



# Fruit Tips

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## Spray Schedules for Controlling Pests of Backyard Fruits in Michigan

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**M**uch of the information in this publication is taken from "Backyard Fruit Sprays For Insects And Diseases," The Ohio State University, by Richard L. Miller and Michael A. Ellis. Information was also taken from Publication 591, "Growing and Using Fruit at Home," from The Ohio State University, by James D. Utzinger, Richard C. Funt, Michael A. Ellis and Richard L. Miller. Additional information is from Michigan State University Extension Bulletins E-154, "Fruit Spraying Calendar-1989" and E-1942, "Availability Guide."

## Availability Guide for Michigan Grown Fruits

This chart is a buying guide for fruits grown in Michigan. It shows a range of availability because the season for fruits varies slightly from year to year, and from one area of the state to another. The solid bars in the chart refer to the **peak periods**

of **availability**. These bars are longer than the harvest dates shown for *apples*, since a significant portion of the crop is stored and marketed after harvest. Usual **peak harvest dates** for each fruit are shown (in white) inside the bars.

FRUIT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Apples (fall)										AUG 25—OCT 31		
Apples (summer)							JUL 10—AUG 31					
Apricots						JUL 1—JUL 15						
Blackberries							JUL 1—AUG 31					
Blueberries							JUL 20—AUG 31					
Cherries, red tart						JUL 7—AUG 1						
Cherries, sweet						JUL 1—JUL 31						
Currants							JUL 15—AUG 7					
Gooseberries							JUL 20—AUG 15					
Grapes									SEP 1—OCT 15			
Nectarines								AUG 20—SEPT 10				
Peaches							AUG 1—SEP 15					
Pears								AUG 25—SEP 20				
Plums									SEP 1—SEP 30			
Raspberries							JUL 1—JUL 31		AUG 25—SEP 30			
Strawberries						JUN 7—30						

A more extensive availability chart showing both Michigan fruits and vegetables is available from your county extension office. Order Extension Bulletin E-1942, *Availability Guide—Michigan Grown Fruits, Vegetables, Other Products*, free.

# Spray Schedules for Controlling Pests of Backyard Fruits in Michigan

This publication deals primarily with the pesticides to use in growing fruits on a small scale. It also includes information on average yields, suggested numbers of plants or trees for a family of four, spacing, useful life of plants and trees, average annual per capita consumption, and other related information that would be of use to gardeners who are interested in growing fruit. Many publications dealing with fruit are listed in this publication and available from county Extension offices or the Michigan State University Bulletin Office.

Home gardeners want to grow their own fruit for several reasons. Freshness is probably the primary reason. Homeowners may also want to grow cultivars that are not available commercially. Some gardeners simply enjoy the challenge of growing their own. It is usually not realistic to grow your own fruit to save money, because the amount of time involved and the cost of equipment, chemicals and fertilizers can be high.

Many inherent problems associated with producing fruit cannot be controlled, such as weather. Ex-

tremely cold temperatures in winter or late spring frosts that kill flower buds are common in northern climates. Gardeners should not expect to harvest a crop of some fruits, such as apricots, strawberries, peaches and nectarines, every year.

Other common problems associated with growing fruit on a small scale include poor site (low and/or wet), poor soil, animal damage, vandalism, weeds, lawnmower damage, and failure to spray adequately on a timely basis to control insects and diseases. Only fruits such as currants, gooseberries, and perhaps strawberries and raspberries can be produced without spraying for insects and diseases.

Another problem is handling the fruit after harvesting. Many fruits are extremely perishable and must be consumed, canned or frozen within one or two days of harvest. If you plan to give away a portion of the harvest to relatives, friends, neighbors, churches, food banks, etc., those individuals must know the date of the anticipated harvest and the necessity of prompt processing or use of the produce. (See

the Availability Guide for usual harvest periods.)

It is almost impossible to raise fruits today without some insect, mite or disease problems. If you have fruit trees or plan to plant them, you need to plan a pest control program. Pest control measures listed and described in this publication are intended to help the home fruit grower with small plantings produce fruit of adequate quality. (See Table 1, "Planting Guide," for information on yields, spacing, consumption, etc.)

Avoid planting more fruit trees and plants than you can manage properly. Unsprayed and neglected fruit plants are good breeding places for disease and insect pests. Remove excess plants so you can properly care for the rest. If you're initiating care for a small planting that has been neglected in the past, do not expect to control all insects and diseases the first year.

If you have or plan to raise a large number of fruit trees, vines, bushes or strawberry plants, ask your county agent for the latest commercial "Fruit Spraying Calendar" (Extension bulletin E-154).

The schedules are intended for experienced commercial fruit growers and some of the pesticides listed are very toxic to humans if not properly used. Safe, economical control of pests in commercial plantings requires the use of large, specialized equipment, including special safety clothing and a spray mask and restricted use pesticides that can be purchased and used only by a certified pesticide applicator.

All pesticides included in this publication are general use pesticides and will not harm the environment to an unreasonable degree when used according to directions. They are available in garden centers and can be purchased and used by gardeners and homeowners—users do not have to be certified.

Restricted use pesticides can be purchased and used only by certified pesticide applicators or by persons under their supervision. Commercial growers commonly buy and use these pesticides to control fruit pests.

**Table 1. Planting guide.**

Fruit	Feet between plants	Feet between rows	Years to bearing	Years useful life	Average yield (lbs.) per mature plant	1985/capita consumption pounds (fresh/total)	Suggested no. of plants for a family of four	Special considerations
<b>TREE FRUITS</b>								
Apples (dwarf)	6-16	14-20	2-3	20+	100	18/30	2-3	Need 8-15 spray applications. Cross-pollination usually necessary.
Apricots	14-20	20	2-3	12	40-60	/0.5	1-2	Need 4-15 spray applications. Cross-pollination is desirable.
Cherries (sweet)	25	25	5-7	20	10-20	0.5/1.7 (sweet & tart)	2	Need 5 spray applications. Fruit must be protected from birds. Cross-pollination essential.
Cherries (tart)	20	20	3-4	15	75	0.5/1.7 (sweet & tart)	1	Need 5 spray applications. Fruit must be protected from birds. Cross-pollination not needed.
Peaches, Nectarines	20	20	3	12	70	5.4/9	2-3	Need 8-10 spray applications. Tree borers and canker can be serious problems. Cross-pollination not needed.
Pears (dwarf)	8-20	16-20	3-5	15	60-70	2.7/4	2	Need 8 spray applications. Cross-pollination essential.
Plums	14-20	20	3-5	15	40-60	1.4/2.1	2	Need 9 spray applications. Cross-pollination necessary for most cultivars.
<b>SMALL FRUITS</b>								
Blackberries (erect)	2-4	10-12	1	8-10	3-6	/0.1 (erect & trailing)	8	Need 7 spray applications.
Blackberries (trailing)	5-6	10-12	1	8-10	12-24	/0.1 (erect & trailing)	8	Need 7 spray applications. Need trellis.
Blueberries	4	8-10	1	20+	4-6	/0.25	6-8	Need 6 spray applications. Fruit must be protected from birds.
Currants	4-5	8-11	2-3	12-15	5-8	—	4	Sprays usually not needed.
Gooseberries	4-5	8-11	2-3	12-15	8-10	—	4	Sprays usually not needed.
Grapes	8-10	8-10	3-4	20	10-20	6.3/7.2	4	Need 7-9 spray applications. Vines must be supported.
Raspberries	1 1/2-4	6-12	1	8-10	2-5	/0.1	25-50	Need 6 spray applications.
Strawberries	2	3-4	1	2-4	1/2	2.9/4.2	100	May need 2-3 sprays.

**A**dditional information on practical certification can be obtained from:

Michigan Department of Agriculture  
Pesticides & Plant Pest Mgt. Division  
P.O. Box 30017  
Lansing, MI 48909

Pertinent Extension bulletins available include the following:

E-1025 "Safe, Effective Use of Pesticides—Private Applicators."

E-1824 "Safe, Effective Use of Pesticides—Commercial Applicators."

