



## PLANT DISEASE MANAGEMENT FOR COMMERCIAL VEGETABLE CROPS

### UPDATES FOR 2008

The following list briefly highlights some of the changes to the chapter for this edition:

- Sovran (kresoxim-methy) has been labeled for use on cucurbits for control of powdery mildew and gummy stem blight.
- Proline 480SC has been registered for use on chickpea and lentils for control of *Ascochyta* blight.
- Cuprofix Ultra 40 Disperss (copper sulfate) has received organic status with the USDA National Organic Program.
- Tables 1 and 3 of this chapter were revised.

### DISEASE MANAGEMENT

Successful control of vegetable diseases requires an integrated program that includes the use of resistant varieties, crop rotation, balanced soil fertility, weed and insect control, and proper crop culture, as well as the proper selection, timing, and method of applying fungicides, bactericides, or nematicides. Economical control depends on establishing an overall disease-management system for the entire farm. Keeping careful records of the crops planted, the problems encountered, and the pesticides used is important.

Because many disease problems originate with seeds or transplants, growers should follow the seed-treatment recommendations given in this chapter and in *Report on Plant Disease (RPD)* no. 915, "Vegetable Seed Treatment" (available from the Department of Crop Sciences, N-533 Turner Hall, 1102 S. Goodwin

Ave., Urbana, IL 61801), or be sure to obtain planting material that is certified as disease free.

This chapter lists the registered fungicides and application intervals for various vegetable crops as approved by the Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (USEPA) as of October 15, 2006, to the best of our knowledge. Tables 1 and 2 give the number of days between the last application at the normal rate and harvest, as well as other restrictions to keep residues within the tolerances set by the FDA. Refer to current labels for information on rates, timing, and methods of application, as well as for information on follow-up crops and other restrictions.

The listing of a chemical as approved for use on a particular crop does not mean that University of Illinois Extension or the Office of Research recommends its use for that crop. Our specific recommendations for disease control are given in Table 3.

In some instances, a tolerance has been set, but a definite interval has not been established. The absence of an interval for a crop in the listings does not necessarily mean that the fungicide may not be used on that crop. To ensure that the crop produced does not exceed the tolerance, the use of the fungicide would require a restriction such as "Do not apply after first blooms appear" or "Do not apply after edible parts form." This information appears on the product label.

In a few cases, the interval and dosage have been established, but the allowable residue concentration has not been determined. Again, this does not mean that the fungicide may not be used on the crops for which the fungicide is labeled. It does mean, however,

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*The information in this chapter is provided for educational purposes only. Product trade names have been used for clarity, but reference to trade names does not imply endorsement by the University of Illinois; discrimination is not intended against any product. The reader is urged to exercise caution in making purchases or evaluating product information.*

*Label registrations can change at any time. Thus the recommendations in this chapter may become invalid. The user must read carefully the entire, most recent label and follow all directions and restrictions. Purchase only enough pesticide for the current growing season.*

that until the tolerance is established, it must be considered zero. These cases are reviewed each year, and some are canceled when the chemical manufacturer supplies the USEPA with additional data.

Growers must follow a program of disease control ensuring that the vegetables produced do not contain excessive fungicide residues. Vegetables marketed with residues exceeding the FDA tolerances may be injurious to consumers, may be confiscated, and may subject the grower to legal action.

*Growers have nothing to fear from the law so long as they use fungicides and other pesticides according to the current labels and only on the crops specified, in the amounts specified, and at the times specified.* The prudent grower keeps a record of the products and trade names used, the percentage of active ingredients, dilutions, rates of application per acre, and dates of application.

### DISEASE DIAGNOSIS

The first step in an effective disease-management program is proper identification of the problem. This is often the most difficult, but the most important, step. Make every possible effort to ensure that the disease is accurately diagnosed. Failure in accurate identification of the problem could have severe consequences.

### FUNGICIDE APPLICATION

We recommend that the following practices be used when applying fungicides.

