaf burn to yellowing of foliage and some defoliation. Do not tank-mix with Cyprex. 3 days if by ground. Smaller trees may get by with reduced rates. Mesurool also repels birds at these rates. Repeated usage of Mesurool, though, may lead to mite problems. See footnote 3. Rates of Mesurool greater than 3 lbs. per acre and captan or diazinon combinations with Mesurool may cause leaf and fruit injury.
	2. malathion ULV	1 pt.	aerial	1	
	3. malathion 25 WP	8 lb.	2 lb.	3	
	4. diazinon 50 WP	4 lb.	1 lb.	10	
	5. parathion 25 WP	4 lb.	1 lb.	14	
	6. methoxychlor 50 WP	8 lb.	2 lb.	7	
	7. Mesurool 75 WP	3 lb.	¾ lb.	7	
Cherry slugs	Usually controlled with insecticides applied for control of other pests.				
Scale crawlers and cherry fruit fly	1. diazinon 50 WP	4 lb.	1 lb.	10	
	2. parathion 25 WP	4 lb.	1 lb.	14	
Shot-hole borers	1. parathion 25 WP	4 lb.	1 lb.	14	Apply Thiodan to scaffolds and limbs as a drenching spray to control shothole borer.
	2. Thiodan 50 WP	5 lb.	1 ¼ lb.	21	
Spider mites and rust mites	1. Omite 30 WP	6-8 lb.	1 ½-2 lb.	—	Use Omite only during post harvest.
	2. Kelthane 35 WP	6-8 lb.	1 ½-2 lb.	7	
	3. Vendex 50 WP	1-2 lb.	¼-½ lb.	14	

* Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides.

FOOTNOTES:

¹ Some growers report control of the canker phase of bacterial canker by the application of bordeaux 12-12-100 in October and January, others report little or no control. Further research is necessary before a recommendation can be made. Sprays of bordeaux 12-12-100 in October and January are the only ones which show some promise of controlling the trunk and branch cankers. Thoroughly spray the trunks and lower scaffolds as well as the upper branches. See footnote 2 under Peach Spray Schedule.

² Quintar may cause a mild skin burn on some people. A glycerol base cream applied to the face, neck, and arms before spraying will prevent this burn. Do not use on oil or lanolin base cream.

³ Mesurool has an Oregon State label for cherry fruit fly control and for use as a bird repellent. It also controls mites. A spray for cherry fruit fly control can be eliminated if Mesurool is applied for bird control by conventional ground sprayers.

⁴ Fixed coppers (Kocide, Microcrop, Neutrocop, etc.) will provide moderate control of blossom blight and should aid in protection against Pseudomonas blight.

⁵ Do not mix Funginex 18.2 EC with wetting agents, spreader stickers or other adjuvants.

PRUNE AND PLUM SPRAY SCHEDULE

Pest	Material*	Amt./acre	Amt./100 gal.	Minimum days from last application and harvest	Remarks	
1. (a) Dormant spray (as winter buds are ready to open)						
Lecanium and San Jose scale, aphid and mite eggs	1. supreme oil or superior-type oil	8 gal.	2 gal.			
	2. supreme oil or superior-type oil + lime sulfur or polysulfide	8 gal. 6 gal. 6 gal. 12 gal. 18 lb.	2 gal. 1 ½ gal. 1 ½ gal. 3 gal. 4 ½ lb.			
	3. Ethion-oil premix combination or Trithion oil premix combination	4-8 gal. 4-8 gal.	1-2 gal. 1-2 gal.			
	4. supreme or superior-type oil + diazinon 50 WP or parathion 25 WP	6-8 gal. 6-8 gal. 4 lb. 4-5 lb.	1 ½-2 gal. 1 ½-2 gal. 1 lb. 1-1 ¼ lb.	10 14		
1. (b) Delayed dormant spray (when 30-50% of buds show green tips)						
Pear Thrips	.....	.....	.....		Effective controls are no longer federally registered for pear thrips.
San Jose scale (if a problem)	supreme or superior type oil	4-6 gal.	1-1 ½ gal.		Lorsban also controls mealy plum aphid. Supracide will help control peach twig borer.	
	+ diazinon 50 WP or Supracide 2 E or Lorsban 4 E	4 lb. 4 qt. 2-4 pt.	1 lb. 1 qt. ½-1 pt.			
	2. Pre-blossom spray (buds white just before opening)					
	Fruit tree leafroller, aphids, eyespotted bud moth	1. Thiodan 50 WP	4-5 lb.	1-1 ¼ lb.		7	Do not apply Guthion more than 8 times per season.
2. Guthion 50 WP		2-2 ½ lb.	½-1 lb.	15		
3. diazinon 50 WP		4 lb.	1 lb.	10		
Plum rust mites	1. Thiodan 50 WP	4-5 lb.	1 lb.	7		
	2. Kelthane 35	4-5 ½ lb.	1-1 ½ lb.	7		
Spider mites	1. Omite 30 WP	4-5 lb.	1 lb.	14	Make only 2 applications of Omite per year. Spider mites seldom a pest at this time of year in the Willamette Valley. Do not use Plictran and summer oils in the same season.	
	2. Kelthane 35	4-5 ½ lb.	1-1 ½ lb.	7		
	3. Plictran 50 WP	1 ½ lb.	6 oz.	0		
Scales, including Lecanium scale and San Jose scale	1. parathion 25 WP	4-6 lb.	1-1 ½ lb.	14	Scales seldom a pest in the valley if dormant oils and insecticides used in the dormant-delayed dormant periods.	
	2. diazinon 50 WP	4-5 lb.	1-1 ¼ lb.	10		
Mealy plum aphid, leaf curl plum aphid	1. Thiodan 50 WP	4-5 lb.	1-1 ¼ lb.	7		
	2. parathion 25 WP	4-5 lb.	1-1 ¼ lb.	14		
	3. diazinon 50 WP	4-5 lb.	1 lb.	10		
	4. Systox 25 EC	3-4 pt.	.75-1 pt.	30		
3. Blossom sprays (popcorn, full bloom, petal fall). For orchards where brown rot blossom blight is a problem.						
Brown rot blossom blight	1. dichlone 50 WP	2 lb.	½ lb.	3		
	2. ferbam 76 WP	6 lb.	1 ½ lb.	7		
	3. Kolo-100	14 lb.	3 ½ lb.	3		
Mealy plum aphid, leaf curl plum aphid	1. parathion 25 WP	4-5 lb.	1 lb.	14	Use these materials after petal fall. Protect bees.	
	2. malathion 25 WP	4 lb.	1 lb.	3		
	3. Thiodan 50 WP	4-5 lb.	1 lb.	7		
	4. diazinon 50 WP	4 lb.	1 lb.	10		
	5. Guthion 50 WP	2-2 ½ lb.	½-1 lb.	15		

* Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides.

PRUNE AND PLUM SPRAY SCHEDULE (Continued)

Pest	Material*	Amt./acre	Amt./100 gal.	Minimum days from last application and harvest	Remarks
Spider mites	1. Omite 30 WP	4-5 lb.	1 lb.	14	Only 2 applications of Omite per year. Do not use Plictran and summer oils in the same season.
	2. Kelthane 35	4-5 $\frac{2}{3}$ lb.	1-1 $\frac{1}{3}$ lb.	7	
	3. Plictran 50 WP	1 $\frac{1}{2}$ lb.	6 oz.	0	
	4. Vendex 50 WP	1-2 lb.	$\frac{1}{4}$ - $\frac{1}{2}$ lb.	14	
Peach twig borer, fruit tree leafroller, aphids	1. Thiodan 50 WP	4-5 lb.	1-1 $\frac{1}{4}$ lb.	7	Use these materials after petal fall. Protect bees.
	2. Guthion 50 WP	2-2 $\frac{1}{2}$ lb.	$\frac{1}{2}$ -1 lb.	15	
	3. diazinon 50 WP	4 lb.	1 lb.	10	
Plum rust mite	1. Thiodan 50 WP	4-5 lb.	1 lb.	7	Guthion, parathion, diazinon, and to a lesser extent Thiodan and malathion, are hazardous to bees. Do not apply them to bloom or when bees are foraging in the orchard.
	2. Vendex 50 WP	1-2 lb.	$\frac{1}{4}$ - $\frac{1}{2}$ lb.	14	
Scales	1. parathion 25 WP	4-6 lb.	1-1 $\frac{1}{2}$ lb.	14	Use these materials after petal fall. Protect bees.
	2. diazinon 50 WP	4-5 lb.	1-1 $\frac{1}{4}$ lb.	10	
4. First fruit spray or dust (at shuck fall and 10 days later)					
Leaf spot and brown rot	1. wettable sulfur	24 lb.	6 lb.	—	
	2. dusting sulfur	50 lb.		—	
	3. Benlate 50 WP	1 lb.	$\frac{1}{4}$ lb.		
	4. Cyprex 65 WP	3 lb.	$\frac{3}{4}$ lb.		
	5. ferbam 76 WP	6 lb.	1 $\frac{1}{2}$ lb.	7	
	6. Kolo-100	14 lb.	3 $\frac{1}{2}$ lb.	3	
5. Summer sprays					
Leaf spot and brown rot	1. wettable sulfur	24 lb.	6 lb.	—	Repeat weekly up to harvest.
	2. dusting sulfur	50 lb.		—	
	3. Benlate 50 WP	1 lb.	$\frac{1}{4}$ lb.		
	4. Cyprex 65 WP	3 lb.	$\frac{3}{4}$ lb.		
	5. ferbam 76 WP	6 lb.	1 $\frac{1}{2}$ lb.	7	
	6. Kolo-100	14 lb.	3 $\frac{1}{2}$ lb.	3	
Shot hole borer	1. parathion 25 WP	4-6 lb.	1 lb.	14	Apply Thiodan to scaffolds and limbs as a drenching spray to control shothole borer.
	2. Thiodan 50 W	5 lb.	1 $\frac{1}{4}$ lb.	7	
Mealy plum aphid, leaf curl plum aphid, Peach twig borer	1. parathion 25 WP	4-6 lb.	1-1 $\frac{1}{2}$ lb.	14	
	2. diazinon AG 500 4 lb./gal. EC	4-6 pt.	1-1 $\frac{1}{2}$ pt.	10	
	3. Thiodan 50 WP	4-5 lb.	1 lb.	7	
Peach tree borer (peach and prune root borer)	1. Thiodan 50 WP	4-5 lb.	1 lb.	7	Apply to trunks and soil at ground level as a drench that slightly puddles around base.
Earwigs	1. Sevin 50 WP		1 lb.	1	Apply around bases of trees and on trunks 4 to 5 weeks prior to harvest.
San Jose scale (late June to early July), lecanium scale (mid-July)	1. parathion 25 WP	4-6 lb.	1 lb.	14	
	2. diazinon 50 WP	4 lb.	1 lb.	10	
Spider mites, red mites (if a problem)	1. Omite 30 WP	4-6 lb.	1 lb.	14	Make only 2 applications of Omite per year. Do not use Plictran and summer oils in the same season.
	2. Kelthane 35	4-5 $\frac{2}{3}$ lb.	1-1 $\frac{1}{3}$ lb.	7	
	3. Plictran 50 W	1 $\frac{1}{2}$ lb.	6 oz.	0	
	4. Vendex 50 WP	1-2 lb.	$\frac{1}{4}$ - $\frac{1}{2}$ lb.	14	

* Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides.