## How To Protect Yourself When Using Pesticides

**P**esticides are used to kill insects and disease-causing organisms. Handle these chemicals carefully to prevent injury to yourself, other people, pets or wildlife. Though the pesticides suggested for use in this bulletin are safe, certain precautions are necessary:

- Before using any pesticide, carefully read the label. Give special attention to precautions to be followed when using a product.
- Avoid spilling pesticides on yourself or in the immediate area where you are working. If this happens, wash yourself immediately with plenty of water to remove all traces of the pesti-

cide. Wash pesticide-contaminated clothing separately. Avoid getting any pesticide in your eyes, nose or mouth.

- Do not smoke or eat while you are applying pesticides. Thoroughly wash immediately after applying a pesticide.
- When applying a pesticide, do not permit material to blow back on you or on other people or pets. Adjust your treating direction according to the wind direction. If it becomes too windy, stop treatment and finish when the wind dies. Remember, you are responsible for pesticide spray drift.
- Do not burn empty pesticide containers in a backyard trash container. Dispose of them as instructed on the label. Liquid containers, when empty, should be triple rinsed into the sprayer.
- Store insecticides in tightly closed, well labeled, original containers away from children, wildlife, pets or irresponsible adults—never under the sink, in the pantry or in the medicine cabinet. Store in a cool, dry place. Mark the storage cabinet or area "POISON STORAGE." Most accidental poisonings occur to children under 2 years old, so keep stored pesticides under lock and key.

- Keep children and pets away from areas where you are mixing or applying pesticides.

## Storage Life of Pesticides

**T**hough most properly stored pesticides will still be effective for a second or third season, it is best to buy only enough for one season's use. Most pesticides gradually lose their effectiveness when exposed to moisture, air, light and high temperatures. Prolonged low or freezing temperatures frequently cause liquid pesticides to separate, making them ineffective. Dry formulations tend to cake when stored in wet or humid locations, and the container may disintegrate. At high temperatures, the active ingredients start to break down.

## Spray Equipment for Home Fruit Growers

**T**o control pests adequately, thoroughly cover fruit plants with pesticide sprays at the appropriate

times as indicated in the spray schedule. Use a sprayer that is powerful enough to reach all parts of the plant with the spray (e.g., tops of trees). It should also be easy to clean and slow to wear out. Suitable sprayers come in various types and sizes. *Note:* the small, handtype sprayers listed below do not have mechanical agitation. Therefore, the operator must vigorously shake the tank every few minutes when using wettable powder types to keep the spray materials thoroughly dispersed in the spray solution.

**Compressed-air sprayers** are

tanks that vary in size from 1 to 5 gallons. A built-in hand pump pumps air into them. The spray is delivered through an attached hose with a hand shut-off valve and a nozzle tip. One type is pressurized by filling with a garden hose using a special attachment on the tank.

**Knapsack or backpack sprayers** are compressed-air sprayers

that vary in size from 3 to 5 gallons and are strapped onto the operator's back. These sprayers, also equipped with hand shut-off valves, have a hand pump that the

Compressed-air sprayer



applicator must pump slowly but continuously. The pumping builds up pressure in the tank and forces the spray through a hose and nozzle tip at an even, steady rate.

The compressed-air and knapsack sprayers are satisfactory for a few dwarf fruit trees, vines, bushes or strawberry plants, but they do not have the capacity to spray mature, standard-sized trees. Most can deliver only a solid stream of spray to the top of standard-sized trees, rather than a fine mist.

**Trombone or slide-type sprayers** consist basically of two small-di-

ameter tubes. One slides within the other, compresses the liquid and forces the pesticide solution through a small hole in the end of one tube. These sprayers can deliver the spray to the tops of most fruit trees and are suitable for plantings of a few trees, as well as small fruits. However, they are very tiring to use.

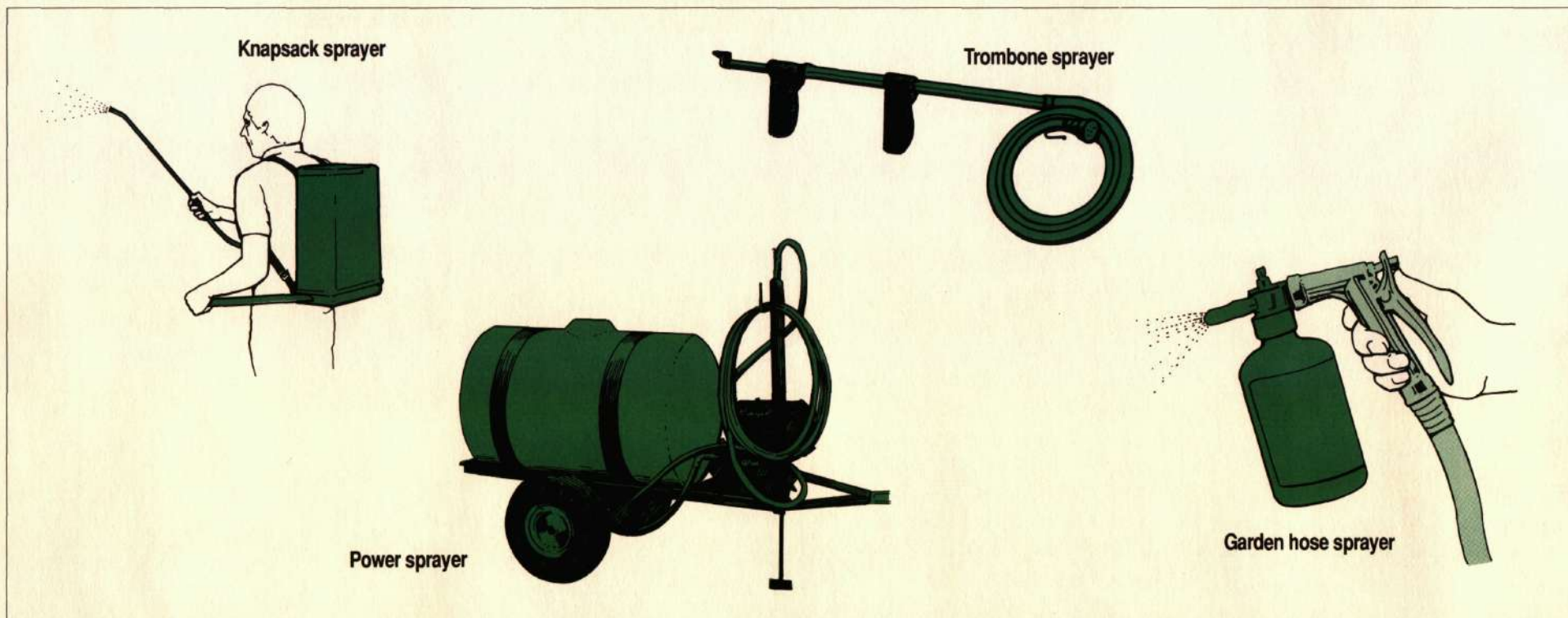
**Garden hose sprayers**, which are attached to the end of a garden hose, work well only with liquid pesticides. Wettable powders often plug the nozzle and/or settle to the bottom of the container. The spray

from most hose sprayers is rather coarse compared with that of compressed-air sprayers, and hose sprayers require more spray to treat a given number of plants. The fruit planting also has to be relatively close to a faucet, and a minimum of 30 to 40 pounds of pressure is needed to do an adequate job of spraying the tops of medium-sized trees.

**Power sprayers.** For plantings of 10 or more dwarf fruit trees or a few large or standard trees, some type of power sprayer is best. The smaller power sprayers range in ca-

capacity from 5 to 25 gallons and are powered by a battery, a small gasoline engine or power takeoff from a tractor. Those larger than 25 gallons are usually powered by a gasoline engine or tractor power takeoff.

Many brands of power sprayers are available, and prospective buyers should look at several models before purchasing one. Small power sprayer usually cost between \$200 and \$500 and can be up to \$1,000. Before spending that much money, you might want to ask yourself if you really can justify



the expenditure to produce your own fruit.

Considerations in buying a power sprayer include the size of the tank, the volume it will spray (in gallons per minute), the pressure attainable, the distance it will spray a fine mist (not a solid stream), materials used in construction (should be corrosion proof where it's in contact with spray), and, for trailing sprayers, the number and size of wheels (small narrow wheels may sink in the ground when the soil is moist or wet as it often is in early spring when you should start spraying).

