

Control Series 158
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PLANT DISEASE CONTROL GUIDE

**Chemical Control of Vegetable Diseases
in the Home Garden**

EXTENSION DIVISION
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

KEYS TO PROPER USE OF PESTICIDES

- 1. Read the label on each pesticide container before each use. Follow instructions to the letter: heed all cautions and warnings, and note precautions about residues.**
- 2. Keep pesticides in the containers in which you bought them. Put them where children or animals cannot get to them, preferably under lock and away from food, feed, seed, or other material that may become harmful if contaminated.**
- 3. Dispose of empty containers in the manner specified on the label.**

SEE YOUR DOCTOR IF SYMPTOMS OF ILLNESS OCCUR DURING OR AFTER USE OF PESTICIDES.

Trade and brand names are used only for the purpose of information and the Virginia Cooperative Extension Service does not guarantee nor warrant the standard of the product, nor does it imply approval of the product to the exclusion of others which may also be suitable.

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Chemical Control of Vegetable Diseases in the Home Garden

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Diseases are seasonal in their occurrence in the home vegetable garden. Because gardeners frequently plant in the same plot where the soil has been improved with compost, soil-borne disease organisms may build up making it important to follow a disease control program. Basic to a program is the accurate identification of diseases. Assistance is available from various sources such as the county Extension Agent and garden center operators.

Healthy nutritious vegetables can be produced by 1) early destruction of diseased plant debris in the fall, 2) using disease free seed of resistant varieties and 3) rotating vegetables so that the same one or closely related ones are not planted in the same location on consecutive years. All of the above practices can be considered as biological control. When heavy disease pressure occurs from plant pathogens during favorable climatic conditions it is necessary to consider a chemical protection schedule. Safe fungicides, bactericides, fumigants and nematicides registered by the agricultural chemical industry with the Environmental Protection Agency and proven effective by research and extension are recommended by the Department of Plant Pathology and Physiology at Virginia Polytechnic Institute and State University.

CROP	DISEASE	CHEMICAL AND FORMULATION	ACTIVE INGREDIENT	RATE/GAL. (UNLESS OTHERWISE STATED)	REMARKS
ASPARAGUS	Rust	Maneb (80% WP)	maneb	2 tbsp.	Use resistant varieties or apply several post-harvest sprays at 7-10 day intervals.
		OR Zineb (75% WP)	zineb	2 tbsp.	
BEANS (snap and lima)	Anthracnose	Maneb (80% WP)	maneb	2 tbsp.	Use certified western grown seed. Spray at 7-day intervals. Do not work in garden when plants are wet.
		OR Zineb (75% WP)	zineb	2 tbsp.	
		OR Captan (50% WP)	captan	1 tbsp.	
	Bacterial blights	Fixed Copper	copper	3 tbsp.	Use certified western grown seed. Spray at 7-10 day intervals.
		OR Kocide 101	copper	2 tbsp.	
	Powdery mildew	Sulfur (95% WP) OR Sulfur dust (90-95%)	sulfur sulfur	6 tbsp.	Use resistant varieties. Apply spray or dust when mildew first appear. Repeat at 7-10 day intervals.
Rust	Maneb (80% WP)	maneb	2 tbsp.	Spray or dust plants when rust threatens and repeat at 7-day intervals. Do not apply Bravo within 7 days of harvest. Maneb on snap beans only.	
	OR Sulfur dust (90-95%)	sulfur			
	OR Zineb (75% WP)	zineb	2 tbsp.		
	OR Captan (50% WP)	captan	1 tbsp.		
Seed decay	Captan (75%)	captan	1.3 oz./bu.	Use as dust or slurry as a seed treatment. (Do not use treated seed for food or feed.)	
	OR Thiram (75%)	thiram	1.5 oz./bu.		
	<u>Sclerotinia</u> white mold	Benlate (50% WP)	benomyl	1 1/2 tsp.	(For snap beans only) Apply at 25 to 50 percent bloom and repeat at peak bloom. Do not apply within 14 days of harvest.