PEACH SPRAY SCHEDULE

Pest	Material*	Amt./acre	Amt./100 gal.	Minimum days from last application and harvest	Remarks
1. Dormant—delayed dormant spray					
Lecanium scale, European red mite eggs, aphids (if a problem)	1. supreme or superior-type oil spray	8-10 gal.	2-2½ gal.		Emulsifiable concentrates or flowable formulations are actually preferred in combinations with oils. Adequate agitation is required for heavy rates of oil plus insecticides particularly when wettable powders are used.
	2. supreme or superior-type oil + diazinon 50 WP or parathion 25 WP	8-10 gal.	2-2½ gal.		
Peach twig borer, scale mite eggs, aphids	6-8 gal.	1½-2 gal.			
	4 lb.	1 lb.	20		
	4-5 lb.	1-1¼ lb.	14		
3. supreme or superior-type oil + Supracide 2 E	6-8 gal.	1½-2 gal.			
4 qt.	1 qt.				
2. Leaf curl spray (apply first spray in mid-December and the second spray in mid-January before the buds swell)					(See footnotes 1 and 2)
Peach leaf curl ¹	1. bordeaux	48-48-400	12-12-100	—	A sticker should be added with each material. Use a reliable spreader sticker.
	2. Bravo 500	4½-6 pt.	1.125-1.5 pt.	—	
	3. lime sulfur	32 gal.	8 gal.	—	
	4. ferbam 76 WP	12 lb.	3 lb.	21	
	5. ziram 76 WP	12 lb.	3 lb.	—	
	6. Cyprex 65 WP	8 lb.	2 lb.	15	
3. Popcorn stage spray (just before petals begin to open)					(See footnote 3 re: Dichlone)
Brown rot blossom blight	1. Benlate 50 WP	1 lb.	¼ lb.	—	Apply only one spray of Benlate or Topsin M. Frequent applications of these fungicides may increase the incidence of fungus strains tolerant to both. See footnote 4.
	2. Bravo 500	4½-8 pt.	1.125-2 pt.	—	
	3. captan 50 WP	8 lb.	2 lb.	—	
	4. Cyprex 65 WP	2 lb.	½ lb.	15	
	5. ferbam 76 WP	6 lb.	1½ lb.	21	
	6. Funginex 18.2 EC	48 fl. oz.	12 fl. oz.	—	
	7. Kolo-100	14 lb.	3½ lb.	7	
	8. maneb 70 WP	8 lb.	2 lb.	2	
	9. Quintar 5F	25.6 fl. oz.	6.4 fl. oz.	20	
	10. Rovral 50 WP	1-2 lb.	.25-.50 lb.	—	
	11. Topsin M 70 WP	1½-2 lb.	½ lb.	1	
	12. ziram 76 WP	6 lb.	1½ lb.	—	
Twig borer, fruit tree leafroller, green peach aphid, eyespotted bud moth	1. Thiodan 50 WP	4-5 lb.	1 lb.	30	This is the most satisfactory time to apply green peach aphid-twig borer combination sprays. 2, 3, 4, and 5 do not control green peach aphid well.
	2. Guthion 50 WP	2-2½ lb.	½ lb.	21	
	3. Pydrin	½-1 pt.	¼-¼ pt.	14	
	4. Pounce	½-1 pt.	¼-¼ pt.	7	
	5. Ambush	.8-1.6 pt.	.2-.4 pt.	7	
Silver or Rust mites (if a problem)	1. Kelthane 35	6-9 lb.	1½-2½ lb.	14	
	2. Thiodan 50 W	4-5 lb.	1-1¼ lb.	30	
	3. Vendex 4L	1-2 pt.	¼-½ pt.	14	
	4. Vendex 50 WP	1-2 lb.	¼-½ lb.	14	
Spider mites (if a problem)	1. Omite 30 WP	4-5 lb.	1 lb.	14	Do not apply Omite more than 2 times per year.
	2. Plictran 50 WP	¾-1½ lb.	3-6 oz.	0	
	3. Kelthane 35	6-9 lb.	1½-2½ lb.	14	
	4. Vendex 4L	1-2 pt.	¼-½ pt.	14	
	5. Vendex 50 WP	1-2 lb.	¼-½ lb.	14	
Lecanium scale	1. parathion 25 WP	4-5 lb.	1 lb.	14	Do not use more than 5 lb. actual parathion per acre per year on peaches.
	2. diazinon 50 WP	4-5 lb.	1 lb.	20	
4. Open blossom spray					
Brown rot blossom blight	1. Bravo 500	4½-8 pt.	1.125-2 pt.		Do not apply insecticides during bloom due to potential to bee kill.
	2. captan 50 WP	8 lb.	2 lb.	—	
	3. Cyprex 65 WP	2 lb.	½ lb.	15	
	4. ferbam 76 WP	6 lb.	1½ lb.	21	
	5. funginex 18.2 EC	48 fl. oz.	12 fl. oz.	—	
	6. Kolo-100	14 lb.	3½ lb.	7	
	7. maneb 70 WP	8 lb.	2 lb.	2	
	8. Quintar 5 F	25.6 fl. oz.	6.4 fl. oz.	20	
	9. Rovral 50 WP	1-2 lb.	.25-.50 lb.	—	
	10. sulfur dust	50 lb.	—	—	
	11. ziram 76 WP	6 lb.	1½ lb.	—	

* Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides.