Some sprayers are or can be equipped with a boom for spraying herbicides on lawns. If you use such a sprayer to apply herbicides, carefully rinse out any herbicide before using the sprayer again on fruit crops.

**Accessory equipment.** Measuring equipment is necessary to measure accurately the required amounts of pesticides. This will include a container for measuring small quantities and a set of measuring spoons. Keep this equipment separate from that used in the home. Mark it for pesticide measurements only and store it with the pesticides.

## Cleaning Spray Equipment

**A**fter spraying, refill the tank with clean water and spray the rinsate on the area that was just sprayed. Repeat this process, if necessary, until the rinsate is clear. To prevent corrosion, suspend small tanks upside down with lids removed to permit drainage and drying.

## How to Spray

**T**he key to successful pest control is thorough and proper coverage at the right time with the proper dosage and materials. Thorough coverage of all aboveground parts of plants is necessary to control fruit insects and diseases. Direct the spray onto both the top and bottom sides of leaves until the spray begins to drip off the leaves. Using proper pruning techniques enhances thorough coverage.

The goal of spraying is to place a thin layer of pesticide over all the exposed surfaces of each plant so that no matter where an insect may eat or crawl on that plant or a disease organism may be, it will be exposed to a lethal amount of pesticide before it can damage the plant. Failure to apply the spray thoroughly to all parts of the plant means pests can escape contact

with the chemical and damage untreated areas.

Prepare only the amount of spray mixture that you will need. Pesticides left standing in water soon lose their strength and may harm sprayer parts. Wettable powders tend to settle to the bottom of the tank unless the sprayer has a mechanical or automatic agitator. When applying sprays without an agitator, stir or shake the mixture often during application.

If you follow the spray schedule but pest control results are poor, be sure to check these important points:

- Did the plants receive thorough spray coverage at the recommended dosage?
- Were any of the recommended sprays omitted?
- Were sprays timed according to schedule?
- Were plants resprayed after heavy rains?

## How Long Pesticides Last

**M**ost pesticides lose their effectiveness several days after application. Temperature, moisture and sunlight affect the life of pesticides. The greater the extremes of these

factors, the quicker the pesticides lose their toxicity.

Rain removes various amounts of pesticides from plant foliage. In general, a pesticide is less likely to be washed off if it has had an opportunity to dry thoroughly on the foliage before a rain. Most materials should be reapplied the day after a heavy rain. Strong sunlight and driving winds also shorten the effective life of pesticides.

New growth, especially early in the season, results in exposed, unsprayed and thus unprotected plant parts.

The fact that pest populations are continuously moving and/or multiplying also makes repeated spray applications necessary.

## Preparation of Sprays

**P**repare the various sprays recommended in the spray schedule by mixing the exact quantities of the appropriate chemicals with the amount of water designated in Table 2. Do not inhale any chemicals that arise during measuring or mixing with the water. When mixing wettable powders, wear a dust mask and rubber gloves; when mixing liquids, wear eye covering and rubber gloves. Mix only as much spray as you will need for one application.

# Insecticides

**Diazinon** is an organic phosphate chemical that is active against a variety of fruit pests. It has a residual activity of 11 to 14 days and is cleared for use on apples, pears, cherries, peaches, plums, prunes, strawberries, grapes and brambles. It will not control organic phosphate-resistant strains of white apple leafhopper, spotted tentiform leafminer or obliquebanded leafroller, which are common in Michigan. Drenching crown treatments of emulsifiable concentrate will kill the overwintering stage of raspberry crown borers.

**Imidan** is an organic phosphate chemical. Its low toxicity to mammals is comparable to that of Sevin. It is used as a prebloom and postbloom treatment on apples, pears, peaches, cherries, plums, prunes, grapes and apricots. It may injure leaves on sweet cherries. It provides good broad-spectrum control of many fruit pests in Michigan but will not control organic phosphate-resistant strains of white apple leafhopper, spotted tentiform leafminer and oblique-banded leafroller, which are common in Michigan.



**Insecticidal soaps** are available for controlling a limited number of insects (aphids, mites, scale and pear psylla) on apples, pears, apricots, nectarines and peaches.

**Malathion** is a mild organic phosphate with a toxicity lower than that of Sevin. It controls an unusual variety of fruit insects. It is especially useful against several species of aphids. However, its residual effectiveness seldom exceeds 2 to 3 days. Malathion is available as a concentrate, a wettable powder or dust. It is used in Michigan for certain insect pests attacking bram-

bles, currants, blueberries and tree fruits. It is generally compatible with other insecticides and fungicides in common usage.

**Methoxychlor** is a chlorinated hydrocarbon with moderate residual activity and very low toxicity to humans and other warm-blooded animals. It will restrain such major fruit invaders as plum curculio, codling moth, apple maggot and cherry fruit fly, but it is generally inferior to alternative chemicals for these purposes. It is often included in all-purpose pesticide mixtures.

**Sevin (carbaryl)** is a carbamate chemical. It is part of the spray program for most fruit crops grown in Michigan. Its residual effectiveness varies from 10 to 14 days, depending on the insects to control. It can be applied fairly close to harvest without fear of excess residues. The use of Sevin may encourage mite and aphid buildups because it is toxic to predators. It is extremely toxic to bees if sprayed where bees are foraging. It is compatible with most pesticides and gives good control of certain pests resistant to other frequently used insecticides. Sevin offers a high degree of safety to animals and plants, lessening the hazards from spray drift that are associated with many pesticide chemicals. Sevin causes fruit thinning of apples and should not be used until at least 30 days after full bloom.

**Horticultural Oils.** Horticultural oils aid in the control of European red mite and San Jose scale. In the past, oils were divided into two groups: dormant, and summer weight or superior oils. Most of the dormant oils were thicker or heavier and applied when plants were



dormant. Superior oils were more refined and thinner (lighter) and could be applied to plants during certain periods of active growth.

The principal advantage of these new, refined, lighter oils is the reduced possibility of plant injury. They are safer because they are more volatile and less persistent on the tree. They remain on the tree long enough to kill the mites but not so long that they interfere with vital plant processes or oil-incompatible pesticides that may be applied later.

Almost all oils used today are of the more refined type. The current tendency is to use a lightweight formulation but vary the rate depending on whether plants are dormant or growing. Be sure to follow the directions on the label regarding the rate, time and environmental conditions.

Do not apply horticultural oils within 1 to 2 days of freezing or near freezing temperatures (either have occurred or may be expected) in the spring or when the temperature is above 85 degrees F for summer application. Do not apply oil with or following an application of captan.

**Table 2. Quantity of insecticides and fungicides to use in preparing sprays.**

Selected materials and common formulations	Amounts to add in water to make:	
	1 gal	10 gal
Benomyl (Benlate) 50% WP%* (fungicide)		
apples only	1/4 Tbsp	2 Tbsp
all other crops	3/4 Tbsp	1 oz
Bordeaux mixture (bactericide and fungicide)***	varies	varies
Captan 50% WP (fungicide)	2 Tbsp	3 oz
Diazinon 25% EC** (insecticide)	2 tsp (1/3 fl oz)	6 Tbsp
Ferbam 76% WP (fungicide)***	varies	varies
Horticultural oil (miticide and insecticide) (spring rate)	1/3 pt (5 1/3 fl oz)	3 1/3 pt
Imidan 50% WP (insecticide)	2 1/4 tsp	7 1/2 Tbsp
Lime-sulfur, dry (fungicide)	8 Tbsp	2 1/2 lb
Lime-sulfur, liquid (fungicide) (dormant stage)	10 Tbsp (5 fl oz)	3 pt + 2 fl oz
Malathion 50% liquid (insecticide and miticide)	2 tsp	3 1/3 oz
Sevin 50% WP (insecticide)	2 Tbsp	5 oz
Sevin 27% liquid (insecticide)	1 Tbsp	5 oz

**SPECIAL NOTE:** Table 2 gives quantities of pesticides to use to prepare sprays. If the information on your container label differs from this table, follow the label.

**EQUIVALENTS:**

- 1 quart = 2 pints or 32 fluid ounces (fl oz)
- 1 pint = 2 cups or 16 fl oz
- 1 cup = 8 oz or 16 tablespoons
- 1 tablespoon = 1/2 fl oz or 3 teaspoons
- 1 fluid ounce = 2 tablespoons or 6 teaspoons
- Tbsp = tablespoon
- tsp = teaspoon

\*WP = wettable powder.

