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Insect and Disease Control in the Home Orchard and Vegetable Garden  
Michigan State University Extension Service  
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Issued February 1928  
8 pages

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Fig. 1.—Critical moments for Cucumber Beetles. Melon and pickle growers try out hand operated dusting equipment in Berrien County, Michigan.

**MICHIGAN STATE COLLEGE  
OF AGRICULTURE AND APPLIED SCIENCE**

**EXTENSION DIVISION  
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The Michigan State College of Agriculture and Applied Science and the U. S. Department of Agriculture, co-operating. Printed and distributed in furtherance of the purpose of the co-operative agricultural extension act of May 8, 1914.



# INSECT AND DISEASE CONTROL IN THE HOME ORCHARD AND VEGETABLE GARDEN

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Injury sustained from various insect pests and fungus diseases is probably the most important single factor limiting the number of home fruit and vegetable gardens and interfering with the success of those that are established. Not one of the commonly grown fruit or vegetable crops is entirely free from their attacks, and in some cases complete or partial destruction of plant or fruit is so common, in the absence of suitable protective measures, that the owner becomes discouraged and often abandons the plantation.

So many different sorts of plants are usually grown in the garden and about the grounds, and each is subject to the attacks of so many different pests that for the gardener to learn to recognize each individual kind is out of the question. Even were this possible, separate treatment of each one would hardly be practicable. The safest and cheapest crop insurance is the application of a general treatment that can not harm the plants and that may benefit many or most of them.

The purpose of this circular is to recommend a few simple remedies or treatments for the more common pests of the fruit and vegetable garden. These measures will not afford complete freedom from insects and plant diseases, and they are not likely to ensure as complete freedom from injury as the more detailed and complicated schedules and materials employed by the larger scale operator. However, they have the virtue of simplicity and their use will afford a relatively large degree of protection.

## DUSTING IS LESS TROUBLE THAN SPRAYING

Control of pests in commercial plantations is sometimes obtained by spraying and sometimes by dusting. With some crops and for certain pests one of these methods may be preferable to the other. Dusting rather than spraying is recommended for the amateur grower. Dusts are more quickly and easily applied than liquid sprays, and they seldom disfigure buildings, fences, and sidewalks. Dusting equipment is usually less expensive than that required for spraying and less troublesome to operate.



## WHAT TO USE

### "The Big Three"

1. On all fruit trees, bush fruits, and lawn ornamentals (except grapes, currants, and gooseberries) use sulphur-arsenical dust. A combination of 90 parts of finely ground sulphur and 10 parts of powdered arsenate of lead makes a "90-10" general purpose dusting mixture which controls the common pests. Occasional attacks by trunk borers, scale, fire blight, psylla, aphids, etc., are not prevented by this treatment; for these special treatments must be employed when the pests appear. A schedule for the applications appears on another page.

2. On grape vines, currants, gooseberries, and raspberries, potatoes and some of the other garden crops use copper-lime-arsenical dust for caterpillars, blight, mildew, black spot (of roses and snapdragon), etc. This should contain 20 parts monohydrated copper sulphate, 15 parts lead arsenate and 65 parts hydrated lime. This material, since it contains arsenic, should not be used on leafy vegetables, such as spinach and lettuce, nor should it be used on cauliflower after the heads start to form, nor on cabbage after the heads are more than two-thirds grown, on account of the possible danger from poisoning.

3. On trees, vegetables or shrubs, whenever plant lice (aphids) are present, use nicotine-impregnated dust ("2% free nicotine").

These three mixtures will take care of most of the pests of fruits, vegetables, and shrubs and should be on hand ready for use in a dusting gun. They are sold in small packages, already mixed, by many stores. Certain pests, however, against which these three mixtures are not effective, occasionally become serious. Following is a list of the preparations that the amateur gardener and fruit grower should know about.

### "The Little Three"

4. "Semesan" and "Bayer" dust are organic compounds containing mercury and are used to treat the seed of sweet corn, cabbage, cauliflower, tomato, cucumber, etc. before planting, to prevent some of the seed-borne diseases. For the small garden, use of one of these dusts may entail more trouble than the results justify, but in all large scale gardening operations, its use is warranted for it tends to prevent the "damping-off" disease of seedlings, thereby resulting in lessened mortality, and it generally promotes more vigorous growth early in the season. Directions for treating seed are stated on the package. Some seedsmen treat most of their vegetable seeds before sending them out to growers.

5. Corrosive Sublimate—Thoroughly wetting the soil along the row or about the plants with a weak solution of corrosive sublimate (made by dissolving one ounce in one gallon of warm water and then adding seven gallons of water) will control onion, radish, and cabbage maggots. Two or three applications at ten day intervals, beginning soon after the plants are up or transplanted, are sufficient. This



treatment is necessary only with onions and plants of the cabbage family. For treating a small number of plants this chemical can be bought in tablet form at any drug store. One tablet is sufficient for one pint of solution. Corrosive sublimate is poisonous and should be labeled, stored, and handled accordingly at all times. It should not be allowed to come in contact with finger rings or metal containers. In making and applying this solution use only wooden, glass, or earthenware vessels.