PEACH SPRAY SCHEDULE (Continued)

Pest	Material*	Amt./acre	Amt./100 gal.	Minimum days from last application and harvest	Remarks
5. Petal fall spray (when petals are falling)					
Green peach aphid, fruit tree leafroller, peach twig borer	1. Thiodan 50 WP	4-5 lb.	1-1 1/4 lb.	30	2, 3, 4, 5, and 6 are not effective on green peach aphid. All materials are hazardous to bees. Do not apply them to bloom or when bees are foraging in the orchard. Zolone not effective on large leafrollers.
	2. Guthion 50 WP	2-2 1/2 lb.	1/2-5/8 lb.	21	
	3. Zolone 25 WP	8-12 lb.	2-3 lb.	7	
	4. Pydrin	1/2-1 pt.	1/8-1/4 pt.	14	
	5. Pounce	1/2-1 pt.	1/8-1/4 pt.	7	
	6. Ambush	.8-1.6 pt.	.2-4 pt.	7	
Spider mites (if a problem)	1. Omite 30 WP	4-6 lb.	1 lb.	14	Do not apply Omite more than 2 times per year. Do not use Plictran if summer oils will be used on peaches.
	2. Kelthane 35	6-8 lb.	1-2 lb.	14	
	3. Plictran 50 W	1 1/2 lb.	6 oz.	0	
	4. Vendex 4 L	1-2 pt.	1/4-1/2 pt.	14	
	5. Vendex 50 WP	1-2 lb.	1/4-1/2 lb.	14	
San Jose scale, Lecanium scale	1. parathion 25 WP	4-5 lb.	1-1 1/4 lb.	14	Do not use more than 5 lb. actual parathion per acre per year on peaches.
	2. diazinon 50 WP	4-5 lb.	1-1 1/4 lb.	20	
Brown rot blossom blight	1. Bravo 500	4 1/2-8 pt.	1.125-2 pt.	—	See footnote 3.
	2. captan 50 WP	8 lb.	2 lb.	—	
	3. Cyprex 65 WP	2 lb.	1/2 lb.	15	
	4. ferbam 76 WP	6 lb.	1 1/2 lb.	21	
	5. Kolo-100	14 lb.	3 1/2 lb.	7	
	6. maneb 70 WP	8 lb.	2 lb.	2	
	7. Quintar 5 F	25.6 fl. oz.	6.4 fl. oz.	20	
	8. Rovral 50 WP	1-2 lb.	.25-.50 lb.	—	
	9. sulfur dust	50 lb.	—	—	
	10. ziram 76 WP	6 lb.	1 1/2 lb.	—	
6. First fruit spray (as soon as shucks fall)					
Coryneum peach blight and mildew	1. wettable sulfur	24 lb.	6 lb.	—	
	2. dusting sulfur	50 lb.	—	—	
7. Summer sprays or dust (first about 5 weeks before harvest or earlier if disease appears; repeat at weekly intervals; last application just before harvest)					
Brown rot, mildew	1. wettable sulfur	24 lb.	6 lb.	—	
	2. dusting sulfur	50 lb.	—	—	
	3. captan 50 WP	8 lb.	2 lb.	—	
	4. ferbam 76 WP	6 lb.	1 1/2 lb.	21	
	5. ziram 76 WP	6 lb.	1 1/2 lb.	—	
Cucumber beetle	1. sulfur dust containing 5% Sevin or methoxychlor	See label	—	—	
	2. Sevin 50 WP	3 lb.	2 lb.	3	
	3. diazinon 50 W	4 lb.	1 lb.	20	
Shot hole borer (if a problem)	1. parathion 25 WP	4-6 lb.	1 lb.	14	Do not use more than 5 lb. actual parathion per acre per year on peaches. Do not make more than two applications of Thiodan during the fruiting period.
	2. Thiodan 50 WP	4-5 lb.	1 lb.	30	
Spider mites and European red mite (if problems)	1. Omite 30 WP	4-6 lb.	1 lb.	14	Do not apply Omite more than 2 times per year. Do not use Plictran if summer oils have been used. Injury may result.
	2. Plictran 50 WP	3/4-1 1/8 lb.	3-6 oz.	0	
	3. Kelthane 35	6-9 lb.	1 1/2-2 1/8 lb.	14	
	4. Vendex 4L	1-2 pt.	1/4-1/2 pt.	14	
	5. Vendex 50 WP	1-2 lb.	1/4-1/2 lb.	14	
Green peach aphid (if a problem)	4. Ethion 25 WP (not on cots)	4-6 lb.	1 lb.	30	Do not use Ethion more than twice during fruiting period.
	1. Thiodan 50 WP	4-6 lb.	1 lb.	30	

* Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides.

PEACH SPRAY SCHEDULE (Continued)

Pest	Material*	Amt./acre	Amt./100 gal.	Minimum days from last application and harvest	Remarks
Earwigs	1. Sevin 50 WP		1 lb.	3	Apply around bases of trees and on trunks. Do not apply Sevin on cover crop blooms because of hazard to bees.
Peach twig borer, oriental fruit moth	1. Thiodan 50 WP (on peaches)	4-6 lb.	1 lb.	30	Make only 2 applications of Thiodan during fruiting period.
	2. Guthion 50 WP	2-2½ lb.	½-⅝ lb.	21	
	3. Zolone 25 WP	8-12 lb.	2-3 lb.	7	
	4. diazinon 50 W	4 lb.	1 lb.	20	
	5. Pydrin	½-1 pt.	⅛-¼ pt.	14	
	6. Pounce	½-1 pt.	⅛-¼ pt.	7	
	7. Ambush	.8-1.6 pt.	.2-4 pt.	7	
San Jose scale, Lecanium scale (mid-June to early July)	1. parathion 25 WP	4-6 lb.	1 lb.	14	Do not use more than 5 lb. actual parathion per acre per year on peaches.
	2. diazinon 50 WP	4 lb.	1 lb.	20	
Peach tree borer	1. Thiodan 50 WP	4 lb.	1 lb.	30	Apply as coarse low pressure sprays to the trunks and lower crotches of peach trees. If peach tree borer is a problem, two applications may be necessary. Timing is usually the 2nd or 3rd week in July, and again a month later in August.
	2. Lorsban 4 E	3 qt.	3 qt.	14	
	3. Guthion 50 WP	2-2½ lb.	½-⅝ lb.	21	
	4. Pydrin	½-1 pt.	⅛-¼ pt.	14	
	5. Pounce	½-1 pt.	⅛-¼ pt.	7	
	6. Ambush	.8-1.6 pt.	.2-4 pt.	7	
8. Fall spray (as leaves are dropping but before rains begin)					
Coryneum peach blight	1. bordeaux ²	32-32-400	8-8-100	—	Follow manufacturer's direction.
	2. Bravo 500	4½-6 pt.	1.125-1.5 pt.	—	
	3. ziram 76 WP	12 lb.	3 lb.	—	
	4. fixed coppers				

* Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides.