CROP	DISEASE	CHEMICAL AND FORMULATION	ACTIVE INGREDIENT	RATE/GAL. (UNLESS OTHERWISE STATED)	REMARKS
BEANS (snap and lima) (Cont'd.)	Botrytis gray mold	Benlate (50% WP)	benomyl	1 1/2 tsp.	(For snap beans only). Apply at 25 to 50 percent bloom and repeat at peak bloom. Do not apply within 14 days of harvest.
BEETS	<u>Cercopsora</u> leaf spot	Zineb (75% WP) OR Captan (50% WP)	zineb captan	2 tbsp. 2 tbsp.	Spray at 7-10 day intervals beginning when disease first appears. Do not apply within 7 days of harvest if tops are to be consumed.
CABBAGE, BROCCOLI, BRUSSELS SPROUT, CAULI- FLOWER, TURNIPS, KALE, COLLARDS	Black leg Black rot				Use western grown hot water treated seed.
	Club root	Terraclor (75% WP)	PCNB	6-8 tbsp.	Applied mixed with transplant water. Use 1/3 pt./plant. (Not registered for turnips, collards and kale.)
	Downy mildew Leaf spot	Maneb (80% WP) OR Zineb (75% WP)	maneb zineb	2 tbsp. 2 tbsp.	Begin garden application when the disease threatens and continue at weekly intervals. Shorten intervals to 3-5 days under severe disease conditions. Do not apply later than 7 days before harvest (10 days on kale). If maneb is applied to Broccoli within 3 days of harvest, remove excess residue by washing.
CARROTS	Leaf blights	Fixed Copper (50% WP) OR Maneb (80% WP) OR Zineb (75% WP) OR Captan (50% WP)	copper maneb zineb captan	1 tbsp. 2 tbsp. 2 tbsp. 2 tbsp.	Make applications at 7-10 day intervals or more frequently if needed. There is a 7-day waiting period for zineb if tops are to be used for food. There is a 7-day waiting period for maneb and the tops are not to be used for food.
CELERY	Leaf blights	Maneb (80% WP) OR Benlate (50% WP)	maneb benomyl	2 tbsp. 1 1/2 tsp.	Apply as a spray at 7-10 day intervals after disease first appears. Do not apply maneb within 14 days of harvest. Do not apply Benlate between 7 days of harvest.
CUCURBITS (Cucum- bers, summer squash, cantaloupe, pumpkin)	Angular leaf spot	Kocide 101	copper	1 tbsp.	Apply as spray at 7-10 day intervals. (Copper may injure some young plants.) Not registered for squash, pumpkins and cantaloupe.

CROP	DISEASE	CHEMICAL AND FORMULATION	ACTIVE INGREDIENT	RATE/GAL. (UNLESS OTHERWISE STATED)	REMARKS
CUCURBITS (Cont'd.)	Anthracnose	Benlate (50% WP) OR Maneb (80% WP) OR Phaltan (50% WP) OR Captan (50% WP)	benomyl maneb folpet captan	1 1/2 tsp. 3 tbsp. 3 tbsp. 2 tbsp.	Start applications when plants are in the two leaf stage and repeat at 5-7 day intervals. Direct spray for thorough coverage of both upper and lower leaf surfaces. Maneb is not registered for pumpkins. Benlate is not registered for pumpkins. Do not apply maneb on cucumbers, summer squash, or cantaloupe later than 5 days before harvest.
	Downy mildew	Maneb (80% WP) OR Captan (50% WP)	maneb captan	2 tbsp. 2 tbsp.	Apply at 7-day intervals throughout the season after runners are formed. Do not apply maneb on cucumber, summer squash or cantaloupes later than 5 days before harvest.
	Gummy stem blight	Benlate (50% WP) OR Maneb (80% WP)	benomyl maneb	1 1/2 tsp. 3 tbsp.	Apply at 7-10 day intervals throughout the season. (Maneb is not registered for pumpkins.) (Maneb is not registered for cucumbers, squash, and pumpkins. Benlate not registered for pumpkins and cantaloupe.) Do not apply maneb or zineb on cucumbers, summer squash, or cantaloupes later than 5 days before harvest.
	Powdery mildew	Benlate (50% WP)	benomyl	2 tsp.	Apply at 7-10 day intervals. Do not apply closer than 7 days before harvest. Benlate not registered for pumpkins.
EGGPLANT	Leaf spot (seed bed)	Captan (50% WP) OR	captan	2 tbsp.	Use captan 50% WP - 2 tbsp. per gal. for seed bed. In the garden use maneb at 3 tbsp./gal. Make applications at 7-10 day intervals.
	Leaf spot (field)	Maneb (80% WP)	maneb	2 tbsp.	
	Phomopsis fruit rot				
IRISH POTATOES	Early blight, Late blight	Maneb (80% WP) OR Captan (50% WP)	maneb captan	2 tbsp. 2 tbsp.	Start applications as soon as the plants are 2-6 inches high and continue at 5-10 day intervals as long as blights threaten. When late blight is present reduce intervals to 3-5 days.
	Rhizoctonia	Terraclor (75% WP)	PCNB		Use according to manufacturer's directions. Plant certified seed.
	Scab				Plant on soil with pH 5 to 5.5. Use a fertilizer with an acid reaction in soil with pH above 5.5. Use resistant varieties.

