

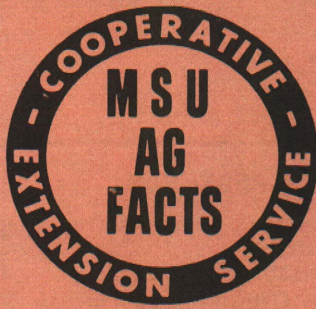
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Home Vegetable Garden: Disease and Insect Control  
Michigan State University  
Cooperative Extension Service  
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May 1976  
8 pages

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NO. 3

MAY 1976

EXTENSION BULLETIN E-760(b)

# Home Vegetable Garden Disease, Insect Control

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## DISEASE CONTROL

In general, diseases in the home garden are less serious than insects. However, diseases can be very serious when weather and other conditions favor their development. Plant diseases can rarely be cured, but must be controlled by prevention.

The following measures will help reduce losses by disease:

1. Use fertile, well-drained soil and plant crops or varieties that are suited to the soil and climate. (Order seeds from local seed companies or those located in the Midwest or Northeast.)
2. Control weeds and grass which provide protection for insects and may be alternate hosts for diseases.
3. Control insects since many transmit diseases.
4. Purchase disease-free seed; avoid seeds which are moldy or spotted.
5. *Chemical treatment of seed* — Buy fungicide treated seed to protect against decay and damping-off organisms. Do not treat seed that is already treated, and do not use treated seed for food. Treatment may be done by the gardener as follows: place a pinch (less than  $\frac{1}{4}$  teaspoon per half pound of seed) of *Thiram* or *Captan* 75 percent seed protectant in the package of seeds and shake, coating all the seeds with the dust. Sift the excess dust from the seed through a fine mesh screen.
6. Purchase disease-free plants; make sure they do not have swellings on the roots, cankers on the stems, or spots on the leaves.
7. Grow disease resistant varieties such as those listed in Extension Bulletin E-760(a) "Variety Suggestions for the Home Vegetable Garden." Some of those varieties are highly resistant; others give partial protection.
8. Since most bacteria, fungi, and some home garden insects live in the soil from one growing season to the next, much of their damage can be avoided by relocating the garden or rotating the crops within the garden.
9. Closely related crops, such as melons and cucumbers or tomatoes, potatoes, peppers and eggplant should not succeed each other, because they are usually damaged by the same pests.
10. Destroy or compost plants of each annual crop as soon as the harvest is completed.
11. To rid soil of disease organisms it is often desirable to fumigate. Apply *Vapam* (VPM) in water to the soil surface two to three weeks before planting using a watering can or a simple proportioner attached to a garden hose. Read label for correct dosages and specific application procedures.
12. Stay out of the garden when plants are wet to avoid spreading diseases. Water during the day and not at night.
13. At the first sign of disease, use a good fungicide for control. Read the label on the pesticide container to determine which crop disease it will control, how much to use, how and when to apply. Contact your County Extension Office if you do not know what disease is causing your problems or consult U.S. Department of Agriculture Home and Garden Bulletin No. 46, "Insects and Diseases of Vegetables in the Home Garden," available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

## INSECT CONTROL

Insects compete very strongly among themselves as well as with humans for their food. In the home garden (as well as in commercial agriculture), insects attack both the underground and aboveground plant parts. In order to limit insect damage, it is necessary to place the insecticide where the insects do the damage.

Since some insects have three or more generations per year, others have one generation per year and still others require three to six years to complete one generation, it is often necessary to make repeated applications of the insecticide. To achieve the highest degree of insect control, gardeners are always encouraged to:

1. properly identify the insect causing the damage;
2. obtain an insecticide which has that specific insect named on the label.;
3. apply the recommended amount of chemical where the insects are actually feeding.