FOOTNOTES:

¹ Bordeaux mixture may be combined with dormant oil for both peach leaf curl and Lecanium scale control. No sticker is needed with this combination.

² Bordeaux 12-12-100 means 12 pounds of copper sulfate plus 12 pounds of lime in 100 gallons of water. In any bordeaux formula the ingredients are always listed in the same order—copper sulfate, lime, then gallons of water.

³ Quintar may cause a mild skin burn on some people. A glycerol base cream applied to the face, neck, and arms before spraying will prevent the burn. Do not use an oil or lanolin base cream.

⁴ Do not mix Funginex 18.2 EC with wetting agents, spreader stickers or other adjuvants.

APRICOT SPRAY SCHEDULE

Pest	Material*	Amt./acre	Amt./100 gal.	Minimum days from last application and harvest	Remarks
1. Dormant spray					
Scale insects, mite eggs, aphids	1. diazinon 50 WP or Parathion 25 WP	4 lb. 4-5 lb.	1 lb. 1-1 ¼ lb.		
2. Popcorn stage					
Brown rot blossom blight	1. Benlate 50 WP	1 lb.	¼ lb.	—	Apply only one spray of Benlate or Topsin M. Frequent applications of these fungicides may increase the incidence of fungus strains tolerant to both. See footnotes. See remarks above.
	2. ferbam 76 WP	6 lb.	1 ½ lb.	21	
	3. Funginex 18.2 EC	48 fl. oz.	12 fl. oz.	—	
	4. Topsin M 70 WP	1 ½-2 lb.	½ lb.	1 day	
	5. ziram 76 WP	6 lb.	1 ½ lb.	—	
3. Full blossom stage					
Brown rot blossom blight	1. Benlate 50 WP	1 lb.	¼ lb.	—	See footnotes.
	2. ferbam 76 WP	6 lb.	1 ½ lb.	21	
	3. Funginex 18.2 EC	48 fl. oz.	12 fl. oz.	—	
	4. ziram 76 WP	6 lb.	1 ½ lb.	—	
4. Petal-fall spray (when most of the petals are falling)					
Brown rot blossom blight	1. ferbam 76 WP	6 lb.	1 ½ lb.	21	
	2. ziram 76 WP	6 lb.	1 ½ lb.	—	
5. Petal-fall spray					
Peach twig borer and aphids	1. Thiodan 50 WP	4 lb.	1 lb.	30	
	2. diazinon 50 WP	4 lb.	1 lb.	10	
	3. Zolone 25 WP	8-12 lb.	2-3 lb.	7	
6. First fruit spray (as soon as shucks fall)					
Coryneum blight	1. ziram 76 WP + spreader	6 lb.	1 ½ lb.		
7. Later sprays					
Brown rot on fruit	1. ziram 76 WP	6 lb.	1 ½ lb.	—	Do not use ziram past the early cover sprays.
	2. ziram dust				
Green peach aphid, peach twig borer, cat facing insects	1. Thiodan 50 W	4 lb.	1 lb.	30	Do not apply Thiodan more than twice during fruiting period.
Earwigs	1. Sevin 50 W	4 lb.	1 lb.	3	Early in the season, spray around bases of trees and cracks and crevices of bark.
Scale	1. diazinon 50 W	4 lb.	1 lb.	10	
Shot hole borer	1. Thiodan 50 W	5 lb.	1 ¼ lb.	30	Do not apply Thiodan more than twice during fruiting period.
Mites	1. Omite 30 WP	4 lb.	1 lb.	14	Do not use Omite more than twice a year.
	2. Kelthane 35 WP	6 lb.	1 ½ lb.	14	
8. Early fall spray					
Coryneum blight	1. bordeaux	32-32-400	8-8-100	—	Cover every bud.

* Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides.

FOOTNOTES:

Sulfur has a detrimental effect on apricots, and therefore is not recommended at any time.

Do not mix Funginex 18.2 EC with wetting agents, spreader stickers or other adjuvants.

MINIMUM DAYS BETWEEN LAST APPLICATION AND HARVEST

Material	Minimum days between last application and harvest			
	Cherries	Prunes	Peaches	Apricots
Ambush	....	....	7	....
Benlate	0	0	0	0
	Do not graze livestock in treated orchards. Registered for aerial application.			
bordeaux	0	0	0	0
Bravo 500	Shuck fall	....	Shuck fall	....
captan	0	0	0	0
Cyprex	0	....	15	....
	Do not graze cover crops in treated orchards			
diazinon	10	10	20	10
dichlone	3	3	7	....
dimethoate	21	....	....	....
Ethion	Postharvest or dormant	21-45 See label for details	30	Dormant
	On peaches do not make more than 2 applications during the fruiting period. On prunes 2 or 3 applications, depending on dosage. See label for details.			
ferbam	0	7	21	21
Funginex	0	0	0	0
Guthion (azinphosmethyl)	15	15	21	21
Imidan (phosmet)	Sour cherries only			
	7	7	14	14
Karathane	Non-bearing nursery stock only	....	45	45
Kelthane (dicofol)	7	7	14	14
	Do not reapply within 30 days			
Kocide 101	0	0	0	0
Kolo-100	3	3	7	....
lime sulfur	Apply during dormant or delayed dormant periods.			
Lorsban (chlorpyrifos)	....	....	14	....
malathion	(WP, EC) 3 (ULV) 1	3	7	7
Mesurof	7	....	21	....
maneb	....	....	2	14
	Peaches—if applied within 14 days of harvest, remove residues by brushing.			
methoxychlor	7	7	21	21
Morestan	Do not apply during the fruiting period.			
oil	0	0	0	0
Omite (propargite)	Use postharvest only	14	14	14
parathion	14	14	14	14
Plictran	0	14	0	0