- Cover the foliage uniformly. *Ground application*—Apply 30 to 50 gallons per acre at 100 to 400 pounds per square inch of pressure unless recommended otherwise. Lowering the volume, pressure, or both may provide adequate coverage; but high-volume, high-pressure applications provide ideal coverage. Make sure the sprayer is functioning properly. Check the nozzles for cleanliness and wear. Boom height, accuracy of pressure gauge, agitation, and calibration should also be checked. *Aerial application*—Apply recommended amounts of pesticide in 3 to 5 gallons of water per acre. Make sure nozzles are properly aligned and clean so that uniform application is achieved. Cover a swath no wider than is reasonable for the aircraft and boom being used. Spray only those fields that are suitable for aerial application. Avoid fields of irregular shape or topography, particularly if they are bounded by power lines, trees, or other obstructions.
- Whenever possible, spray when the air is still or when wind velocity is less than 10 mph.
- Avoid situations where pesticide drift may cause needless problems.

- When it is compatible with the product label, use a spray adjuvant (surfactant). Available surfactants include Bio-Film, Bio 88, Regulaid (for systemic fungicides), Plyac, NuFilm, Chevron Spray Sticker, X-77 Spreader, Triton, and some others. Spray adjuvants are most useful on cabbage, cauliflower, Brussels sprouts, onions, and peppers.

### SOIL FUMIGATION

Follow the manufacturer's directions exactly. Fumigants work best in light, loose soils that are free of trash, clods, and lumps. Avoid recontaminating treated soil. It is best to apply fumigants during the fall before planting. In general, the soil temperature must be at least 55° to 60°F at the 6-inch depth, with a time lapse of 21 to 28 days between treating and seeding. Some fumigants require gas-tight plastic covers. Many fumigants are restricted use chemicals.

### USING NEMATICIDES

Use nematicides only where soil analysis shows a nematode problem to be present. Follow soil sampling instructions in RPD no. 1100, "Collecting and Submitting Soil Samples for Nematode Analysis." RPD no. 1100 and other RPDs are available from the Department of Crop Sciences, N-533 Turner Hall, 1102 S. Goodwin Ave., Urbana, IL 61801.

### RECOMMENDED WEB RESOURCES

<http://veg-fruit.cropsci.uiuc.edu>, <http://www.ag.uiuc.edu/~vista/pubs.html>, and <http://ipm.uiuc.edu> For information on vegetable crops in Illinois, *Illinois Fruit & Vegetable News*, current and archived issues. Includes IPM links and "Ask an Expert" section. Published weekly during the summer.

<http://www.APSnet.org>

Information on plant diseases. Web site of the American Phytopathological Society. News features, reports, and other public-access information, as well as subscription journals.

**Table 1. Preharvest intervals (in days) and re-entry intervals for fungicides registered for use on Illinois vegetables in 2008.<sup>a</sup>**