CROP	DISEASE	CHEMICAL AND FORMULATION	ACTIVE INGREDIENT	RATE/GAL. (UNLESS OTHERWISE STATED)	REMARKS
IRISH POTATOES (Cont'd.)	Seed piece decay	Captan (7.5% dust) OR Captan (15% dust) OR Captan (50% WP)	captan captan captan	1 lb./100 lbs. of seed 8 oz./100 lbs. of seed 1-3 tbsp./gal.	Use as seed treatment dust according to manufacturer's label. Dust seed pieces immediately after cutting. Do not use treated seed pieces for food. Dip seed potatoes.
LETTUCE	Downy mildew	Maneb (80% WP) OR Zineb (75% WP)	maneb zineb	3 tbsp. 2 tbsp.	Apply as a spray at 7-10 day intervals after disease first appears. Do not apply within 10 days of harvest.
ONION	Blast Purple Blotch	Dyrene (50% WP) OR Maneb (80% WP)	dyrene maneb	2 tbsp. 3 tbsp.	Apply as a spray at 7-10 day intervals, after disease first appears.
	Downy mildew	Maneb (80% WP) OR Zineb (75% WP) OR Captan (50% WP)	maneb zineb captan	2 tbsp. 3 tbsp. 2 tbsp.	Apply as a spray at 7-10 day intervals after disease first appears. Do not apply zineb to green onions within 7 days of harvest.
PEPPERS	Anthracnose	Captan (50% WP) OR Maneb (80% WP)	captan maneb	3 tbsp. 3 tbsp.	Make applications every 7-10 days. More often during wet season.
	Bacterial spot	Fixed Copper (50% WP) OR Kocide 101 WP	copper copper	2 tbsp. 3 tbsp.	Make foliar applications at 7-10 day intervals. More often during wet seasons.
	Cercospora leaf spot	Captan (50% WP) OR Maneb (80% WP)	captan maneb	3 tbsp. 3 tbsp.	Make applications every 7-10 days.
	Damping-off	Captan (50% WP)	captan	2 tbsp.	Use as a drench in seed bed.
RADISH	Leaf spot, Downy mildew	Zineb (75% WP)	zineb	2 tbsp.	Apply at 7-10 day intervals when disease first appears.
SPINACH	Damping-off	Thiram (75%)	thiram	5 oz./100 lbs. of seed	Apply seed treatment according to manufacturer's label.
	Downy mildew	Maneb (80% WP) OR Zineb (75% WP) OR Captan (50% WP)	maneb zineb captan	1 1/2 tbsp. 1 1/2 tbsp. 2 tbsp.	Start applications when disease first appears in area and continue at 7-10 day intervals. (Do not apply later than 10 days before harvest.) (Remove maneb residues by washing.)

PLANT	DISEASE	CHEMICAL AND FORMULATION	ACTIVE INGREDIENT	RATE/GAL. (UNLESS OTHERWISE STATED)	REMARKS
SPINACH (Cont'd.)	White rust	Maneb (80% WP)	maneb	3 tbsp.	Apply every 7-10 days throughout the season. (Do not apply later than 10 days before harvest.) (Remove excess residues of maneb by washing.)
		OR Zineb (75% WP)	zineb	2 tbsp.	
SWEET CORN	Bacterial wilt				Plant resistant varieties. Spray with approved insecticide to control flea beetles.
	Leaf blights	Maneb (80% WP)	maneb	1 1/2 tbsp.	Plant resistant varieties. Maneb registered for Helminthosporium leaf blight only.
		OR Zineb (75% WP)	zineb	2 tbsp.	
OR Captan (50% WP)		captan	1 1/2 tbsp.		
Seed decay	Captan (75% WP) OR Thiram (75% WP)	captan thiram	3/4 oz./bu. of seed 1 oz./bu. of seed	Use as a seed treatment. Do not use treated seed for food or feed.	
SWEET POTATOES	Black rot, Scurf	Thiram (75%)	thiram	1 lb. in 5 gal. of water	Use disease-free bedding stock. Use as a dip for 1/2 minute. Do not use treated roots for food or feed.
	Pox				Use disease-free seed and keep soil pH below 5.2.
	Post harvest decay	Botran (75% WP)	botran	1 lb. in 100 gal. of water	Dip washed roots for 10-15 seconds in well agitated suspension. Do not rinse after treatment.
TOMATOES	Anthracnose, Gray leaf spot, Septoria leaf spot, Gray leaf mold	Maneb (80% WP)	maneb	2 tbsp.	Make foliar application when plants begin to set fruit. Repeat at 7-10 day intervals throughout the season. Under severe disease conditions, shorten spray interval. Do not apply maneb or zineb later than 5 days before harvest.
		OR Zineb (75% WP)	zineb	2 tbsp.	
		OR Captan (50% WP)	captan	4 tbsp.	
Bacterial spot	Fixed Copper (50% WP) OR Kocide 101 WP	copper copper	3 tbsp. 2 tbsp.	Make foliar applications every 7-10 days throughout the season.	
Early blight		Dyrene (50% WP)	dyrene	3 tbsp.	Make application every 7-10 days throughout the season. Under severe disease conditions, shorten spray interval. Do not apply maneb or zineb later than 5 days before harvest.
		OR Maneb (80% WP)	maneb	2 tbsp.	
		OR Zineb (75% WP)	zineb	2 tbsp.	
		OR Captan (50% WP)	captan	4 tbsp.	