MINIMUM DAYS BETWEEN LAST APPLICATION AND HARVEST (Continued)

Material	Minimum days between last application and harvest			
	Cherries	Prunes	Peaches	Apricots
Pounce	....	....	7	....
Pydrin	....	....	14	....
Quintar 5 F	....	....	0	....
Rovral 50 WP	0	....	0	....
Sevin (carbaryl)	1	1	1	3
sulfur	0	0	0	0
Supracide (methamidaphos)	prebloom	prebloom	prebloom	prebloom
Systox (demeton)	nonbearing trees only	30-60 On apricots and peaches do not make more than 3 applications per season. On prunes do not make more than 2 applications per season.	30	30
Thiodan (endosulfan)	21 Do not make more than 2 applications after shuck split.	7 Peaches, Apricots—21 days as a trunk spray. Do not make more than 2 applications during the fruiting period.	30	30
Topsin M	1	1	1	1
Trithion (carbophenothion)	30	30	30	30
Vendex 50 WP	14	14	14	....
Vendex 4L	....	....	14	....
wettable sulfur	0	0	0	0
ziram	7	....	Early cover and before harvest (remove excess residue by wiping or brushing)	Early cover

.... Not registered for use on these crops.

Preparation of tank-mix bordeaux

Materials:

copper sulfate "snow"
hydrated lime (spray lime)

1. Start water flowing into spray tank.

2. When tank is about one-third full and the mechanical agitator is in operation, start washing the copper sulfate "snow" into the tank through a screen with water from the supply hose. A wooden spoon or paddle is often helpful in working the "snow" through the screen. Do not hurry the "snow" through the screen—give the copper sulfate time to go into solution in the tank.

3. By the time the tank is two-thirds full, all of the "snow" should be in the tank. Then wash the lime, using the water supply hose, through the screen into the solution of copper sulfate in the tank. Again, a wooden spoon or paddle will be useful in working the lime through the screen into the tank. The lime should be as dilute as possible

before it meets the copper sulfate solution in the tank, so use lots of water to wash the lime through the screen.

Pre-soaking of lime before adding to the tank may be preferred to washing the powdered lime directly through the screen into the tank.

- a. Lime (hydrated or slaked)—soak in water for 2 hours before putting in spray tank.
- b. Quick lime (unslaked)—slake in water carefully for several days before putting into tank.
- c. When adding lime to tank, follow above instructions in 3.

NOTE

The mechanical agitator in the tank should be started before the copper sulfate "snow" is put in the tank, continued while the lime is being added, and kept going until the spray is applied. Bordeaux should be applied soon after it is prepared—it deteriorates upon standing. A by-pass agitator system is usually not adequate for the preparation of a tank-mix bordeaux.

VEGETATION MANAGEMENT AND WEED CONTROL

Vegetation management and weed control in orchards is essential if a productive orchard is to be maintained throughout the life of the crop. Many perennial, biennial, and annual weeds such as false dandelion, filaree, bull thistle, prostrate knotweed, and others should be controlled before they become established in the orchard. In non-irrigated orchards, weeds plants often are controlled in strips beneath the tree row, and the remaining vegetation between rows is moved or cultivated during summer when soil moisture becomes limiting. Read Oregon Extension Circular 795, *Soil Management in Non-Irrigated Orchards*, for more information. In irrigated orchards, a permanent sod often is maintained between tree rows. Selective control of unwanted species within the sod, and mowing several times during the summer, help maintain the sod and limit competition with the trees.

Herbicides can provide effective and economic weed control when used as an integral part of a year-round weed management program. Accurate application of selective herbicides or the use of special application equipment for less selective herbicides will in-

hibit or control weed growth with minimal chance for crop injury. Also, accurate weed identification is essential to select the most effective herbicides throughout the life of the orchard. Continual use of the same herbicide or herbicide type will result in resistant weed species or plant biotypes. Each year, identify and map the location of common weeds. Consult labels and other publications for information about control of specific weeds. Your weed control program may be improved or modified by rotating or selecting different types of herbicides and control methods. Spot treatment will eliminate weeds plants that become established as resistant weeds. Herbicide combinations applied separately at the correct time of year, or as tank-mixes, will control a broader spectrum of weeds.

Apply herbicides correctly. Proper application of herbicides will improve weed control and reduce the chance of crop or personal injury caused by mishandling of pesticides. Herbicides must be applied uniformly as described on the product label. Proper equipment, calibrated to deliver exactly the correct rate and application at the proper time of year, is essential. Obtain more consistent results by *reading and understanding each herbicide label* before application. Carefully note the precautions printed on the product label and the information listed in the following chart.