	actbenzolar-S-methyl	azoxystrobin	boscalid	boscalid / pyraclostrobin	chlorothalonil	cyazofamid	cymoxanil / famoxadone	cyprodinil / fludioxonil	dimethomorph	fixed copper	aluminum trifoseetyl-Al	iprodione	mancozeb	maneb	myclobutanil	phosphorous acid	propamocarb	propiconazole	pyraclostrobin	thiophanate methyl	trifloxystrobin	triflumizole
Asparagus	...	100	...	...	190	...	...	...	...	...	110	...	180	...	180	0	...	...	...	...	...	...
Bean (lima)	...	0	7	...	14	...	...	7	...	0	...	b	...	30	...	0	...	...	...	28	...	...
Bean (snap)	...	0	7	...	7	...	...	7	...	0	...	b	...	...	0	0	...	...	...	14	...	...
Beet	...	0	...	...	...	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	7	...
Broccoli	7	0	0	...	7	...	...	7	0	0	3	0	...	7	...	0	...	...	...	...	...	...
Brussels sprout	7	0	0	...	7	...	...	7	0	0	3	...	...	7	...	...	...	...	...	...	...	...
Cabbage	7	0	0	...	7	...	...	7	0	0	3	0	...	7	...	0	...	...	...	...	...	...
Chinese cabbage	7	0	c	...	7	...	...	7	0	0	3	...	...	7	...	0	...	...	...	...	...	...
Cantaloupe	...	1	...	0	0	0	3	...	0	0	½	...	5	5	0	0	2	...	0	1	0	0
Carrot	...	0	0	0	0	...	...	7	...	0	...	0	...	...	...	...	...	...	0	...	7	...
Cauliflower	7	0	0	...	7	...	...	7	0	0	3	0	...	7	...	0	...	...	...	...	...	...
Celery	...	0	...	...	7	...	...	0	...	0	3	...	...	...	...	...	14	...	...	...	7	...
Collard	7	0	14	...	...	...	...	7	0	0	3	...	...	14	...	...	...	...	...	...	...	...
Cucumber	...	1	...	0	0	0	3	...	0	0	½	...	5	5	0	...	2	...	0	1	0	0
Eggplant	...	0	0	...	...	...	...	...	...	0	...	...	...	5	...	0	...	...	0	...	3	...
Endive	...	0	...	...	...	...	...	0	...	...	3	...	...	10	...	...	...	...	...	...	...	...
Kale	7	0	14	...	...	...	...	7	...	...	3	...	...	10	...	...	...	...	...	...	...	...
Lettuce (head)	...	0	0	14	...	...	3	0	0	...	3	14	...	10	...	...	2	...	...	...	...	...
Lettuce (leaf)	...	0	0	14	...	...	3	0	0	...	3	14	...	10	...	...	2	...	...	...	...	...
Mint	...	7	...	...	80	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mustard	...	0	14	...	...	...	...	7	...	0	3	...	...	...	...	...	...	...	...	...	...	...
Onion (bulb)	...	0	7	7	7	...	...	7	0	0	7	7	7	7	...	0	...	...	7	...	...	...
Onion (green)	...	0	7	7	14	...	...	7	0	0	...	...	...	7	...	0	...	...	7	...	...	...
Parsley	...	0	...	...	...	...	...	0	...	0	3	...	...	...	...	...	...	...	...	...	...	...
Parsnip	...	0	...	...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7	...
Peas	...	0	...	...	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	...	...	...
Pepper	...	0	0	...	...	...	3	...	...	0	...	...	...	7	...	0	5	...	0	...	3	...
Potato	...	14	30	14	7	7	14	...	4	0	...	14	14	14	...	0	14	...	3	21	7	...
Pumpkin	...	1	...	0	0	0	3	...	0	0	½	...	...	5	0	...	2	...	0	1	0	0
Radish	...	0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0	...	...	...
Spinach	7	0	...	...	...	...	...	...	0	...	3	...	...	...	...	...	...	...	...	...	...	...
Squash (summer)	...	1	...	0	0	0	3	...	0	0	½	...	5	5	0	...	2	...	0	1	0	0
Squash (winter)	...	1	...	0	0	0	3	...	0	0	½	...	...	5	0	...	2	...	0	1	0	0
Sweet corn	...	7	...	...	14	...	...	...	...	...	...	...	7	7	...	...	...	14	...	...	...	...
Tomato	14	0	0	...	0	0	3	...	4	0	14	...	5	5	0	0	5	...	0	...	3	...
Turnip	7	0	...	...	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	7	...
Watermelon	...	1	...	0	0	0	3	...	0	0	½	...	5	5	0	0	2	...	0	1	0	0
Re-entry interval (hr)	12	4	12	12	12	12	12	12	12	24	12	24	24	24	24	4	12	24	12	12	12	12

<sup>a</sup>Check label directions before applying any of these pesticides.<sup>b</sup>Do not apply past peak bloom.<sup>c</sup>0-day PHI for napa Chinese cabbage, 14-day PHI for bok choy.