6. Poisoned baits—Cutworms and grasshoppers can be controlled best by the use of a poisoned bait. To prepare this bait, thoroughly mix: coarse bran, 5 pounds; powdered white arsenic,  $\frac{1}{4}$  pound; molasses, 1 pint; then add the juice of one lemon and enough water to make a moist mash. This mixture is scattered about the garden in the evening. Two or three treatments should rid the garden of cutworms in the spring and greatly reduce grasshopper injury in the summer.

POULTRY SHOULD BE KEPT OUT OF THE GARDEN UNLESS THE BAIT IS PLACED BENEATH BOARDS OR SHINGLES. THIS PRECAUTION MAY ALSO BE DESIRABLE WHERE SONG BIRDS ARE NUMEROUS AND WELCOME.

### WHEN TO MAKE APPLICATIONS

Dusting mixtures should be applied to all garden plants soon after growth starts and at least every two weeks until three to five doses have been given. For fruit plants, the following table or schedule of treatments is suggested.

**Fruit Dusting Schedule**

When to start		What to use	Should be completed	What fruits
I	From one side.....	90-10 (No. 1, page 3)	Before blossoms open.....	Apples Pears Peaches Plums Cherries Apricots Ornamentals
	From the other side.			
II	From one side.....	90-10 (No. 1, page 3)	Within one week after last petals fall	
	From the other side.			
III	From one side.....	90-10 (No. 1, page 3)	Within 20 days after petals fall.....	
	From the other side.			
IV	From one side.....	90-10 (No. 1, page 3)	Only needed with late rains.....	
	From the other side.			



FOR GRAPES, CURRANTS, AND GOOSEBERRIES SUBSTITUTE THE COPPER-LIME-ARSENICAL MIXTURE, LISTED AS NO. 2 ON PAGE 3. FOR RASPBERRIES AND THE OTHER BRAMBLE FRUITS A SINGLE APPLICATION (THE FIRST) OF THIS SUBSTITUTE MIXTURE WILL SUFFICE.

### How Often to Dust

The first three applications recommended should be applied every year. If dry weather follows, there may be no need to apply more material in orchards that are isolated from other trees. For the greater part of the state, however, four or five applications will give much better results. It is better to make five or six applications and thoroughly protect the plants than to make only three and not really secure good control of pests. One orchard in the Upper Peninsula of Michigan receiving but three applications during the severe disease year 1924 produced fruit 84 per cent of which was absolutely free from disease or insect injury. In 1927 three applications (not so well timed) resulted in only 6 per cent clean fruit. These two concrete cases will serve to point out that correct timing in accordance with bud development or rate of plant growth is often more important than the number of applications.

### Vegetable Dusting Schedule

WHEN TO USE	WHAT TO USE	PEST CONTROLLED
When seeds of all garden crops are sown . . .	"Semesan" or "Bayer" dust (See page 3).	"Damping off" diseases
When potato, tomato, cabbage, cauliflower, celery, cucumbers, melons are set in garden make 4 applications at intervals of two weeks . . . . .	Copper-lime-arsenical dust (see page 3) . . .	All chewing insects and many diseases
When onions, cabbage, cauliflower, and radish are up . . . . .	Corrosive sublimate (see page 3.) . . . . .	Maggot
When tomato, pepper, cabbage, cauliflower, etc., are set in garden . . . . .	Poison bait (see page 3.) . . . . .	Cut worm

### How to Apply Dust

Applications of dust, like those of liquid sprays, should be thorough. This means that there should be a thin, uniform coating spread over the entire surface of twigs, buds, leaves, and developing fruits. The applications should also be timely, for, though with many pests prevention is relatively easy, cure is impossible. Nicotine dust (number 3) is the only mixture mentioned that should not be applied until the pest appears.

Dust applications can be made most advantageously when there is comparatively little wind blowing. This usually means that evening or early morning is the best time.



Applications to bearing trees should be made from the top of a vehicle or a step ladder. Dusting alternate sides weekly gives protection to newly grown parts and renewed covering to older parts.

LARGE TREES SHOULD BE COMPLETELY PROTECTED.

### LIMITATIONS

Do not expect perfect protection from these simple "all-in-one" mixtures. Seldom can adequate coverage be made with hand operated equipment, and the schedules are compromises, simplified to meet average conditions. That the recommendations may be fairly effective, however, is indicated by the fact that in one Upper Peninsula orchard 96 per cent of the fruit harvested from hand dusted McIntosh apple trees was clean, while untreated trees produced only 22 per cent clean fruit. For special problems advice can always be had from a representative of the Michigan State College, a local high school agricultural teacher, or from technical advisors representing reliable products.

### Desirable Equipment

There are many types of hand operated dusters on the market. They range from a small gun holding a pound of dust and costing only a dollar to a twenty-five dollar duster that will hold ten pounds of dust. The taller the plant and the larger the planting the greater is the need for a large capacity machine.



Fig. 2.—Types of Hand operated dusters demonstrated in the Upper Peninsula of Michigan. Larger trees would require that the operator work from the top of some vehicle.





Fig. 3.—Two minutes a week from April 15 to June 15, and every two weeks thereafter until August 15, can result in as good fruit as any one would care to have.





Fig. 4.—Small dust guns are adequate for small plants where large volume delivery is a disadvantage. For general use on trees, vegetables, and shrubs, a larger duster saves time and energy and gives a safer distribution of materials.