SUGGESTED HERBICIDES FOR STONE FRUITS

Herbicide name	Amount per acre*		Time of application	Remarks
	Active ingredient	Formulated product		
Site preparation				
glyphosate (Roundup)	1-4 lb. ai./A.	(Cherry only) 1-4 qt./a.	Apply to actively growing annual weeds or perennials in correct stage of growth as listed on the label. Examples: quackgrass in 3- to 4-leaf stage; Canada thistle in bud stage; field bindweed in mid-flower stage etc.	Repeat applications may be necessary. Do not apply more than 10.6 quarts in 1 year.
New plantings				
oryzalin (Surflan)	2-4 lb. ai./A.	2-4 qt. surflan A.S./A. or 2 ² / ₃ - 5 ¹ / ₃ lb. 75 W/A.	Late fall to early spring to weed-free soil. Apply after soil is settled following tree planting.	Not recommended for use on soil containing more than 3% organic matter. Apply only once per growing season. Shallow cultivation may follow application.
dichlobenil (Casoron)	4-6 lb. ai./A.	(Cherry, peach, plum and prune only) 100-150 lb. 4% granular/A.	Apply 4 weeks after transplanting before weed emergence or after Canada thistle rosettes are developed.	Irrigate if temperatures exceed 70° F or if no rain occurs after application. Apply higher rates for perennial weeds. Do not graze livestock in treated areas.
trifluralin (Treflan)	0.5-0.1 lb./A.	(Apricot and peach only) 1-2 pt./A. depending on soil organic matter	Preplant and incorporate within 8 hours by cross-discing or rotary tilling.	Consult label about rate requirements for soils containing different amounts of organic matter. Follow label instructions for both crops when interplanting other crops between young trees.
diphenamid (Enide)	4-6 lb. ai./A.	(Non-bearing cherry only) 4.4-6.6 lb. 90% WP/A.	After trees are established to soil free of weed growth and excess debris.	Soil moisture or shallow incorporation is required for herbicide activation.
Established plantings—winter applications that persist: Note—Rotate these herbicides to reduce resistant weeds from occurring in your orchard.				
dichlobenil (Casoron)	4-6 lb. ai./A.	100-150 lb. 4% granular/A.	After harvest in fall through spring rainy season before weed emergence or after Canada thistle rosettes are developed.	Irrigate if temperatures exceed 70° F or if no rain occurs after application. Apply higher rates for perennial weeds. Do not graze livestock in treated areas.
napropamide (Devrinol)	4 lb. ai./A.	8 lb. of 50% WP/A.	Fall through early spring before weeds emerge to soil free of excess debris and existing vegetation. Labeled also as tank-mix with paraquat.	Incorporate with rainfall or mechanically in top 1 or 2 inches of soil to activate herbicide and reduce photodecomposition (loss caused by sunlight).

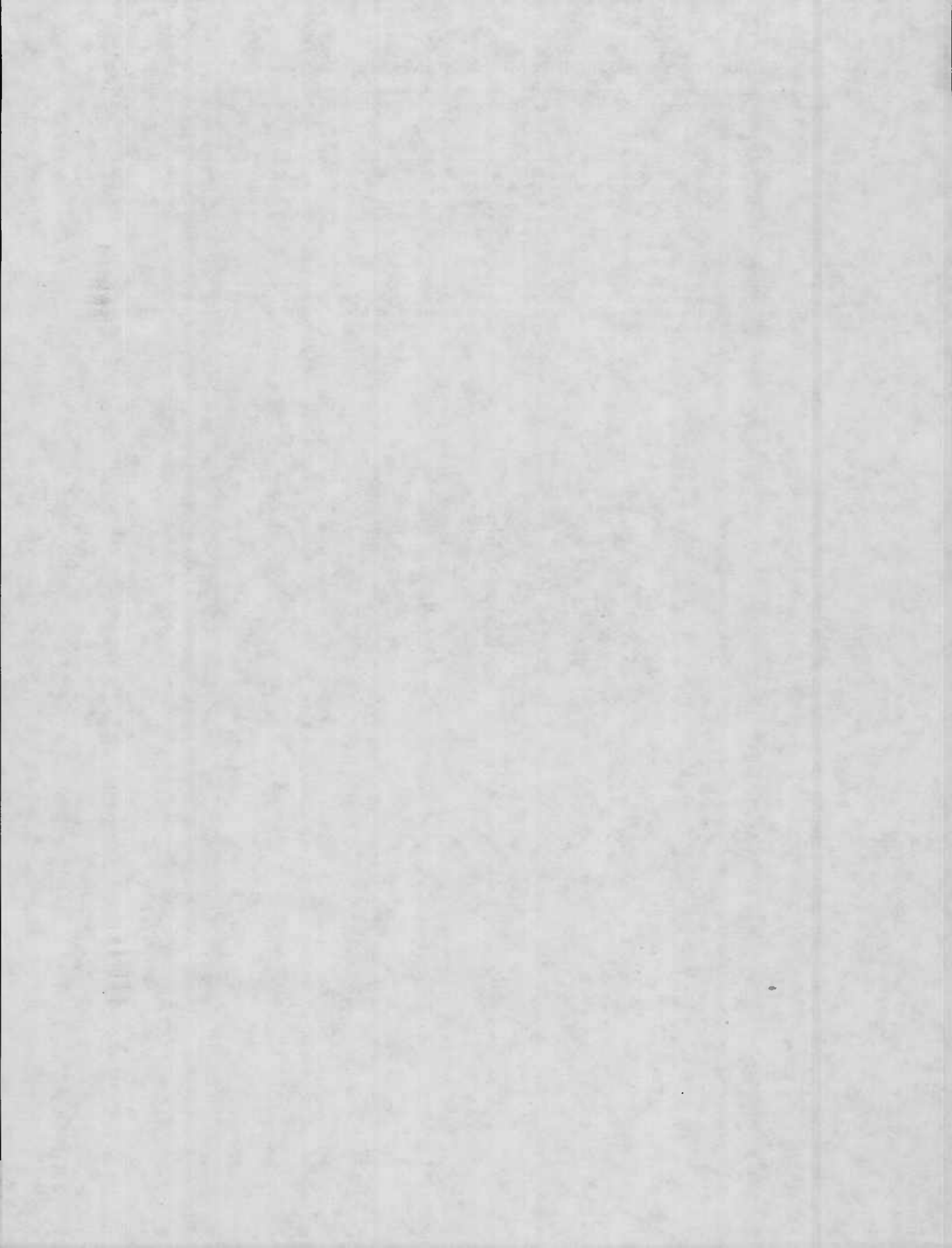
SUGGESTED HERBICIDES FOR STONE FRUITS (Continued)

