



CURCULIO



SCAB

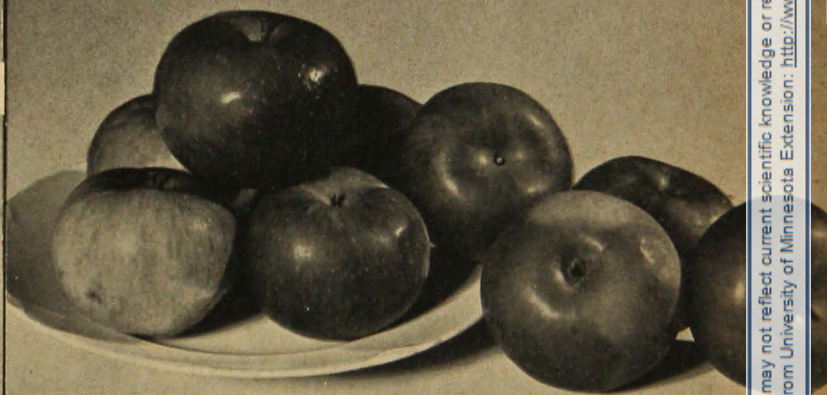


MAGGOT



BROWN ROT

Controlling HOME ORCHARD PESTS.....



A. C. HODSON
E. G. SHARVELLE

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Controlling HOME ORCHARD PESTS

A. C. Hodson and E. G. Sharvelle

MANY FRUIT GROWERS in Minnesota have only a few trees to supply apples or plums for home use. They realize the need for pest control but may become discouraged when faced with the kind of a spray schedule which the commercial grower uses and are apt to feel that there is little they can do. As a matter of fact, home growers can accomplish a great deal with light equipment, a shortened spray schedule, and the use of sanitary control measures. Suggestions will be found in this bulletin which will enable the home orchardist to help himself and his neighbors.

Learn To Know Fruit Insects and Diseases

There are several major insects and diseases of tree fruits which commonly cause trouble for the home and farm orchardist in Minnesota. Often these pests are not noticed until too late to prevent damage. Control measures must be undertaken well in advance of the time injury shows up on the fruit. A brief description of common insects and diseases is given to enable each grower to determine what his problems are.

Insects and Diseases of Apples

One of the first pests to show up in most years will be apple scab. Scab is caused by a fungus which produces dark-green, velvety spots on the leaves and fruit, usually seen first soon after

the petals fall. At picking time such scabby apples will be deformed and cracked.

Shortly after scab appears there may be damage from the plum curculio, a snout beetle which causes crescent-shaped scars and pits on young apples, resulting in greatly distorted, knobby fruit at picking time (see Extension Folder 121 on "Plum Curculio").

About the middle of June, apple cedar rust will cause bright orange spots on the leaves of susceptible varieties such as the Wealthy (see Extension Folder 110 on "Apple Cedar Rust"). At this time also the codling moth, or apple worm, bores through the skin of the fruit, and, later on, damage will be readily recognized by the brown excrement forced out of the tunnel opening.

Toward the end of June, fire blight disease will appear on susceptible varieties such as the Wealthy. The trees affected will look as if the ends of the branches have been scorched. At the tips of the twigs the leaves turn black, and the ends of the affected twigs usually bend over, forming a hook (Extension Folder 71, "Fire Blight of Apples").

About the first of August, some damage from the apple maggot will start to show up. It is not easily recognized in the early stages because it consists of inconspicuous, light-brown streaks in the flesh. Later there are brown tunnels under the skin, and as the damage progresses the flesh rapidly becomes a mass of rotten pulp. Severe damage will not be noticed for at least a week after the fruit has fallen to the ground or has been picked.

Insects and Diseases of Stone Fruits

On plums and cherry-plum hybrids the insects and diseases to be controlled are the plum curculio, plum gouger, and brown rot. Plum curculio injury on plums is similar to that described for apples. Infested fruits tend to fall early, although infested plums often turn purple before they fall. Those that remain on the tree will have a gummy material issuing from the site of the egg scar and usually are attacked by brown rot earlier than normal fruit.

The plum gouger causes round holes extending from the pit, the damage becoming apparent only at harvest.