\*\*EC = emulsifiable concentrate or emulsion.

\*\*\* = See label for specific rate for each crop and disease being controlled.

# FUNGICIDES

**Benomyl (Benlate)** is an excellent general purpose fruit fungicide that is compatible with most other fungicides and insecticides.

Benomyl is also effective against the powdery mildew fungi. Using benomyl alone may cause some fungi to become resistant to it. Using benomyl in conjunction with other fungicides should provide good disease control and reduce the possibility that fungi will develop resistance to benomyl.

**Bordeaux mixture** is a combination of soluble copper sulfate (blue-stone), hydrated lime and water. It is used to control fire blight on apple and pear, peach leaf curl on peach, and spur blight and anthracnose in red raspberry. In a 2-6-100 Bordeaux, for example, the first figure of the formula is copper sulfate in pounds, the second figure is spray lime in pounds, and the third figure is water in gallons. Home-made Bordeaux is superior to prepared dry mixes.

Bordeaux is not compatible with captan, ferbam, Sevin and horticultural oils. Read the label carefully before combining it with any other pesticides.

**Captan** is one of the best general purpose fruit fungicides. It is compatible with most other fungicides and insecticides. On Red Delicious apples, however, it has caused leaf spotting when used at full strength early in the season and when used in combination with sulfur. Captan is not compatible with horticultural oil, lime or other strongly alkaline materials.

**Copper compounds** are fungicides or bactericides containing copper in a slowly available form. They generally are not as effective as the Bordeaux mixture in controlling diseases, but they are less injurious to foliage and fruit. Follow directions on the label for use.

**Daconil 2787** is a liquid concentrate fungicide that has limited potential for use on fruits. It is listed for use on a few diseases of peach, nectarine, apricot, cherry and plum. Follow directions on the label for use.

**Dodine** is an excellent fungicide for apple scab and cherry leaf spot control that has both protectant and after-infection control activity. Protectant sprays are applied be-

fore infection occurs and set up a chemical barrier between the susceptible plant tissue and the germinating spore. Fungicides that have after-infection activity control infections that may have occurred a few hours or days previously. Continued use of this product may cause fungi to develop resistance to it. Therefore, it should be either combined or alternated with another fungicide. It is sold under the trade name Cyprex and is formulated as a 65 percent active wettable powder. Dust formulations are also available. During critical periods for spore discharge and to inactivate sporulation of scab lesions, it is used at 1/2 lb per 100 gal of water.

**Ferbam** is formulated as a 76 percent wettable powder. It is used as a protectant for control of apple scab, pear scab, cedar-apple rust, peach leaf curl and brown rot. It is used in combination with wettable sulfur on plums, prunes and sweet cherries to control leaf spot. In some cases, yellow apple cultivars have produced inferior finish when this material was used.

Ferbam used in combination with captan in blueberries gives fair to poor control of the shoot blight phase of mummy berry disease and good control of the blossom infection phase that gives rise to mummified fruit. In grapes, ferbam is one of the best fungicides for black rot control; however, it gives very little control of downy mildew or *Eutypa dieback* and no control of powdery mildew. In raspberries, ferbam gives fair control of anthracnose.

**Funginex** is registered for use on apples for apple scab, powdery mildew and rust disease control. Applications are limited to the period from 1/2-inch green tip to petal fall and to five applications per season. Funginex is primarily an after-infection fungicide for use in scab control programs. Treatments should be made within 72 hours from the beginning of a wet period suitable for scab infection. It is used at 10 fl oz per 100 gal dilute spray or 36-40 fl oz per acre.

Funginex is also registered for use on peaches, nectarines, apricots, cherries, plums and prunes for brown rot (blossom blight) con-

trol and for season long control of brown rot on peach, nectarine and apricot fruits. It is used at 10-16 fl oz per 100 gal of dilute spray or at 36-48 fl oz per acre in low-volume sprays.

**Lime sulfur** is available as a wettable powder and as a paste. Because of convenience, the wettable sulfur formulations are generally used. Recommendations are based on a 95 percent wettable sulfur for-

mulation. Formulations containing less sulfur should be used at higher rates. Sulfur, once used extensively as a protectant for scab, has generally been replaced by organic materials of the protective-eradicant type. Do not apply sulfur with horticultural oil. Lime sulfur is not compatible with Bordeaux, captan, Imidan and Sevin.

**Sulfur** is used to control powdery mildew on grapes; brown rot

on cherries, peaches and plums; and scab on apples and pears. The wettable powder formulations are generally used.

Sulfur is also used on all stone fruits, except apricots, to control brown rot. It is especially important in the bloom and early cover sprays on peaches to control not only brown rot, but also peach scab and powdery mildew.

**Wettable sulfur** gives fair to good control of powdery mildew in French hybrid and vinifera (European) grape cultivars. Sulfur injures many American cultivars and some French hybrid cultivars. Sulfur can also injure tolerant cultivars if the temperature is 85 degrees F or higher during spraying or shortly after spraying is finished.

**Table 3. Approximate amount of spray required for fruit trees of various sizes.**

Height in feet	Spread in feet	Amount per tree per application+	Number of trees per gallon of spray
4	3	1/4 pint	up to 40
5 to 8	3 to 6	1/4 to 1 pint	5-32
8 to 10	4 to 8	1/2 to 3 pints	2-11
10 to 15	8 to 15	1/2 to 2 1/2 gal.	—
15 to 20	15 to 25	2 1/2 to 8 1/2 gal.	—

+Use the greater amounts for trees in full foliage. Amounts are based on using 1 gallon of spray solution per 1,450 cubic feet of orchard foliage (tree height x tree width x lineal feet of row).

# Harvest Restrictions

## Days To Wait After Application Until Harvest

Because some pesticides are poisonous, many backyard fruit growers are concerned about the safety of eating fruits sprayed with pesticides.

- Avoid excessive pesticide residues on harvested fruits by following directions on the pesticide label:
- Apply pesticides only to fruit crops listed on the label and use only at the rate indicated.
- Do not pick the fruit before the number of days waiting period given on the label has passed. Every pesticide label should provide harvest restrictions. If a pesticide label does not give this information, it is not intended for use on fruit and should not be used. Follow the suggestions on "days waiting time" from last application until harvest and you will have no reason to fear that your fruit is harmful. Table 4 lists harvest restrictions.

## Special Notice: On Herbicides

Herbicides (weed killers) are designed to kill plants, and some are extremely difficult to rinse out of sprayers. If possible, use a separate sprayer for herbicides. Also, store herbicides in a different place or in such a way that they will not contaminate other spray materials.

## On Sevin Insecticide

Sevin causes apple drop. This insecticide may cause excessive fruit thinning (reduced numbers) on apples if applied within 30 days after bloom. Unless you want to thin apple fruit, do not use Sevin in the spray schedule until at least 30 days after full bloom.

## All-Purpose Pesticide Mixtures

Insecticides and fungicides are often needed at the same time on a plant to protect it against attack by both insects and diseases. All-purpose fruit sprays contain a mixture

of fungicides and insecticides. One, for example, contains malathion, methoxychlor and captan—two insecticides and one fungicide. This mixture is safe but is not the most effective fruit pest control combination.

Most home orchardists find that two other insecticides—Imidan and Sevin—will give them better pest control alone or in combination with the all-purpose fruit spray. An all-purpose fruit spray can be mixed with additional pesticides, within some limitations. When a liquid concentrate is added to the wettable powder all-purpose fruit spray, it may cause burned spots on the leaves and fruits. This is caused by the action of the oil in the liquid concentrate with the fungicide captan. This burning could harm the foliage.

Alternatives include:

- Use only wettable powder or flowable-type formulations in combination with the all-purpose mix.
- Use only liquids together and not the all-purpose mix.

- Use only the all-purpose fruit spray by itself.

If you're in doubt about combination spray injury, check the label, ask your county agent, or apply the mixture to a small portion of the plant and wait to see what happens. Spray burn usually appears in 24 to 48 hours. If burn results, do not apply the combination.