**ALWAYS READ AND FOLLOW ALL LABEL DIRECTIONS WHEN USING A PESTICIDE**

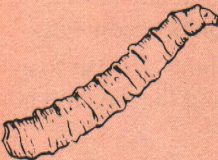
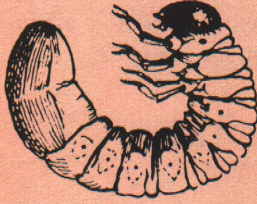


**Liquid Measures:**

3 Tsp = 1 tbsp  
 2 Tbsp = 1 fluid ounce  
 8 fluid ounces = 1 cup  
 2 cups = 1 pint  
 2 pints = 1 quart  
 4 quarts = 1 gallon

**Abbreviations:**

WP = Wettable Powder  
 EC = Emulsifiable Concentrate  
 Tbsp = Tablespoon  
 Tsp = Teaspoon  
 Sq ft = Square Feet

**Underground Root-Feeding Insects.**

Insect	Insecticide	Remarks
<p><b>MAGGOTS</b>                      Onion                      Cabbage                      Seed-Corn</p> 	<p>Diazinon, 2 Tsp 50%/gal water/20 ft of row                      or                      Chlordane, 3 Tbsp 5% dust/25 ft of row                      or                      Transplants: Chlordane, 2 Tbsp, 40% wettable powder/gal water.                      SEE REMARKS.</p>	<p>Apply insecticide in seed furrow and cover lightly with soil. If cabbage or cauliflower are being transplanted, dip the roots in a chlordane solution at transplanting. Or 1/3 cup of the diazinon solution can be poured around the stems of the transplants.</p>
<p>1/3-inch long and creamy white colored.</p>		
<p><b>WHITE GRUBS</b>                      "C" shaped, 1 to 1 1/2 in. long, white and purple colored.</p> 	<p>Chlordane, 5 oz 40% wettable powder                      or                      Diazinon, 3 oz 50% wettable powder                      or                      Diazinon, 10 oz 14% granules per 1000 sq. ft. of soil surface.</p>	<p>These insects are most serious in soil where sod (grass) has been growing. They will remain in the soil for 3 to 6 years if not properly controlled.</p> <p>Sprays should be applied in sufficient water to allow thorough coverage (1 to 2 gal). Granules should be applied as bought.</p> <p>Immediately after application, thoroughly mix the chemical into the top 4 to 5 inches of soil.</p>
<p><b>WIREWORMS</b>                      1 1/2 to 1 3/4 in. long. Dark brown in color.</p> 		
<p><b>CUTWORMS</b></p> 	<p>Sevin, 2 Tbsp 50% WP; or Malathion, 2 Tsp, 50% EC/gal water.</p>	<p>Apply to soil around the base of the plants.                      READ THE LABEL.</p>
<p>1 1/4 to 1 1/2 in. long. Brown to black and mottled with yellow, brown or white.</p>		

