

# DISEASE CONTROL GUIDE FOR VEGETABLE CROPS IN THE HOME GARDEN

Chemical control is an important tool in the prevention of vegetable crop diseases. However, cultural controls are effective against many diseases and should be integrated into vegetable production systems. For some diseases, cultural controls are the only effective management strategy.

**CULTURAL PRACTICES for vegetable disease control include the following:**

**Resistant varieties:** Varieties of some vegetable crops are resistant to one or more diseases and should be planted in place of susceptible varieties (i.e., those with no resistance claimed).

**Exclusion:** Avoid introducing plant pathogens into fields or gardens. Use certified or otherwise healthy seed and transplants obtained from reputable sources. Do not transport soil on equipment or boots from diseased areas to disease-free areas.

**Crop rotation:** Practice crop rotation to avoid the build-up of disease problems. Apply long rotations (2 to 4 years) where diseases have become established. Use non-related crops for rotations. Avoid rotating within legume, crucifer, cucurbit, and solanaceous (tomato, pepper, potato) crop groups. Diseases often attack several crops within each group.

**Sanitation:** Remove and destroy diseased plants from plantings to help prevent spread to healthy plants. Residue management consisting of removal, soil incorporation, or burning of old plant parts, weeds, and trash is important for reducing survival of pathogens and resulting inoculum available for infection of the next crop.

**FUNGICIDES:** Fungicides and other disease control chemicals are most effective when they are applied before infection. Because new plant growth is vulnerable to infection and fungicides are subject to weathering, fungicides must be reapplied at regular intervals during the period of pathogen activity in order to keep plants adequately protected. Carefully read the manufacturer's label and use according to the instructions. Pay particular attention to recommended protective clothing, the number of days allowed between the last application and harvest (i.e., the pre-harvest interval), and the total allowable amount per season.

Inorganic fungicides are sold under various brands and formulations. Copper fungicides include basic copper sulfate, Kocide, Copper Count N, Tenn-Cop, and many other brands. Sulfurs include sulfur dusts, dry flowables (e.g. Mircothiol Special), liquid flowables (e.g. Red Ball F), and wettable powders (Sulfur 90W). Bordeaux mixture is a mixture of copper sulfate and lime. TopCop is a mixture of copper and sulfur. Coppers are generally suggested for control of bacterial diseases, but they also may provide adequate control of fungus diseases. Coppers may burn foliage of some crops when applied under cool and wet conditions. Lime is added to the bordeaux mixture to soften the copper sulfate component. Bordeaux mixture can be made by adding 2-10 lbs (2-10 tbs) of copper sulfate and 2-24 lbs (2-24 tbs) of lime to 100 gal (1 gal) of water. The higher rates of lime should be used for copper-sensitive crops. Sulfurs are effective for powdery mildews, but may burn foliage when temperatures are hot (>90°F). A few common brands are specified in the crops listing. Check the labels for recommended rates and use patterns for other coppers and sulfurs.

Home gardens: When using commercial products in gardens or small plantings that list rates per acre or per 100 gallons, consult Table 1 to convert the suggested per acre or 100 gal rate to the per gallon rate. When using fungicide in gardens and small plantings on a per gallon rate, frequently agitate the spray tank and spray plants to runoff. Most of the fungicides listed for commercial vegetable crops can be used in home gardens, but they are not usually available in small quantities. Table 2 lists home and garden products recommended for disease control in vegetable crops. Table 2 does not include ready to use products or fungicides formulated in combination with insecticides. Registered fungicides are listed under the common name of the active ingredient. Always check the label for diseases controlled, crop-specific rates, and days to harvest restrictions.

**TABLE 2. CONVERSION TABLE FOR MIXING SMALL QUANTITIES OF LIQUID AND DRY FUNGICIDES**

### DRY FORMULATIONS

RATE/ACRE OR 100 GAL	1/4 lb	½ lb	1 lb	2 lb	3 lb	4 lb	5 lb
RATE/GAL	½ tsp	1 tsp	2 tsp	1 tbsp	1.5 tbsp	2 tbsp	3 tbsp

### LIQUID FORMULATIONS

RATE/ACRE OR 100 GAL	1/4 pt	½ pt	1 pt	2 pt	3 pt	4 pt	5 pt
RATE/GAL	1/4 tsp	½ tsp	1 tsp	2 tsp	3 tsp	4 tsp	5 tsp