Brown rot covers the fruit with a brown mold at picking time. Such fruits decay rapidly and either fall to the ground or remain on the tree as black, dried-up "mummies."

Cleaning Up Is Half the Battle

One of the first things the home apple grower should do is to rake up all of the old apple leaves underneath the trees and burn them. This should be done in the fall or early in spring before the apple buds burst. These fallen leaves are the place where the apple

scab fungus overwinters and are the only source from which the disease can come in the spring.

Clean up and destroy all fallen fruits, for fruit infested with insects not only drops earlier than normal but also serves as a breeding place. When apple maggot has been abundant, pick up drops at least once each week after the first of August because the apple maggots enter the ground from fallen fruit and emerge again as flies the following year. Fruit infested with the apple maggot may be buried, placed in the garbage can, or piled at one side of the orchard to be treated with crankcase oil before July 1 the following year. Apply one gallon of oil for every 10 square feet of ground surface.

Scrape loose bark from the trunks and larger branches of apple trees and keep the ground underneath the trees free from trash to eliminate sheltered places where the codling moth can spin cocoons. Scraped trees can be banded by the middle of June with 4-inch corrugated paper bands under which the worms will spin their cocoons. About every 10 days, remove these bands and burn them and put on new ones. Worms seen clinging to the tree can be crushed. After the middle of August the tree bands may be left on over winter because no more moths will be produced until the following spring, and the remaining worms will be killed by birds or cold.

As with apple insects and diseases, clean-up methods help to control stone-fruit pests. Remove and destroy any dropped fruit under the trees in the fall. Pick and burn dried, shriveled fruits (mummies) remaining on the trees in the spring. Both of these practices are recommended for the control of brown rot disease. In addition, all dead branches should be pruned out.

The plum curculio and the plum gouger overwinter as adults in trash near the trees. They feed on young leaves and blossoms for some time before they can attack the fruit. During

the late blossoming period many of them can be eliminated by spreading an old sheet or blanket under plum trees and then jarring or shaking the trees to make the beetles drop. Fallen beetles should be destroyed. Jarring early in the morning gives the best results. If curculio-infested fruits are numerous they should be picked from the tree and, together with the drops, should be destroyed or left in the sun where the worms will be killed.

Most farm orchards and many home orchards have more trees than can be cared for properly. It is better to have a small selection of two or three good varieties which will supply the needs for the home. An orchard consisting of too many old trees cannot be sprayed easily, and many of the old varieties do not compare with the new ones now available (see Extension Bulletin 224).

Spraying Simplified

Spraying Apples—Even though the sanitary measures mentioned will eliminate much of the trouble, spraying is still necessary to get clean fruit. The first spray should be applied to apple trees when three fourths of the petals have fallen. This is the so-called petal-fall or calyx spray. For this spray use 5 tablespoons of liquid lime-sulfur and 1½ tablespoons of arsenate of lead to each gallon of water. Liquid lime-sulfur is preferred for scab control, but if dry lime-sulfur is substituted it should be used at the rate of 3 tablespoons for every gallon of spray. A second spray, called the first cover spray, should be applied about 7 to 10 days after petal-fall, to protect the surface of the growing apples. This application should consist of 3 tablespoons of any good brand of "wetttable" sulfur, 1½ tablespoons of arsenate of lead, and 1 tablespoon of spray lime to every gallon of water. A third spray, the second