**Table 2. Label information on fungicides and nematicides of less general use**

Fungicide	Crops and use restrictions
<b>Actigard</b> (plant activator) (Actigard 50WG)	<b>Spinach:</b> downy mildew, white rust, 7 days. <sup>a</sup> <b>Tomato:</b> bacterial spot, bacterial speck, 14 days. <sup>a</sup>
<b>Azoxystrobin</b> (Amistar, Quadris)	<b>Bulb vegetables</b> (garlic, leek, onions, shallot); <b>corn</b> (popcorn and sweet corn); <b>cucurbits</b> (cantaloupe, chayote, Chinese waxgourd, cucumber, gourd, honeydew melon, muskmelon, pumpkin, squash, watermelon, zucchini); <b>eggplant; leafy vegetables</b> (amaranth, arugula, Brassica leafy green, cardoon, celery, celtuce, chervil, coriander, cress, dandelion, dock, edible chrysanthemum, endive, fennel, lettuce, mint, orach, parsley, purslane, radicchio, rhubarb, spinach, Swiss chard); <b>okra; pepper; tomatoes; vegetable—root</b> (beet, burdock, carrot, celeriac, chervil, chicory, ginseng, horseradish, parsley, parsnip, radish, rutabaga, salsify, skirret, turnip); <b>vegetable—tuberous</b> (arracacha, arrowroot, artichoke, burdock, canna, cassava, chayote, chufa, dasheen, ginger, leren, potato, sweet potato, taniel, turmeric, yam). Read and follow label directions.
(Dynasty)	<b>Corn</b> (pop and sweet); <b>legume vegetables</b> (field bean, kidney bean, lima bean, navy bean, pinto bean, runner bean, snap bean, wax bean), chickpea (garbanzo bean), lentil, peas (dwarf pea, edible-pod pea, English pea, field pea, garden pea, green pea, snow pea, sugar snap pea); seed treatment against seedborne and soilborne fungi.
(Protégé)	<b>Cucurbits</b> (cucumber); <b>corn</b> (pop and sweet); <b>legume vegetables</b> (field bean, kidney bean, lima bean, navy bean, pinto bean, runner bean, snap bean, was bean), chickpea (garbanzo bean) lentil, peas (dwarf, edible-pod, English, garden, green, snow, sugar, snap); seed treatment against seedborne and soilborne fungi.
<b>Azoxystrobin + chlorothalonil</b> (Quadris Opti)	<b>Bulb vegetables</b> (leek, onion, shallot); <b>carrot; celery; cucurbits</b> (cantaloupe, chayote, Chinese wax gourd, cucumber, gourd, honeydew, <i>Momordica</i> spp., muskmelon, pumpkin, squash, watermelon, zucchini); <b>dry beans</b> (adzuki bean, broad bean, kidney bean, lablab bean, lima bean, moth bean, mung bean, navy bean, pink bean, pinto bean, tepary bean, urd bean, yardlong bean, rice bean, running bean, jackbean, blackeyed pea, southern catjang pea, chickpea [garbanzo bean], grain lupin, lupine); <b>potatoes; tomatoes.</b> Read and follow label directions.
<b>Azoxystrobin + propiconazole</b> (Quilt)	<b>Sweet corn:</b> eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, rusts, southern corn leaf blight, 14 days. <sup>a</sup>
<b>Bordeaux mixture</b> (many trade names)	<b>Asparagus, beans, beet, broccoli, Brussels sprout, cabbage, carrot, casaba melon, celery, collard, crenshaw melon, cress, cucumber, eggplant, honeydew melon, horseradish, kale, muskmelon, mustard, pepper, Persian melon, potato, pumpkin, radish, rape, rutabaga, spinach, squash, tomato, turnip, watermelon.</b> Read and follow label directions.