## Where To Purchase Pesticides

Most garden centers or stores with yard and garden departments where pesticides are sold will have formulations of some of the commonly recommended pesticides. Many agricultural supply or farmer co-op centers also market them.

## Detection Devices For Insects

The rate at which insects develop depends largely on temperature. Temperature varies from year to year, so it is very difficult to pre-

dict the presence of a pest throughout the entire season based on the date or developmental stage of a fruit tree. Associating pest development with the flowering of certain plants has been somewhat successful with a few pests but not with others.

In fruit, we are dealing with many pests over a long time. Following the development of fruit pests throughout the growing season can reveal the vulnerable stage of the pests and so the best times to apply an appropriate pesticide. Home orchardists, however, often

do not have the time nor the knowledge to do this monitoring.

Commercial growers inspect their orchards at least weekly to detect pests. Plant parts are collected frequently and examined in the laboratory for certain pests. Bait-lure

traps have been successfully used to detect cherry fruit fly, apple maggot and blueberry maggot. Pheromone or sex-lure traps are often used for some of the more serious moth pests of apple and peach.

*Continued on page 14.*

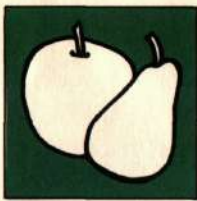
**Table 4. Days between final application and harvest.**

Listed below are some of the commonly used pesticides and the intervals from last application to harvest for each crop. See spray schedules for recommended materials. Consult product label.

<b>FUNGICIDES</b>											
Chemical	Apples	Apricots	Cherries	Peaches	Pears	Plums & prunes	Blueberries	Currants & gooseberries	Grapes	Raspberries	Strawberries
Benomyl (Benlate)	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	21	7	3		
Benomyl + Captan	0			0	0						
Bordeaux mixture	b			b	b				b		
Captan	0	0	0 <sup>a</sup>	0 <sup>a</sup>	0		0		c	0	c
Dodine (Cyprex)	7		0	15					14		
Ferbam	7		0		7	7	40	14	7	40	
Lime-sulfurs	b		b	b		b					
<b>INSECTICIDES</b>											
Chemical	Apples	Apricots	Cherries	Peaches	Pears	Plums & prunes	Blueberries	Currants & gooseberries	Grapes	Raspberries	Strawberries
Diazinon	14	10	10	20	14	10	7		10	7	5
Horticultural oil	e	e	e	e	e	e	e	e	e	e	e
Imidan	7 <sup>c</sup>	14	7	14 <sup>c</sup>	7 <sup>c</sup>	7			7		
Insecticidal soaps	0	0		0	0						
Malathion	3	7	3	7	1	3	0-1 <sup>c</sup>	3 <sup>c</sup>	3	1	3
Methoxychlor	7	21	7	21	7	7	14	14 <sup>d</sup>	14	3	3
Sevin	1	3	1	1	1	1	0		0	7	1

<sup>a</sup> = May be used as postharvest treatment—see label. <sup>b</sup> = Exempt if used as recommended. <sup>c</sup> = See label restrictions on use. <sup>d</sup> = Remove excess residues at harvest.

<sup>e</sup> = No residue if used according to recommendations.



**Table 5. Spray schedules for pest control on apples, crabapples, quince and pears.**

Time to spray	Apples, crabapples, quince	Pears	Insects and diseases most likely to be a problem at specific times (first column) during the growing season.*
	Materials (rates listed in Table 2)		
<b>Dormant:</b> Early spring before buds swell	Horticultural oil. <i>Note: Do not spray when freezing or near freezing temperatures may be expected or have just occurred.</i>	Horticultural oil	Oil for scale insects, mites, pear psylla and pear leaf blister mites.
<b>Half-inch green:</b> When blossom buds show 1/2 inch green	Captan + benomyl	No spray needed	Fungicide for control of scab.
<b>Prepink:</b> When blossoms first show pink	Captan + benomyl + malathion or all-purpose spray	No spray needed	Fungicide for control of scab and black rot. Insecticide for European red mites and aphids.
<b>Pink:</b> Just before blooms open	Same as prepink spray	Captan	Same as prepink.
<b>Bloom:</b> When 90% of blossoms are open	<i>Note: to protect bees, do not use insecticide during bloom. During bloom is the most critical time to protect trees from infection by fire blight. For recommendations on fire blight control, refer to "Control of specific pests not covered in spray schedules" in this publication.</i>		
<b>Petal fall:</b> When last petals are falling	Captan + benomyl + malathion or Imidan, or all-purpose spray	Captan + Imidan or Sevin, or all-purpose spray	Fungicide for control of scab, black rot, calyx rots and blotch. Insecticide for codling moth, plum curculio, pear psylla and plant bugs.
<b>First cover:</b> Seven days after petal-fall spray	Captan + Imidan or all-purpose spray	Captan + Imidan or all-purpose spray	Fungicide for control of scab, black rot, calyx rots and blotch. Insecticide for codling moth and plum curculio.
<b>Second cover:</b> Two weeks after first cover spray	Captan + Imidan or Sevin, or all-purpose spray	Captan + Imidan or Sevin, or all-purpose spray	Fungicide for control of scab, fruit rots, blotches and leaf spots. Insecticides for codling moth, plum curculio and mites.
<b>Third cover:</b> Two weeks after second cover	Captan + Imidan or Sevin, or all-purpose spray	Sevin + Imidan or all-purpose spray	Fungicide for control of scab, fruit rots and blotches. Insecticides for codling moth, apple maggot and pear psylla.
<b>Remaining covers :</b> Spray every two weeks	Captan + Imidan or Sevin, or all-purpose spray. Continue sprays to within two weeks of harvest or Aug. 30, whichever comes first.	Captan + Imidan or Sevin, or all-purpose spray. Apply two more sprays as above.	Fungicide for control of scab, fruit rots and blotches. Insecticide for codling moth, apple maggot, leafhoppers and pear psylla.

\* Scab sprays may be required more often than indicated, depending on rainfall and temperature.



**Table 6. Spray schedules for pest control on peaches, nectarines, apricots, cherries and plums.**

Time to spray	Peaches, nectarines, apricots		Plums	Cherries	Insects and diseases most likely to be a problem at specific times (first column) during the growing season.
	Materials (rates listed in Table 2)				
<b>Dormant:</b> For peaches, nectarines and apricots— early spring, before buds swell. <b>Delayed dormant:</b> For plums and cherries just before the buds break open	Ferbam	All-purpose fruit spray, Benomyl for black knot control		If black knot is a problem, use Captan or all-purpose fruit spray. If black knot is not a problem, no spray needed.	This is the only spray that controls peach leaf curl, plum pockets, and black knot of plum and cherries. For black knot control, this spray should be repeated for two successive years.
<b>Half-inch green:</b> When blossom buds show 1/2 inch green	No spray needed	Horticultural oil		Horticultural oil	Oil for control of scale insects, European red mite and aphids.
<i>Note: Do not spray when freezing or near freezing temperature may be expected or have just occurred.</i>					
<b>Pink :</b> Just before blooms open	Captan	Captan		No spray needed	Fungicide for control of brown rot.
<b>Bloom :</b> When 90% of blossoms open	Captan+ benomyl	Benomyl		Captan+ benomyl	Same as pink.
<i>Note: To protect bees—do not use insecticide during bloom</i>					
<b>Petal fall:</b> When last petals are falling	Captan + Imidan or Sevin, or all-purpose spray	Imidan or Sevin, or all-purpose spray		Captan + Imidan or Sevin, or all-purpose spray	Insecticide for control of plum curculio, European red mite, Oriental fruit moth, plant bugs, green fruit worm and rust mite. Fungicide for scab, brown rot and cherry leaf spot.
<b>First cover:</b> Seven days after petal-fall spray	Same as petal fall	Same as petal fall		Same as petal fall	Same as petal fall.
<b>Remaining covers:</b> Continue spraying at 10- to 14-day intervals	Same as petal fall	Same as petal fall		Same as petal fall	Insecticide for control of same pests as above plus cherry fruit fly. Fungicide for scab, brown rot, cherry leaf spot.
<b>Final spray :</b> Within one week of harvest	Captan + benomyl	Benomyl		Same as petal fall	For control of brown rot.