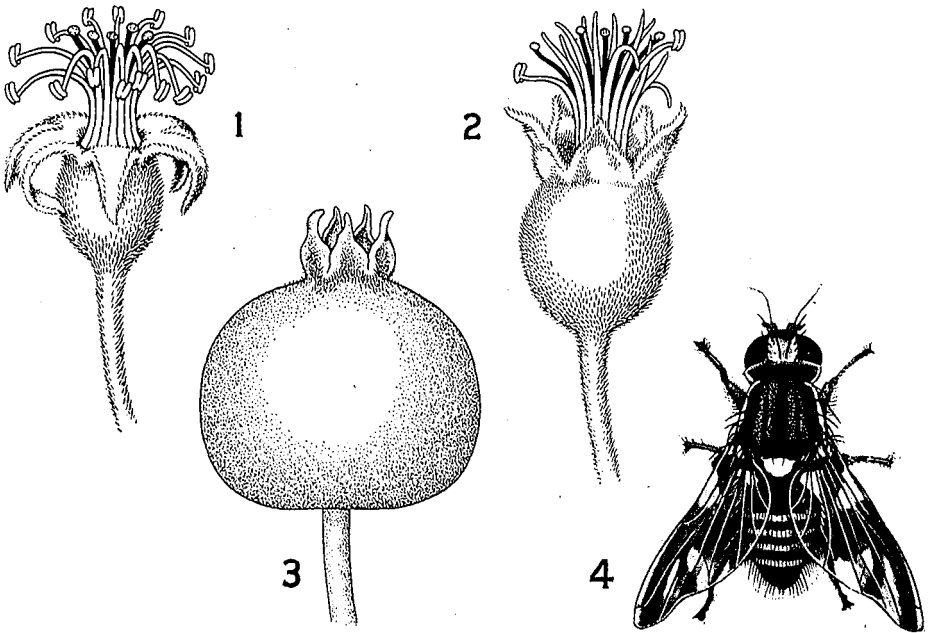
cover spray, should be applied about 10 days after the first cover spray, using the same materials. When the fruit has been infested by the apple maggot a third cover spray may be necessary. This should be mixed the same as the first two cover sprays and applied one week after the first maggot flies emerge, usually the last week in July or the first week in August. If aphids (plant lice) or leafhoppers are troublesome they may be controlled by adding 1 teaspoon of nicotine sulfate per gallon to any of the cover sprays.

Spraying Stone Fruits—Three sprays are necessary for the best results with stone fruits. The first should be applied when most of the petals have fallen, and should consist of 5 tablespoons of liquid lime-sulfur and 1½ tablespoons of lead arsenate in every gallon of water. The second spray is particularly important for curculio control and should be applied just after the shucks have fallen when the fruit is the size of a small pea. The materials used in this spray are 3 tablespoons of "wetttable" sulfur, 1½ tablespoons of arsenate of lead, and 1 tablespoon of spray lime per gallon of water.

If plum curculio has been a serious problem in the past, lead arsenate with lime should be applied about 10 days after the second spray, when the plums are approximately three-eighths to one-half inch in diameter. The fourth and final spray must be applied just as the fruit begins to color and consists of 3 tablespoons of wetttable sulfur per gallon of water with a sticker added. This last spray is very important for the control of brown rot disease.

Mixing Sprays

Correct mixing of the different chemicals used in spraying fruit trees will greatly improve the results. All of the suggestions given are very important



FIGS. 1-4. Guides to proper timing of sprays

Simplified Apple Spray Program

Time of application	Materials to use	Amount of materials required for given amounts of spray			Pests controlled
		1 gal.	5 gals.	50 gals.	
1. When three fourths of the petals have fallen (petal-fall or calyx spray) (Fig. 1)	Liquid lime-sulfur Arsenate of lead	5 T. 1½ T.	1½ C. ½ C.	1 gal. 1½ lbs.	Apple scab, codling moth, plum curculio
2. Seven to 10 days after petal-fall (first cover spray) (Fig. 2)	Wettable sulfur Arsenate of lead Spray lime	3 T. 1½ T. 1 T.	1 C. ½ C. ¼ C.	2½ lbs. 1½ lbs. 1½ lbs.	Plum curculio, scab, leaf-eating insects, codling moth
3. Ten days after first cover spray (second cover spray) (Fig. 3)	Same materials and same strengths as in spray No. 2				First-generation codling moth, scab, plum curculio
4. When first maggot flies appear, if apple maggot has been abundant in past years (Fig. 4)	Same materials and same strengths as in spray No. 2				Apple maggot, second-generation codling moth, fall scab