Herbicide name	Amount per acre*		Time of application	Remarks
	Active ingredient	Formulated product		
oryzalin (surflan)	2-4 lb. ai./A.	2-4 qt. surflan A.S./A. or 2 $\frac{1}{4}$ - 5 $\frac{1}{2}$ lb. 75 W/A.	Late fall to early spring to weed-free soil. Consult other labels for precautions when tank-mixing with diuron or simazine.	A single 0.5-inch rain or shallow cultivation is required for activation. Avoid overlaps, misapplications, or lack of adequate agitation to reduce chance of injury.
norflurazon (Solicam)	(Cherry statewide; apricot, peach, plum and prune, west Cascade only) 2-4 lb. ai./A.	2-5 lb. 80% WP/A.	Spring, before weeds emerge to soil free of excess plant debris or weed growth.	Direct treatment in wide strips within tree row and avoid contact with tree foliage. Sprinkler irrigate if no rainfall occurs within 2 weeks of application.
diuron	1.6-4 lb. ai./A.	(Peach only) 2-5 lb. of 80% WP/A.	Apply during winter rainy season at least 8 months before harvest before weeds emerge or in early stage of seedling growth.	Direct treatment in wide strips within tree row and avoid contact with tree foliage. Do not use in orchards less than 3 years old. Apply lower rates on soils of lighter textures and do not use on sandy soils.
terbacil (Sinbar)	1.6-3.2 lb. ai./A. (Consult label for rate to apply depending on soil texture and organic matter.)	(Peach only) 2-4 lb. of 80% WP/A.	Fall after harvest through spring before weed emergence. Reduce rate to half and alternate herbicides after good weed control is achieved.	Direct treatment in wide strips within tree row. Avoid contact with tree foliage and do not use in orchards less than 3 years old. Do not apply on sand, loamy sand, or gravelly soils, nor on soils containing less than 1% organic matter.
simazine	1.6-3.2 lb. ai./A.	(cherry only) 2-4 lb. of 80% WP/A.	<i>Single application</i> in fall through spring before weed emergence. <i>Split application</i> at lowest rate of 1.6 lbs. ai./acre in both fall and spring. Reduce rate and alternate herbicides after good weed control is achieved.	Direct treatment in wide strips within tree row. Avoid contact with tree foliage and do not use in orchards less than 1 year old. Apply lower rates on soils of lighter texture and do not use on very light sandy soils.
diphenamid (Enide)	4-6 lb. ai./A.	(Peach only) 4.4-6.6 lb. of 90% WP/A.	Anytime to soil around established trees except when fruit is on tree or within 90 days of harvest.	Soil moisture or shallow incorporation is required for herbicide activation.
Established plantings—summer applications to weed foliage				
dinoseb	1.9 lb. a.i./A.	3 pt. phenol OR 5.1 pt. amine formulation	When weeds are small. Add 1 qt. weed oil/A. in sufficient volume water to wet weed foliage.	Avoid contact with trunks of young trees. Do not spray on fruit or foliage nor graze livestock in treated areas.
paraquat	0.5-1 lb. a.i./A.	1-2 qt./A. + non-ionic spreader in sufficient water to wet weed foliage	Anytime when weeds are succulent and new growth is 1 to 6 inches tall.	Apply as a directed spray towards base of trees. Use a shield for young trees and avoid contact with foliage, fruit, and young tree trunks. Do not graze treated areas. Can be tank-mixed with napropamide or other herbicides unless denied on the label.
glyphosate (Roundup)	<i>Spray</i> 1-4 lb. a.i./A.	(Cherry only) 1-4 qt./A.	Apply to actively growing annual weeds or perennials in correct stage of growth as listed on the label. Examples: quackgrass in three- to four-leaf stage; field bindweed in midflower stage, etc.	Repeat treatment may be necessary. Apply as a directed spray towards base of trunk on trees with mature brown bark. Do not spray green bark or foliage, nor exceed 10.6 qt./acre in one year. Do not apply within 14 days of harvest.
	<i>Selective wiper</i> 33% solution 1 gal. product in 2 gal. water.		Apply to one or preferably two sides of weeds with selective wiper equipment when weed is in correct stage of growth.	Avoid contact with desirable vegetation. In severe infestations, reduce equipment ground speed or apply in two directions to ensure contact with the wiper.

SUGGESTED HERBICIDES FOR STONE FRUITS (Continued)

Herbicide name	Amount per acre*		Time of application	Remarks
	Active ingredient	Formulated product		
dalapon (Dowpon M)	(Apricot, peach, plum and prune only) 3.7-7.4 lb. a.i./A.	5-10 lb. of 74% soluble formula- tion/A. + non-ionic wetting agent	Spring application when grass weeds are 6 to 10 inches tall and growing rapidly. Repeat application 2 to 4 weeks apart may be necessary, especially for perennial grass control.	Controls annual and perennial grasses. Use lower rate for trees less than 4 years old. Do not apply within 30 days of harvest or treat bare soil.

* Herbicides listed in this chart are formulated as liquids, wettable powders (WP), or dispersible granules. Application rates are listed in both actual as active ingredient (ai) or acid equivalent (ae) and amount of formulation needed per acre. Apply in 20 to 40 gallons water per acre unless stated otherwise. Read the *entire label* to be certain the correct formulation and rate are being used.



	STAGE	APPLE	PEAR	PEACH/COT	CHERRY/PLUM
Dormant	1				
Delayed Dormant	2				
Prepink	3				
Prepink	4				
Pink	5				
Pink	6				
Pink	7				
Full Bloom	8				

Courtesy Washington State University Extension Service

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This publication was prepared by Extension specialists at Oregon State University. *Insect- and disease-control schedules*: Glenn C. Fisher, Extension entomology specialist, and Iain C. MacSwan, Extension plant pathology specialist. *Weed-control schedules*: Ray D. William, Extension horticultural weed specialist. Trade names are used for purposes of illustration only; the authors intend no endorsement of any trade-name product by the Oregon State University Extension Service.

Extension Service, Oregon State University, Corvallis, O. E. Smith, director. This publication was produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the U. S. Department of Agriculture, and Oregon counties.

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