**Table 7. Spray schedules for pest control on brambles (blackberries and raspberries).**

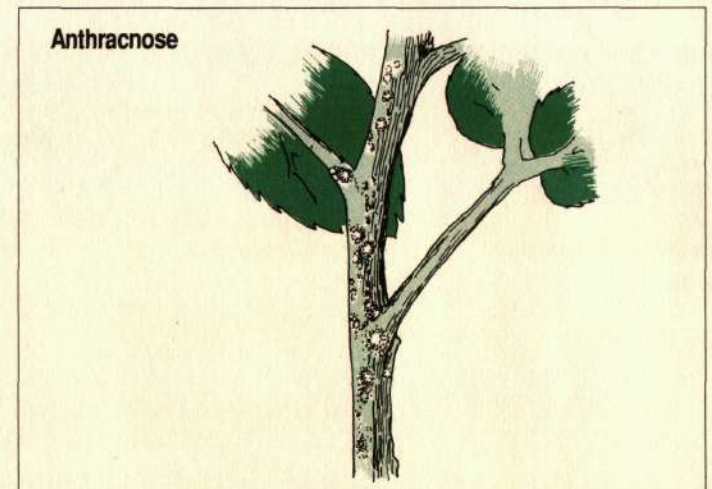
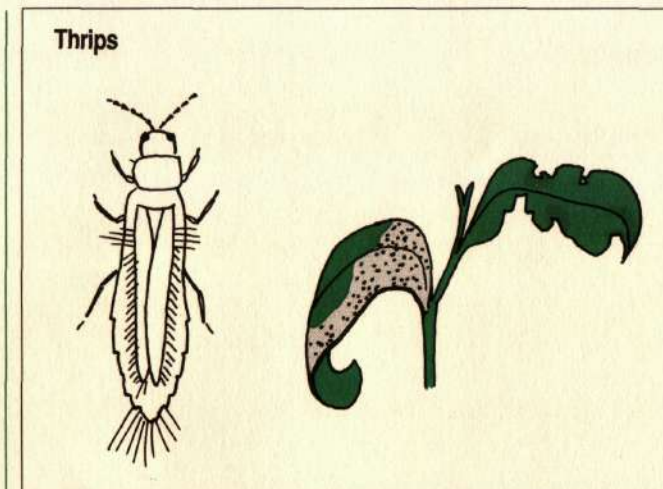
Time to spray	Materials (Rates listed in Table 2)	Insects and diseases most likely to be a problem at specific times (first column) during the growing season.
<b>Delayed dormant</b> When buds begin to break and show silver	Liquid lime-sulfur <b>Note:</b> <i>This spray is critical for good disease control.</i>	Lime-sulfur for rose scale, anthracnose, cane blight and spur blight.
<b>New cane spray:</b> When new canes are 6-12 inches high	Captan or Ferbam	Fungicide for control of anthracnose, cane blight, spur blight and septoria leaf spot.
<b>Prebloom:</b> Just before blossoms open	Captan + benomyl + malathion or Imidan	Fungicide for control of anthracnose, cane blight, spur blight, fruit rots, septoria leaf spot and powdery mildew. Insecticide for raspberry fruit worm, cane borer, thrips and strawberry weevil.
<b>Postbloom</b>	Captan + benomyl + Sevin	Fungicide for anthracnose, septoria leaf spot, powdery mildew and fruit rots. <i>* Insecticide for various insects.</i>
<b>Preharvest:</b> As fruit begins to color ( <i>Continue sprays every 7 days through harvest. See Table 4 for days waiting from last spray to harvest.</i> )	Captan + benomyl + malathion	Fungicide for anthracnose, septoria leaf spot, powdery mildew and fruit rots. <i>* Insecticide for sap beetle.</i>
<b>Postharvest</b>	Captan + Sevin	Fungicide for anthracnose, cane blight, septoria leaf spot, powdery mildew and spur blight. <i>* Insecticide for various insects.</i>

\*Do not include an insecticide (Sevin, malathion, diazinon, Imidan, etc.) unless insects are present or have been a problem in previous years.

Continued from page 11.

All of these devices are useful, but they are expensive and require constant monitoring. In most cases, they are too costly and too complicated for most amateur growers.

An alternate method for obtaining pest development information is to call your local county Cooperative Extension Service horticultural agent, who generally is aware of this information for your area.







**Table 8. Spray schedules for pest control on grapes.**

Time to spray	Materials (Rates listed in Table 2)	Insects and diseases most likely to be a problem at specific times (first column) during the growing season.
<b>New growth:</b> 2-4 inches long	Captan + methoxychlor and Sevin <b>Note:</b> <i>If powdery mildew is a problem, a fungicide</i>	Fungicides for control of black rot. Insecticide for flea beetles and climbing cutworms. Methoxychlor or Sevin may be needed just before buds show green for flea beetles.
<b>New growth:</b> 10-15 inches long	Same as above	Same as above
<b>Prebloom:</b> Just before first blossoms open	Ferbam or captan	Fungicide for control of black rot and powdery mildew.
<b>Bloom:</b> When the first few blossoms open	Ferbam or captan	Same as above
<b>Postbloom:</b> After all blossoms have fallen	Ferbam or captan + Imidan or Sevin or methoxychlor. <b>Note:</b> <i>In wet weather, do not wait until all blossoms have fallen, especially if black rot is a problem. Spray every 7 to 10 days.</i>	Fungicide for black rot, downy mildew and powdery mildew. Insecticides for mites, grape berry moth, leafhoppers, rose chafer and grape rootworm.
<b>First cover:</b> 10 days after postbloom	Ferbam or captan + Sevin or methoxychlor + Imidan. <b>Note:</b> <i>If black rot is present on leaves or berries, use ferbam.</i>	Fungicides for control of black rot, powdery mildew and downy mildew. <i>*Insecticides for control of mites, grape berry moth, leafhoppers, rose chafer and grape rootworm.</i>
<b>Second cover:</b> 12-14 days after postbloom	Same as first cover	Same as first cover
<b>Third cover:</b> 12-14 days after second cover	Ferbam or captan + Imidan or Sevin or methoxychlor	Fungicide for control of powdery mildew and downy mildew. Insecticide for grape berry moth, grape rootworm and leafroller.
<b>Fourth cover:</b> 12-14 days after third cover	Same as third cover	Same as third cover

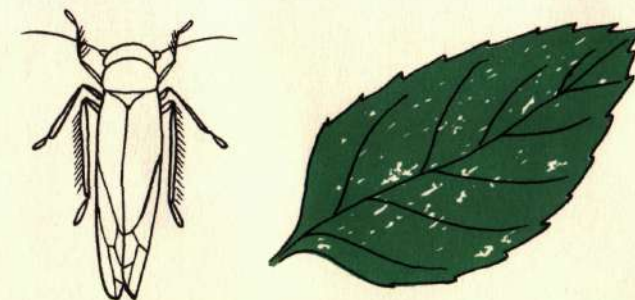
**SPECIAL NOTES:**

Black rot—when berries reach about 6 to 8 percent sugar content (usually when they start to change color), they are no longer susceptible to black rot.

Powdery mildew—If powdery mildew becomes evident, incorporate benomyl in the spray schedule.

\*Do not include an insecticide (Sevin, malathion, diazinon, Imidan, etc.) unless insects are present or have been a problem in previous years.