**TABLE 2. HOME GARDEN FUNGICIDES AVAILABLE IN SMALL QUANTITIES FOR VEGETABLE CROPS.**

COMMON NAME: (MOA GROUP) FORMULATION AND RATE PER GAL	BRAND	CROP USES AND REMARKS
chlorothalonil (M): Broadspectrum Lanscape and Garden Fungicide 1.12F 4 to 8 tsp Fung-onil Multipurpose Fungicide 2.7F 1.5 tsp to 1 tbsp Daconil Fungicide Concentrate 2.7F 1.5 tsp to 1 tbsp Garden Disease Control, Disease B Gon Garden Fungicide, or Max Garden Disease Control 2.7F 1.5 to 2.75 tsp Fruit, Veg. and Ornamental Fungicide 2.7F 1.5 tsp to 1 tbsp Veg., Flower, Fruit, and Orn. Fungicide 1.12F 5 to 8 tsp SA-50 Liquid Orn. and Vegetable Fungicide 1.12F 2 to 4 tbsp	Ferti-lome Bonide Garden Tech  Ortho Monterey Hi-Yield Southern Ag	Foliar spray for fungal diseases on beans, carrots, cole crops, cucurbits, garlic, onions, potatoes, sweet corn, and tomatoes. Apply on a 7 to 14 day schedule.
copper ammonium complex (M): Liqui-Cop (8%) 1 to 6 tsp Liquid Copper Fungicide (8%) 1 to 6 tsp	Monterey Southern Ag	Foliar spray for bacterial and fungal diseases on beans, carrots, cole crops, cucurbits, eggplant, onions, peas, peppers, spinach, and tomatoes. Apply on a 5 to 10 day schedule.
copper octanoate (M): Copper Soap Liquid Fungicide (10%) 1 to 4 tbsp Liquid Copper Fungicide (10%) 1 to 4 tbsp Disease B Gon Copper Fungicide (10%) 1 to 4 tbsp	Natural Guard Bonide Ortho	Foliar spray for bacterial and fungal diseases on most vegetable crops. Apply on a 5 to 10 day schedule.
copper sulfate (M): Bordeaux Mix Fungicide (12.5%) 4 to 4.5 tbsp Copper Spray or Dust (7%) 4 to 12 tsp	Hi-Yield Bonide	Foliar spray for bacterial and fungal diseases on tomatoes (Hi-Yield) and most vegetable crops (Bonide). Apply on a 7 to 10 day schedule.
mancozeb (M): Mancozeb Flowable 4F 2 to 5 tsp	Bonide	Foliar spray for fungal diseases on asparagus, cucurbits, onions, potatoes, sweet corn, and tomatoes. Apply on a 7 to 10 day schedule.
maneb (M): Maneb Garden Fungicide 80W 1.5 tbsp	Hi-Yield	Foliar spray for fungal diseases on cucurbits, dry beans, eggplant, peppers, and tomatoes. Apply on a 7 to 10 day schedule.
phosphorous acid (33): Agri-Fos Systemic Fungicide 3.35L 2 tsp to 4 tbsp Exel LG 3.35L 2 tsp to 4 tbsp	Monterey Organic Labs Inc.	Foliar spray for control of downy mildews, late blight, white rust, and <i>Pythium</i> and <i>Phytophthora</i> diseases. Apply on a 7 to 21 day schedule.
propiconazole (3): Fungi-Fighter 1.55% 2 tbsp Fung-onil 1.55% 2 tbsp Liquid Systemic Fungicide 1.55% 2 tbsp	Monterey Bonide Ferti-lome	Foliar spray for rust and leaf spots on sweet corn only. Apply on a 14-day schedule.
sulfur (M): Dusting Wettable Sulfur 90W 4 tbsp Dusting Sulfur 90W 4 tbsp/gal Garden Fungicide 12%F 4 tbs Wettable Dusting Sulfur 90W 2 tbsp/gal Wettable Dusting Sulfur 90W 2 tbsp/gal Sulfur Dust 90W 3 tbsp/gal Sulfur Plant Fungicide 90W 3 tbsp/gal	Hi-Yield Ferti-lome Safer Green Light, Southern Ag Lilly Miller Bonide	For powdery mildew on beans, cole crops, cucumbers, onions, peas, and squash. Apply on a 7 to 10 day schedule.

**ROOT-KNOT NEMATODE CONTROL:** Root-knot nematodes are microscopic roundworms that live in soil and feed on the roots of plants such as tomatoes, causing large swellings (galls) on the roots which debilitate plants. There are cultural practices and safe methods of nematode control that can be applied in small-scale, garden settings.

**Crop rotation:** Rotate tomatoes and other susceptible broadleaf vegetable crops with grassy crops such as corn. Fallowing affected areas is not effective.

**Nematode-Resistant Tomato Varieties:** Tomato varieties with the letter “N” is the disease resistance designation are resistant to the major species of root-knot nematode.

**Green manures:** Incorporation of crucifer green manure (cabbage, mustard, rape, canola) into moist soil results in the release of compounds which act as "biological soil fumigants" and kill nematodes. The practice is most effective where combined with soil solarization.

**Soil solarization:** Soil solarization is a method of pasteurizing soil using solar radiation. The area to be solarized should be tilled as deep as possible and moistened by irrigation or rainfall. Cover the area with clear plastic (polyethylene) film and seal the edges with soil. Leave the film in place for three to five weeks (the longer the better) during the summer or early fall. The goal is to heat the soil to high temperatures for as long as possible to achieve a good kill. Consult OSU Extension Facts #7640 for more information on solarization.

**Chitin application:** Hi-Yield Nem-A-Cide Nematode Control (Voluntary Purchasing Groups) is a formulation of chitin (crab shells) and urea, which together stimulate the growth and activity of soil microbes that destroy nematodes. At 2-4 weeks before planting, broadcast at 5 lb/100 sq ft or band at or band over the row at 2.25 to 7 lb/100 ft of row and incorporate 6 to 8 inches deep.