**Diseases (in bold print) and Aboveground Foliage-Feeding Insects.**

Crop	Insect Pest or Disease	Insecticide or Fungicide	Formulation to Buy	Amount of Formulation/ Gal. of Water	Days from Last Application to Harvest	When to Treat	
ASPARAGUS	Asparagus beetles	Sevin	50% WP	2 Tbsp.	1	When beetles are first seen on spears and fern. READ LABEL.	
			25% EC	3 Tbsp.	1		
		<b>or</b> Malathion	50% EC	2½ Tsp.	1		
			57% EC	2 Tsp.	1		
	<b>Rust (fungus)</b> Powdery red to black pustules on ferns.	maneb	80% WP	2 to 3 Tsp.	after harvest	— ferns only	Apply when rust first seen, repeat at 7 to 10 day interval.
		<b>or</b> Mancozeb (Dithane M-45 Manzate 200)	80% WP	2 to 3 Tsp.	after harvest	— ferns only	
<b>or</b> Polyram		80% WP	2 to 3 Tsp.	after harvest	— ferns only		
BEANS	Aphids	Malathion	50% EC	2 Tsp.	1	Begin treatment when aphids are first seen.	
			57% EC	1½ Tsp.	1		
		<b>or</b> Diazinon	25% EC	2 Tsp.	7		READ LABEL.
	Mexican Bean beetles and Leafhoppers	Sevin	50% WP	3 Tbsp.	0	Begin treatment when insects are first seen. Repeat as necessary.	
			25% EC	2 Tbsp.	0		
		<b>or</b> Malathion	50% EC	2 Tsp.	1		
			57% EC	1½ Tsp.	1		READ LABEL.
		<b>or</b> Methoxychlor	50% EC	2 Tbsp.	3		
			25% EC	3 Tbsp.	3		
	<b>Blights (bacteria)</b> Leaves and pods — water soaked, spots, may become brown or black, sometimes with a yellow border.	Tribasic Copper Sulfate	53% WP	2 to 4 Tsp.	0	Apply treatment when spots are first seen, repeat at 7 to 10 day intervals.	
		<b>or</b> Kocide 101	54% WP	2 to 4 Tsp.	0		
	<b>Rust (fungus)</b> Powdery red to black pustules on ferns.	maneb	80% WP	2 to 3 Tsp.	4	Apply treatment when spots first appear, repeat at 7 to 10 day intervals.	
<b>or</b> Bravo		6 flowable	2 to 3 Tsp.	7			
<b>Anthracnose (fungus)</b> Red brown sunken spots on pods.	SAME AS FOR RUST						
<b>White and Gray Mold (fungi)</b> Cotton white to gray growth on pods and leaves causing watery rot.	Bravo	6 flowable	2 to 3 Tsp.	7	Apply treatment when spots first appear, repeat at 7 to 10 day intervals.		
	<b>or</b> Benlate	50% WP	1¼ Tsp.	14 (snap) 28 (lima)			
BEETS	White Grubs, Wireworms, Maggots	REFER TO SECTION ON UNDERGROUND ROOT-FEEDING INSECTS, PAGE 2.					
	<b>Leaf Spot (fungus)</b>	Tribasic Copper	53% WP	2 to 4 Tsp.	0	Apply treatment when disease first seen. Repeat at 7 to 10 day intervals.	