T. = Tablespoon (all measures in standard level tablespoons).
C. = Cup (standard measuring cup, ½ pint).

Summarized Stone Fruit Spray Program

Time of application	Materials to use	Amount of materials required for given amounts of spray			Pests controlled
		1 gal.	5 gals.	50 gals.	
1. When most of the petals have fallen	Liquid lime-sulfur	5 T.	1½ C.	1 gal.	Plum curculio and brown rot
	Arsenate of lead	1½ T.	½ C.	1½ lbs.	
2. Just after the shucks have fallen. When fruit is less than ¼ inch in diameter	Wettable sulfur	3 T.	1 C.	2½ lbs.	Most important for plum curculio
	Arsenate of lead	1½ T.	½ C.	1½ lbs.	
	Spray lime	1 T.	¼ C.	1½ lbs.	
3. When curculio is severe, apply 10 days after spray No. 2	Arsenate of lead	1½ T.	½ C.	1½ lbs.	Plum curculio
	Spray lime	1 T.	¼ C.	1½ lbs.	
4. Ten to 14 days before harvest, when the fruit just begins to color	Wettable sulfur Sticker	3 T. (see "Mixing sprays")	1 C.	2½ lbs.	Most important for brown rot

T.=Tablespoon (all measures in standard level tablespoons).
C.=Cup (standard measuring cup, ½ pint).

for such reasons as getting and keeping the materials well distributed throughout the mixture, and to prevent chemical changes that might weaken the spray or injure the trees. The *lime-sulfur-lead-arsenate spray* should be mixed as follows: Fill the sprayer half full of water, add the necessary amount of liquid lime-sulfur, add water to fill the sprayer two-thirds full, and stir the mixture thoroughly. Now make a paste of the required amount of lead arsenate with a small amount of water in a tin can, strain into the sprayer through a piece of window screen, and rinse out the can with water, adding this to the sprayer also. Fill the sprayer to the "full" mark and then mix the spray materials thoroughly before starting to spray. To do this, a knapsack sprayer may be tipped upside down several times before starting and this can be repeated frequently during the spraying. If a bucket-pump or barrel-pump sprayer is used, thoroughly stir the mixture with a paddle. Mixtures containing lime-sulfur and lead arse-

nate should not stand more than one hour before applying.

The later *sprays using wettable sulfur, lead arsenate, and spray lime* should be mixed as follows: Fill the sprayer half full with water. Paste the required amount of spray lime with a small amount of water in a tin can and strain into the sprayer through a screen, making sure that the contents of the can are thoroughly rinsed into the sprayer. Paste the wettable sulfur and add it to the sprayer in exactly the same manner. Fill the sprayer two-thirds full with water and add the lead arsenate to the spray just before applying, as previously described. When nicotine sulfate is used it should always be put into the sprayer first.

Use of Sticker—The addition of a "sticker" to the spray mix will prevent the spray material from being washed off easily by rain and will greatly improve the control of the various insects and diseases. There are several commercial stickers which are

to be used at the rates recommended by the manufacturer. Soybean flour may be used at the rate of 1 teaspoon to every gallon of spray, and it should be pasted with a small amount of water before adding to the sprayer. Casco glue, the ordinary cabinet maker's glue, is a very effective sticker used at the rate of 1 teaspoon to every gallon. Paste the glue with enough water to make a thick cream, let stand 15 minutes, add enough water to make the mixture pour easily, and pour into the sprayer last.

Applying Sprays

The sprays recommended can be put on with relatively small sprayers by using an extension rod, a stepladder, or by climbing up in the tree. A bucket, wheelbarrow, or barrel type pump is the most efficient but even two- or three-gallon knapsack sprayers may be used. In any case the operator should make sure that all surfaces of leaves and fruits are thoroughly covered with a fine mist of the spray material without causing a heavy drip. To insure complete coverage, spray should be applied both from the inside of the tree out, and from the outside in. The top third of the tree needs special attention because most of the fruit is produced there. Overlooking this fact, many growers fail to adequately cover this portion of the tree with spray.

Always use measured quantities of chemicals. Never guess.

Always wash out the sprayer tank, the hose, and the nozzle after finishing the day's work. The spray chemicals will corrode metal if allowed to remain.