**Leaf hopper**





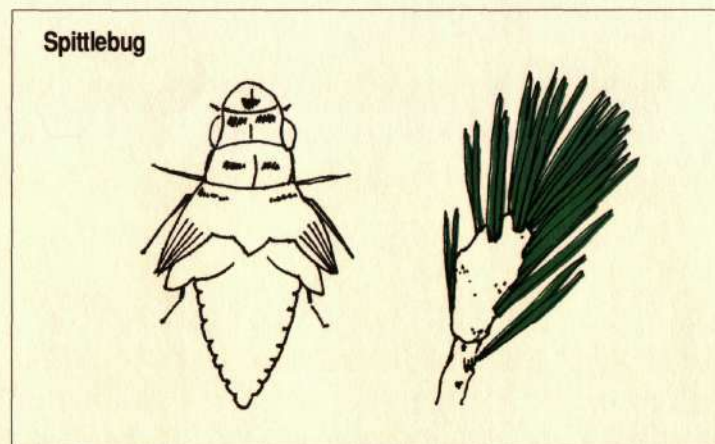
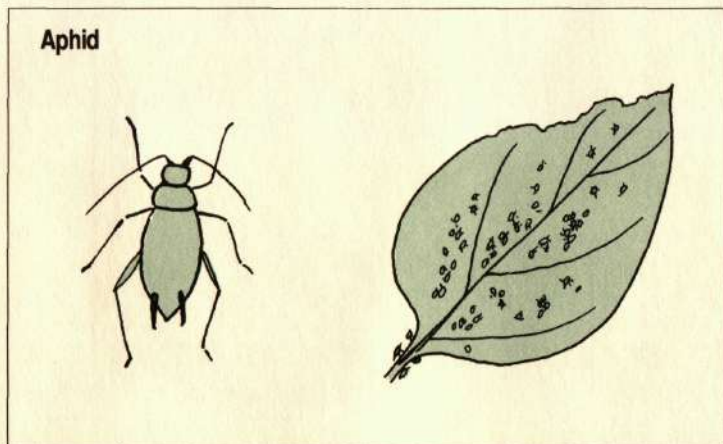
**Table 9. Spray schedules for pest control on strawberries.**

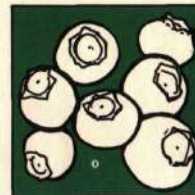
Time to spray	Materials (Rates listed in Table 2)	Insects and diseases most likely to be a problem at specific times (first column) during the growing season.
<b>Prebloom:</b> When blossom buds are visible in the crown	Captan + malathion	Fungicide for control of fruit rots and leaf spots. Insecticide for spider mites, leaf aphids, weevils and spittlebugs.
<b>Early bloom:</b> When blossom stems have pushed out of crown	Captan + benomyl + malathion	Same as prebloom.
<b>Full bloom</b>	Captan + benomyl. Note: No insecticide should be used during bloom.	Fungicide for fruit rots.
<b>Postbloom:</b> Begin 10 days after full bloom spray and continue to spray every 7 days until harvest is over. See Table 4 for days waiting from last spray to harvest.	Captan + benomyl + Sevin and malathion, or all-purpose fruit spray.	Fungicide for fruit rots and leaf spots. *Insecticide for aphids, leaf rollers, spittlebugs and plant bugs.
<b>Preharvest</b>	** Captan + benomyl	Fruit rots.
<b>Postharvest:</b> Apply one or more times after renovation to protect the new foliage or next year's crop.	Captan + Sevin or diazinon	Fungicide for leaf spot.

\*Insecticide for strawberry leafrollers and leafhoppers.

\*Do not include an insecticide (Sevin, malathion, diazinon, Imidan, etc.) unless insects are present or have been a problem in previous years.

\*\*Captan has a re-entry stipulation that requires protective gloves be worn for 4 days after application when harvesting berries, even though berries can be eaten the day they are sprayed with captan.



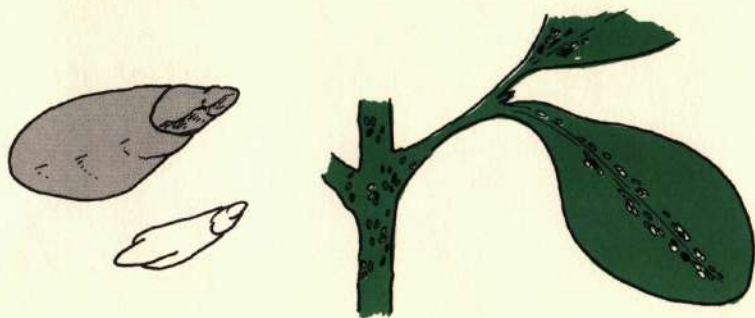


**Table 10. Spray schedules for pest control on blueberries.**

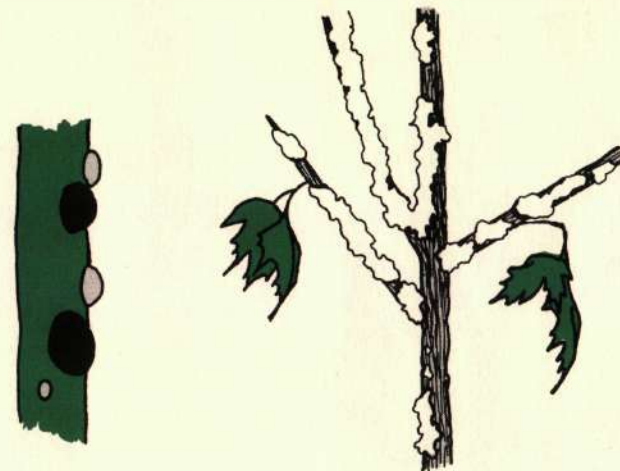
Time to spray	Materials (Rates listed in Table 2)	Insects and diseases most likely to be a problem at the specific time (first column) during the growing season
<b>Dormant:</b> Before budbreak	Horticultural oil <b>Note:</b> <i>apply only if scale insects are a problem.</i>	*Oil for control of scale insects.
<b>Green tip:</b> Bud has 1/4 inch of green	Funginex	To control mummy berry.
<b>Prebloom:</b> Just before blossoms open	Same as green tip	Same as green tip.
<b>Bloom:</b> 25-75% of blossoms open	Benomyl	Same as green tip.
<b>Petal fall:</b> 75% of petals have dropped	Benomyl + Sevin or malathion or diazinon	Fungicide for mummy berry. *Insecticide for fruit worms, tip borer, leafroller, leafhoppers and plum curculio.
<b>After bloom:</b> Seven to 10 days after petal fall	Same as above	Same as above, plus blueberry maggot and Japanese beetle.

\*Do not include an insecticide (Sevin, malathion, diazinon, Imidan, etc.) unless insects are present or have been a problem in previous years.

**Armored Scale and Euonymus Scale**



**Soft Scale**



# Control of Pests Not Covered In Spray Schedules

## Fire Blight on Apples and Pears

Fire blight, like most bacterial plant diseases, is very hard to control but can be greatly reduced by planting the more resistant cultivars, using good sanitary practices and spraying properly. Fire blight can occur on all common cultivars of apple and pear but is most destructive to Paulared, Jonathan, Rome Beauty, Wealthy, Transparent and Idared apples and Bartlett, Clapp Favorite and Bosc pears. However, most of the more desirable pear cultivars are so susceptible that fire blight is a serious problem.

Thoroughly examine trees at least once a week from the time

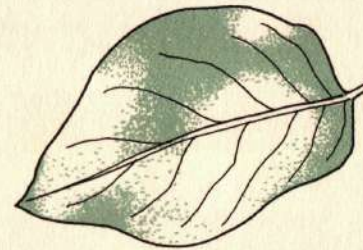


blossoms appear in the spring until early August and immediately remove all blighted twigs, spurs, etc. Break or cut infected parts off 6 to 8 inches below the lowest point of visible infection. Avoid spreading the bacteria by disinfecting the blade of any cutting tool used by dipping the blade in a 10 percent household bleach solution between cuts. Remove diseased material from the vicinity of the trees and burn, bury or otherwise dispose of it. Use nitrogen fertilizers very sparingly around pears and susceptible apple cultivars—young, vigorously growing trees are generally more susceptible than mature ones.

## Control of Powdery Mildew on Fruit Crops

Most Michigan fruit crops are susceptible to powdery mildew. Benomyl (fungicide) is effective against powdery mildew fungi and can be used on all fruit crops mentioned in this publication. When benomyl is included in the recommended spray schedule, powdery mildew should not be a problem. If

Powdery Mildew



powdery mildew is a problem, use benomyl in combination with another fungicide recommended in the spray schedule. Follow instructions for rates given in Table 2 and on the container label.

## Rust on Apples and Pears

If rust is a problem, apply ferbam. Apply four sprays 7 to 10 days apart starting at pink stage in early bloom. Follow label instructions for correct rates and precautions.

Cedar-Apple Rust



## Control of Mites on Fruit Trees

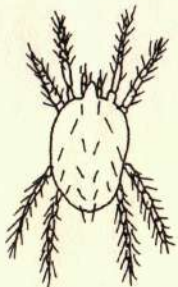
For control of mites throughout the growing season, apply horticultural oil as a dormant spray as suggested in the spray schedule. Summer sprays spaced 8 to 10 days apart are necessary. Pesticides do not generally control eggs, so always use two sprays in succession. Hatching eggs can result in a mite

buildup in a very short period of time. Remember that oil can not be applied with or after an application of captan.