**Diseases (in bold print) and Aboveground Foliage-Feeding Insects, continued.**

Crop	Insect Pest or Disease	Insecticide or Fungicide	Formulation to Buy	Amount of Formulation/ Gal. of Water	Days from Last Application to Harvest	When to Treat	
<b>CABBAGE CAULIFLOWER BROCCOLI BRUSSEL SPROUTS</b>	Aphids	Malathion	50% EC 57% EC	2 Tsp. 1½ Tsp.	7 (broccoli, 3)	Begin treating when aphids are first seen before leaves cup. Repeat as needed.  READ LABEL.	
		<b>or</b>					
		Diazinon	50% WP 25% EC	1 Tbsp. 2 Tsp.	7 — Cabbage and Brussel sprouts; 5 — Cauliflower and Broccoli		
	Cabbage Worms	Thuricide or Dipel	Disease spores. (Follow the label).				
		<b>or</b>					
		Sevin	50% WP 25% EC	4 Tbsp. 2½ Tbsp.	Same as for Aphids, above	Apply treatment when worms are very small and continue every 7 to 10 days until harvest. READ LABEL.	
		<b>or</b>					
		Diazinon	50% WP 25% EC	1 Tbsp. 1 Tbsp.			
		<b>or</b>					
		Malathion	50% EC 57% EC	2 Tsp. 1½ Tsp.			
	<b>Blights (fungi)</b> Brown to black spots on leaves and kurds (flowers).	maneb <b>or</b> Bravo	80% WP 6 flowable	2 to 3 Tsp. 2 to 3 Tsp.	7 0	Apply treatment when disease first appears, repeat at 7 to 10 day intervals.	
	<b>Mildew (fungus)</b> Leaves with yellow spots, sparse gray white mold on underside.	SAME AS FOR BLIGHTS.					
	<b>Club Root (fungus)</b> Knot or wart-like growth on roots.	Terraclor	75% WP	3 Tsp.		Apply ½ cup solution to roots when transplanting.	
<b>CARROTS</b>	White Grubs, Wireworms	REFER TO SECTION ON UNDERGROUND ROOT-FEEDING INSECTS, PAGE 2.					
	<b>Blight and Leaf Spots (fungi)</b> Leaves and stems — round tan spots with dark borders or irregular dark brown spots. Leaves curl and die.	Bravo <b>or</b> maneb <b>or</b> Mancozeb (Dithane M-45 Manzate 200) <b>or</b> Duter	6 flowable 80% WP 80% WP 47% WP	2 to 3 Tsp. 2 to 3 Tsp. 2 to 3 Tsp. 1 Tsp.	0 7 7 14	Apply treatment when disease first seen, repeat at 7 to 10 day interval.	
<b>CUCUMBERS MELONS SQUASH PUMPKINS</b>	Cucumber beetles	Methoxychlor	50% WP 25% EC	1¼ Tbsp. 2½ Tbsp.	1 1	Begin treatment when plants first break through soil, repeat at 5 day intervals. Do not use Sevin when blossoms are present.  READ LABEL.	
		<b>or</b>					
			Malathion	50% EC 57% EC	3½ Tsp. 2½ Tsp.		1 1
			<b>or</b>				
		Sevin	50% WP 25% EC	2 Tbsp. 1¼ Tbsp.	0 0		

**Diseases (in bold print) and Aboveground Foliage-Feeding Insects, continued.**

Crop	Insect Pest or Disease	Insecticide or Fungicide	Formulation to Buy	Amount of Formulation/ Gal. of Water	Days from Last Application to Harvest	When to Treat
<b>CUCUMBERS</b> <b>MELONS</b> <b>SQUASH</b> <b>PUMPKINS</b> <b>(Continued)</b>	Aphids	Malathion	50% EC	2 Tsp.	1	Apply treatment when aphids first appear and before leaves curl. Repeat weekly.
		<b>or</b> Diazinon (Do not use on squash and pumpkins.)	57% EC	1½ Tsp.	(pumpkin - 3)	
	Squash Bug (Squash and pumpkins only)	Sevin	50% WP	2 Tbsp.	0	Begin treatment when black bugs are first seen. Repeat as needed.
			25% EC	1¼ Tbsp.	0	
	<b>Angular Leaf Spot (bacteria)</b> Leaves — brown angular to square spots. Centers of spots drop out giving leaf a shot holed appearance. Water soaked to scabby spots on fruit.	Kocide 101	54% WP	2 to 4 Tsp.	0	Apply treatment when disease first seen, repeat at 7 to 10 day intervals.
		<b>or</b> Tribasic Copper Sulfate	53% WP	2 to 4 Tsp.	0	
		<b>Other Leaf Spots (fungi)</b> Round tan to brownish leaf spots often with darker borders. Fruit spots often sunken with concentric ring pattern.	Bravo	6 flowable	2 to 3 Tsp.	
	<b>Powdery Mildew (fungus)</b> White powder on leaf surfaces. Leaves yellow and die.	<b>or</b> maneb	80% WP	2 to 3 Tsp.	5	Same as above.
		<b>or</b> Mancozeb	80% WP	2 to 3 Tsp.	5	
		Bravo	6 flowable	2 to 3 Tsp.	0	Apply treatment when disease is first seen. Repeat every 7 to 10 days.
<b>PEAS</b>	Aphids	Malathion	50% EC	2 Tsp.	3	Begin treating when aphids first appear and repeat weekly or as needed. READ LABEL.
		<b>or</b> Diazinon	57% EC	1½ Tsp.	3	
		50% WP	1 Tbsp.	0		
		25% EC	1 Tsp.	0		
<b>PEPPERS</b>	Aphids	Malathion	50% EC	2 Tsp.	3	Begin treating undersides of leaves for aphids in mid-June and continue every 5 to 7 days until frost. Add Sevin to either Malathion or Diazinon in early August and continue 5 to 7 day treatment until frost.
		<b>or</b> Diazinon	57% EC	1½ Tsp.	3	
	Aphids and Corn Borer	25% EC	1 Tsp.	5		
		50% WP	½ Tbsp.	5		
	plus Sevin	50% WP	2 Tbsp.	0		