CROP	DISEASE	CHEMICAL AND FORMULATION	ACTIVE INGREDIENT	RATE/GAL. (UNLESS OTHERWISE STATED)	REMARKS
TOMATOES (Cont'd.)	Late blight	Fixed Copper (50% WP) OR Maneb (80% WP) OR Zineb (75% WP) OR Captan (50% WP)	copper maneb zineb captan	1 tbsp. 2 tbsp. 2 tbsp. 4 tbsp.	Make regular applications every 7-10 days. When disease is severe, reduce intervals to 3-5 days. Do not apply maneb or zineb later than 5 days before harvest.
	Seed decay	Thiram (75%)	thiram	1 tsp./lb. of seed	Use as seed treatment according to manufacturer's label.
WATERMELON	Anthracnose, Downy mildew, Gummy stem blight	Maneb (80% WP) OR Benlate (50% WP)	maneb benomyl	2 tbsp. 1 1/2 tsp.	Start application when conditions are favorable for disease development. Repeat applications at 7 day intervals. Do not apply maneb later than 5 days before harvest. Benlate not registered for downy mildew. Maneb not registered for alternaria.

RESIDUE TOLERANCE IN PPM ON VEGETABLES

Chemical	Asparagus	Beans	Beets	Broccoli	Brussels sprouts	Cabbage	Carrots	Cantaloupe	Cauliflower	Celery	Collards	Corn (Sweet)	Cucumber	Eggplant	Kale	Lettuce	Onion	Pepper	Potato (Irish)	Pumpkin	Radish	Spinach	Squash (summer)	Tomato	Turnips	Sweet Potato	Watermelon
Benlate	-	2	-	-	-	-	-	1	-	3	-	-	1	-	-	-	-	-	-	-	-	-	1	5	-	-	1
Botran	-	20E	-	-	-	-	10F	-	-	15	-	-	-	-	-	10	5	-	0.25	-	-	-	-	5	-	10	-
Captan	-	25	2	-	-	-	2	25	-	-	-	2	25	25	-	-	G	25	25	25	-	-	25	25	-	-	-
Difolatan	-	-	-	-	-	-	-	5	-	-	-	-	2	-	-	-	-	-	NE*	-	-	-	-	15	-	-	5
Dithane M-45	-	-	-	-	-	-	2	4	-	-	-	A	4	-	-	-	-	-	1.0	-	-	-	4	4	-	-	4
Dyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	10	-	-	-
Folpet (Phaltan)	-	-	-	-	-	-	-	15	-	-	-	-	15	-	-	-	-	-	-	15	-	-	15	-	-	-	15
Maneb	-	10	-	10	10	10	7	-	10	5	10	5	4	7	10	10	7	7	0.1	7	-	10	4	4	B	-	4
Manzate 200	-	-	-	-	-	-	2	4	-	-	-	A	4	-	-	-	-	-	1.0	-	-	-	4	4	-	-	4
Polyram	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	D	-	-	-	-	4	-	-	-
Terraclor	-	-	-	0.1	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-
Zineb	NE*	7	7C	7	7	7	7	4	7	-	25	5	4	7	10	10	7	7	-	7	7	10	4	4	7	-	4

NE* = No tolerance established

A = 0.5 on kernal and cob
15.0 on fodder and forage

B = 10 on tops and 7 on roots

C = 7.0 ppm on roots
25.0 ppm on leaves

D = 0.5 seed piece only

E = Snap beans only

F = Post harvest

G = 50 ppm green onions, 25 ppm dry onions