Horticultural oils can be applied between green-tip and prepink stages of tree development. European red mite eggs are most susceptible to control by oil when they are about to hatch. Under Michigan conditions, the period of peak mite egg hatch occurs when apple trees are in the prepink to pink stage. Thus, the closer the application to prepink, the greater the kill of mite eggs. Oil applied earlier than green-tip is not as effective as later applications. The addition of a phosphate insecticide does not increase the miticidal value of oil.

Preventive oil applications do not control the two-spotted mite because this mite moves up into the trees from grass and weeds during

Spider Mite



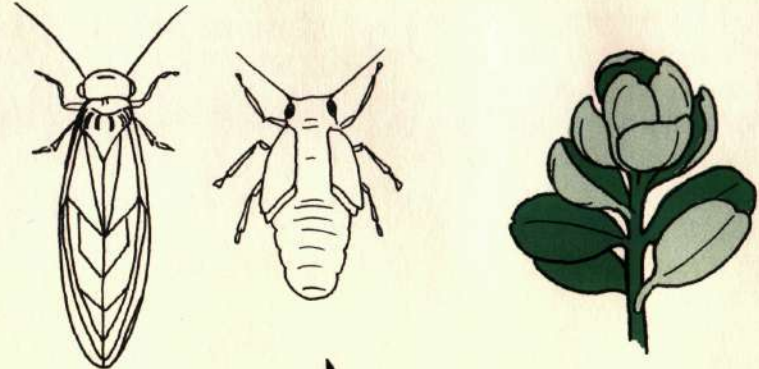
the season. Preventive European red mite control programs are designed to control the mites at an early stage in their development to prevent any buildup through the season. Supplemental measures are usually required in mid- to late season. Eradicative mite control programs, on the other hand, attempt to control mites after they have increased sufficiently in numbers to damage the crop. Eradicative programs are expensive and require specific miticides.

## Control of Mites on Strawberries

Two species of mites attack strawberries. Damage appears as distorted and discolored leaves and stunted fruits. Silken webs may also be found on the lower surfaces of the leaves. The two-spotted spider mite varies in color from pale greenish yellow to dark crimson with two dark spots on its back. The cyclamen mite is so tiny that it is scarcely visible to the naked eye. Both mites suck sap from the foliage and, when populations are heavy, can seriously damage strawberry plantings.

Life cycles of both species are quite short during the summer. Under ideal weather conditions, they can build up very rapidly if left uncontrolled.

Boxwood Psyllid



Sooty Mold



## Control of Pear Psylla on Pears

Some time between the dormant and green-tip stages of pear bud development, tiny pear psylla nymphs appear and begin sucking plant juices. They congregate beneath the leaves and, if left unchecked, their feeding causes the leaves to turn brown and even drop in the summer. Leaves, twigs

and fruits are often covered with sticky honeydew (psylla droppings) on which a sooty mold grows.

If pear psylla has been a problem, apply a horticultural oil spray before buds open, followed by an application of Imidan at petal fall and first cover sprays. Then wait 30 days. If psyllids are still present, make two more applications of Imidan 7 to 10 days apart.

Many other Extension publications are available on Michigan Fruit production, including recommended varieties, culture, insects/diseases, fertilizers, pesticides and pruning methods. Call, write or visit the Cooperative Extension Service Office in your county for more information. Following is a list of related publications available there or by writing to the MSU Bulletin Office, P.O. Box 6640, East Lansing, MI 48826-6640.

E-O509, Peach Culture in Michigan (free)

E-O519, Pear Culture in Michigan (free)

E-O852, Fertilizers for Fruit Crops (\$1.35, for sale only)

E-1025 "Safe, Effective Use of Pesticides—Private Applicators" (\$1.00, for sale only)

E-1330, How to Recognize and Control Black Knot (free)

E-1439, Diseases in the Home Orchard (\$.50)

E-1456, Highbush Blueberry Varieties for Michigan (free)

E-1728, Strawberry Diseases in Michigan (\$.35)

E-1730, Raspberry Diseases in Michigan (\$.35)

E-1731, Blueberry Diseases in Michigan (\$.75, for sale only)

E-1732, Common Diseases of the Grapevine in Michigan (\$.60, for sale only)

E-1744, Training and Pruning Young Cherry Trees (free)

E-1824 "Safe, Effective Use of Pesticides—Commercial Applicators" (\$3.00, for sale only)

E-1863, Common Blueberry Insect Pests and Their Control (free)

E-1864, Small Fruit Insect Pests and Control: Homeowner's Perspective (free)

E-1899, Grape Varieties for Michigan's Vineyards (\$.50)

E-1905, Growing Strawberries in the Home Garden (free)

E-1935, Pruning Grapevines in Michigan (free)

E-1941, Renovating Old, Abandoned Apple Trees (free)

E-2030, Growing Blackberries in Michigan (\$.30)

E-2066, Hints on Growing Blueberries (\$.45)

E-2087, Cedar-Apple Rusts (\$.85, for sale only)

E-2155, Storing Pesticides Commonly Used in Fruit/Vegetable Production (\$.70, for sale only)

NCR-045, Diseases of Tree Fruits (\$1.75, for sale only)

# Spray Record Sheet

It is very important to keep a record of pesticides used, rates and dates applied. This record will probably be the only place you can check to determine the interval from the last pesticide application to harvest and to determine when your fruit can be safely harvested.

DATE APPLIED	PESTICIDE & FORMULATION (liquid, wettable powder, emulsifiable concentrate, etc.)	RATE APPLIED (amount/gal)	CROP & CULTIVAR	COMMENTS (weather conditions, stage of development, etc.) The number of gallons used is also good to know for future applications.



## PESTICIDE EMERGENCY INFORMATION

(Please post in an appropriate place)

For any type of emergency involving a pesticide, the following Emergency Information Centers should be contacted immediately for assistance.

Current as of May, 1989



### HUMAN PESTICIDE POISONING

#### Eastern Half of Michigan

within the Detroit city proper:

**\*(313) 745-5711**

within the 313 area code:

**\*1-800-462-6642**

#### **Poison Control Center**

Children's Hospital of Michigan  
3901 Beaubien  
Detroit, MI 48201

#### Western Half of Michigan

within the Grand Rapids city proper:

**\*(616) 774-7854**

Statewide

**\*1-800-632-2727**

#### **Blodgett Regional Poison Center**

Blodgett Memorial Medical Center  
1840 Wealthy, S.E.  
Grand Rapids, MI 49506

#### Upper Peninsula of Michigan

within the Marquette city proper:


**\*(906) 225-3497**

Upper Peninsula only:

**\*1-800-562-9781**

#### **U.P. Poison Control Center**

Marquette General Hospital  
420 West Magnetic Street  
Marquette, MI 49855

 Cooperative Extension Service  
Michigan State University

**May 1989**  
**(Revised-destroy previous editions)**

Revised by Larry G. Olsen,  
Pesticide Education Coordinator

MSU is an Affirmative Action/Equal Opportunity Institution.

### SPECIAL PESTICIDE EMERGENCIES

#### Animal Poisoning

Your personal veterinarian:

and/or

Animal Health Diagnostic Laboratory, Michigan State  
University:  
**(517) 353-1683**

#### Pesticide Fire

Local fire department:

and

Fire Marshal Division, Michigan State Police:  
**(517) 322-1924**

#### Traffic Accident

Local police department or sheriff's department:

and

Operations Division, Michigan State Police:  
**\*(517) 337-6102**

#### Environmental Pollution

Pollution Emergency Alerting System (PEAS), Michigan  
Department of Natural Resources:

**\*1-800-292-4706**

**(Toll free for environmental emergencies)**

Michigan Department of Natural Resources, Waste Man-  
agement Division:


**(517) 373-2730**

**For information on pesticide disposal and local pick-up  
days:**

Pesticides & Plant Pest Management Division, Michigan  
Department of Agriculture:

**(517) 373-1087**

**\* Telephone Number Operated 24 Hours**

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