**Diseases (in bold print) and Aboveground Foliage-Feeding Insects, continued.**

Crop	Insect Pest or Disease	Insecticide or Fungicide	Formulation to Buy	Amount of Formulation/ Gal. of Water	Days from Last Application to Harvest	When to Treat	
<b>PEPPERS</b> (Continued)	<b>Leaf and Fruit Spots (bacteria - fungi)</b> Round to irregular shaped brown to black spots on leaves and fruit.	Bravo	6 flowable	2 to 3 Tsp.	0	Apply treatments when disease first appears, repeat at 7 to 10 day intervals. <b>Kocide 101 or Tribasic Copper Sulfate</b> are important during wet weather to prevent bacterial diseases.	
		<b>or</b> maneb	80% WP	2 to 3 Tsp.	5		
		<b>or</b> Mancozeb (Dithane M-45 Manzate 200)	80% WP	2 to 3 Tsp.	5		
		<b>plus</b> Kocide 101	54% WP	2 to 4 Tsp.	0		
		<b>or</b> Tribasic Copper Sulfate	53% WP	2 to 4 Tsp.	0		
<b>POTATOES</b>	Aphids	Diazinon	25% EC 50% WP	2 Tsp. 1 Tbsp.	35 35	Begin treatment to underside of leaves in mid-June and continue every 5 to 7 days until harvest.	
		<b>or</b> Malathion	50% EC 57% EC	2 Tsp. 1½ Tsp.	0 0		
		<b>or</b> Thiodan	3% Dust	¾ lb/1000 sq. ft.	0		READ LABEL.
		Flea beetles, Leafhoppers, Colorado Potato Beetles	Sevin	50% WP 25% EC	2 Tbsp. 1 Tbsp.		0 35
	Diazinon	25% EC 50% WP	2 Tsp. 1 Tbsp.	0 35	READ LABEL.		
		Thiodan	3% Dust	¾ lb/1000 sq. ft.	0		
	<b>Late and Early Blight (fungi)</b> Leaves — brown to black; round or irregular spots, often with a concentric ring pattern or with white mold growth (particularly on underside of leaf) around the border. Tubers with brown sunken spots.	Bravo	6 flowable	2 to 3 Tsp.	0	Apply treatment when plants are 6" high and repeat at 7 to 10 day intervals till harvest. Add Kocide 101 or Tribasic Copper Sulfate to spray late in growing season.	
		<b>or</b> maneb	80% WP	2 to 3 Tsp.	0		
		<b>or</b> Mancozeb (Dithane M-45 or Manzate 200)	80% WP	2 to 3 Tsp.	0		
		<b>plus</b> Kocide 101	54% WP	2 to 4 Tsp.	0		
		<b>or</b> Tribasic Copper Sulfate	53% WP	2 to 4 Tsp.	0		
	<b>RADISHES</b> <b>TURNIPS</b>	Aphids	Malathion	50% EC 57% EC	2 Tbsp. 1½ Tsp.	7 (turnip - 3)	Apply treatments when aphids first appear and repeat as needed. READ LABEL.
<b>or</b> Diazinon			50% WP 25% EC	1 Tbsp. 2 Tsp.	10 10		

Diseases (in bold print) and Aboveground Foliage-Feeding Insects, continued.