To enable the small grower to estimate the amounts of spray material needed for the summer's program the

following table gives the approximate amounts of spray required for each application:

Height of tree in feet	Gallons per application
5-10	1-2
10-15	3-5
15-20	6-8
20-25	10-15

Home growers are often confused by recommendations giving spray chemicals in pounds per 100 gallons of spray. The following table gives equivalent amounts of chemicals required for smaller amounts:

Spray chemical	For 1 gallon spray	For 100 gallons spray
Liquid lime-sulfur	2½ fluid oz. or 5 T. (tablespoons)	2 gals.
Dry lime-sulfur	3 T.	8 lbs.
Nicotine sulfate	1 teaspoon	1 pint
Arsenate of lead	½ oz. or 1½ T.	3 lbs.
Spray lime	½ oz. or 1 T.	3 lbs.
Wettable sulfur	¾ oz. or 3 T.	5 lbs.

Spraying Small Fruits

Raspberries. The most common insects on raspberries are the fruit worm, cane borers, tree crickets, and leaf-feeding sawflies. The most important diseases are anthracnose, leaf spot, mosaic, and crown gall. Spraying will control some of these pests; others require different practices.

The first spray should be applied just as the buds show green at the tips, before the leaflets are more than ¼ inch long. Use 1¼ cups liquid lime-sulfur to 1 gallon of water to prevent anthracnose and spur blight. The second regular spray, applied about one week before bloom, should consist of lead arsenate, 1 tablespoon in 1 gallon of water, and a copper fungicide at the rate given on package. This spray is recommended to control sawflies, fruit worm, leaf spot,

and anthracnose. Adding a sticker will greatly improve control in both sprays.

Cane borers and tree crickets can be eliminated by cutting out and burning infested canes in the fall when old fruiting canes are commonly removed. Mosaic and crown gall are not controlled by spraying. They must be excluded by planting disease-free stock in clean ground.

Currants. The most troublesome currant and gooseberry pests are aphids, sawfly, currant borer, and mildew. To control these pests two spray applications are usually necessary. The first spray, applied just before the buds burst should consist of liquid lime-sulfur at the rate of 1 pint to 1 gallon of water. This spray is applied to destroy aphid eggs and mildew spores.

The second spray, applied when the terminal leaves are from ½ to 1 inch long, should contain the following: 1½ tablespoons lead arsenate, 1 teaspoon nicotine sulfate, in 1 gallon of water together with a copper fungicide used according to manufacturer's directions. This spray will control aphids, currant sawfly, mildew, and leaf spot. The underside of the leaves should be sprayed to kill aphids.

If the currant sawfly is still present after the fruit is fully formed, use rotenone in place of lead arsenate. If mildew becomes severe in midseason, use a wettable sulfur spray at the rate of 3 tablespoons in 1 gallon of water.

Canes infested with currant borer will appear sickly in the spring. They should be cut off at the ground level, removed, and burned. Canes which wilt in midseason may be infested with the common stalk borer. Such canes should be cut below the damaged portion and burned.

Grapes. Grapes may be attacked by leafhoppers, mildew, black rot, and occasionally the grape berry moth. At least two sprays are essential in most seasons. Just before blossoming, spray with lead arsenate, 1½ tablespoons to 1 gallon of water, and a copper fungicide. Spray again when the grapes in clusters are starting to touch each other. Use lead arsenate and a copper fungicide as before with the addition of 1 teaspoon of nicotine sulfate. Additional sprays with copper may be necessary if mildew appears later in the season.

Additional Information

Further information on disease and insect control, cultivation, and recommended varieties for Minnesota fruits is given in the following agricultural extension publications obtainable from the county agent or Bulletin Room, University Farm, St. Paul 8, Minnesota.

Growing Currants and Gooseberries in Minnesota	Folder 123
Growing Grapes in Minnesota	Folder 124
Control of Plum Curculio, Plum Gouger, Apple Curculio	Folder 121
Apple Maggot Control	Folder 122
Fire Blight of Apples	Folder 71
How to Control Apple Cedar Rust	Folder 110
Anthracnose of Red Raspberries	Folder 113
Growing Raspberries for Home Use	Bulletin 206
Growing Strawberries in Minnesota	Bulletin 72
Fruit Varieties for Minnesota	Bulletin 224

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