Crop	Insect Pest or Disease	Insecticide or Fungicide	Formulation to Buy	Amount of Formulation/ Gal. of Water	Days from Last Application to Harvest	When to Treat
<b>RADISHES TURNIPS (Continued)</b>	Flea beetles	Sevin	50% WP 25% EC	2 Tbsp. 1½ Tbsp.	3 (14 days if tops are eaten)	Begin treatments when small round holes first appear in leaves. Repeat as needed.
		or Diazinon	25% EC	1 Tbsp.	10	
	<b>Mildew (fungus)</b> Yellow spots on leaves with sparse gray to white mold on underside.	zineb	75% WP	2 to 3 Tsp.	0 (7 days on turnips if tops used.)	Apply treatment when disease first seen. Repeat 7 to 10 day intervals.
		or Tribasic Copper Sulfate	53% WP	2 to 4 Tsp.	0	
<b>Leaf Spot (fungus)</b> Tan to dark brown round to irregular spots.	zineb	75% WP	2 to 3 Tsp.	0 (7 days on turnips if tops used.)	Same as above.	
<b>SWEET CORN</b>	Corn borer and Aphids	Sevin	50% WP	3 Tbsp.	0	Begin treatments in mid-June and particularly from early August throughout harvest.
		plus Diazinon	25% EC	1 Tbsp.	1	
	Corn earworm	Sevin	50% WP 25% EC	4 Tbsp. 2½ Tbsp.	0 0	Begin treatments to silks when silks first appear. Continue treatments every 2 to 3 days until silks dry up and turn brown.
		or Diazinon	25% EC	1 Tbsp.	1	
	Flea beetles	Sevin	50% WP 25% EC	3 Tbsp. 2½ Tbsp.	0 0	Apply treatment when plants emerge. Repeat 2 to 3 times at 5-day intervals.
		or Diazinon	25% EC	1 Tbsp.	1	
<b>TOMATOES</b>	Cutworms	Sevin	50% WP 25% EC	4 Tbsp. 2½ Tbsp.	0 0	Apply to soil surface when plants are set out and repeat weekly for 2 or more weeks.
		or Thiodan	3% Dust	¾ lb/1000 sq. ft.	1	
		Aphids	Malathion	50% EC 57% EC	2 Tsp. 1½ Tsp.	
	Aphids	or Diazinon	50% WP 25% EC	1 Tbsp. 2 Tbsp.	1 1	Begin treatments to undersides of leaves when aphids are first seen. Repeat as needed.
		or Thiodan	3% Dust	¾ lb/1000 sq. ft.	1	
		Hornworms	Thuricide or Dipel Disease spores. (Follow the label).			
	Hornworms, Fruit worms	Sevin	50% WP 25% EC	3 Tbsp. 2 Tbsp.	0 0	Worms can be hand picked off when damage first appears. Otherwise, apply insecticide as needed.



**Diseases (in bold print) and Aboveground Foliage-Feeding Insects, continued.**

Crop	Insect Pest or Disease	Insecticide or Fungicide	Formulation to Buy	Amount of Formulation/ Gal. of Water	Days from Last Application to Harvest	When to Treat
<b>TOMATOES</b> (Continued)	<b>Leaf Blights and Fruit Spots</b> (bacteria, fungi)	Bravo	6 flowable	2 to 3 Tsp.	0	Apply treatment after transplanting or when plants are 6" tall, repeat at 7 to 10 day intervals. Kocide 101 or Tribasic Copper Sulfate added to protect against bacterial diseases.
		or maneb	80% WP	2 to 3 Tsp.	5	
		or Mancozeb (Dithane M-45 or Manzate 200)	80% WP	2 to 3 Tsp.	5	
		plus Kocide 101	54% WP	2 to 4 Tsp.	0	
		or Tribasic Copper Sulfate	53% WP	2 to 4 Tsp.	0	

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