**Table 2. Label information on fungicides and nematicides of less general use (cont.)**

Fungicide	Crops and use restrictions
<b>Boscalid</b> (Endura)	<p><b>Beans</b> (dry, succulent): Aschyta blight, Botrytis gray mold, rust, white mold, 7 days.<sup>a</sup></p> <p><b>Bulb vegetables</b> (garlic, leek, onion): purple blotch, Botrytis leaf blight, 7 days.<sup>a</sup></p> <p><b>Carrot:</b> Alternaria leaf spot, 0 days.<sup>a</sup></p> <p><b>Fruiting vegetables</b> (eggplant, ground cherry, pepino, pepper, tomatillo, tomato): early blight, Botrytis gray mold, 0 days.<sup>a</sup></p> <p><b>Lettuce:</b> lettuce drop (<i>Sclerotinia</i> spp.), Botrytis rot, Rhizoctonia bottom rot, 14 days.<sup>a</sup></p> <p><b>Potato:</b> early blight, white mold, 30 days.<sup>a</sup></p> <p><b>Head and stem Brassicas</b> (broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, cauliflower, kohlrabi): Alternaria blight, gray mold, Sclerotinia stem rot, powdery mildew, Rhizoctonia bottom rot, 0 days.<sup>a</sup></p> <p><b>Leafy Brassica green</b> (broccoli, Chinese cabbage, kale, mustard greens, mustard spinach, rape greens): Alternaria blight, gray mold, Sclerotinia stem rot, powdery mildew, Rhizoctonia bottom rot, 14 days.</p>
<b>Captan</b> (many)	<p><b>Beans</b> (snap, dry, cowpeas), <b>beet</b> (garden), <b>broccoli</b>, <b>Brussels sprout</b>, <b>cabbage</b>, <b>cantaloupe</b>, <b>cauliflower</b>, <b>corn</b> (sweet), <b>crucifers</b> (collard, kale, mustard, radish, rape, turnip), <b>cucumber</b>, <b>lentils</b>, <b>muskmelon</b>, <b>peas</b>, <b>pepper</b>, <b>pumpkin</b>, <b>spinach</b>, <b>squash</b>, <b>Swiss chard</b>, <b>watermelon</b>: seed protectant. Read and follow label directions.</p>
<b>Copper fungicides<sup>b</sup></b> copper sulfate (many)	<p><b>Beans</b>, <b>beet</b>, <b>cantaloupe</b>, <b>carrot</b>, <b>celeriac</b>, <b>celery</b>, <b>cucumber</b>, <b>eggplant</b>, <b>honeydew melon</b>, <b>muskmelon</b>, <b>onion</b>, <b>pea</b>, <b>pepper</b>, <b>Persian melon</b>, <b>potato</b>, <b>pumpkin</b>, <b>spinach</b>, <b>squash</b>, <b>tomato</b>, <b>watermelon</b>. Read and follow label directions.</p>
copper ammonium carbonate (Copper-Count N)	<p><b>Beans</b>, <b>cabbage</b>, <b>cantaloupe</b>, <b>carrot</b>, <b>celery</b>, <b>cucurbits</b>, <b>eggplant</b>, <b>honeydew melon</b>, <b>lettuce</b>, <b>onion</b>, <b>peas</b>, <b>pepper</b>, <b>potato</b>, <b>squash</b>, <b>tomato</b>, <b>watermelon</b>. Read and follow label directions.</p>
copper hydroxide (Kocide DF, Kocide 4.5LF, Kocide 101, Kocide 2000)	<p><b>Beans</b>, <b>broccoli</b>, <b>Brussels sprout</b>, <b>cabbage</b>, <b>cantaloupe</b>, <b>carrot</b>, <b>cauliflower</b>, <b>celery</b>, <b>cucumber</b>, <b>eggplant</b>, <b>lettuce</b>, <b>muskmelon</b>, <b>onion</b>, <b>peas</b>, <b>pepper</b>, <b>potato</b>, <b>pumpkin</b>, <b>squash</b>, <b>tomato</b>, <b>watermelon</b>. Read and follow label directions.</p>
copper oxychloride (many)	<p><b>Beans</b>, <b>beet</b>, <b>broccoli</b>, <b>Brussels sprout</b>, <b>cabbage</b>, <b>cantaloupe</b>, <b>carrot</b>, <b>casaba melon</b>, <b>cauliflower</b>, <b>celery</b>, <b>crenshaw melon</b>, <b>cucumber</b>, <b>eggplant</b>, <b>honeydew melon</b>, <b>lettuce</b>, <b>muskmelon</b>, <b>onion</b>, <b>peas</b>, <b>Persian melon</b>, <b>potato</b>, <b>pumpkin</b>, <b>spinach</b>, <b>squash</b>, <b>tomato</b>, <b>watermelon</b>. Read and follow label directions.</p>
tribasic copper sulfate (many)	<p>Read and follow label directions.</p>
<b>Cyazofamid</b> (Ranman)	<p><b>Cucurbits:</b> downy mildew and Phytophthora blight, 0 days.<sup>a</sup></p> <p><b>Potato:</b> late blight, 7 days.<sup>a</sup></p> <p><b>Tomato:</b> late blight, 0 days.<sup>a</sup></p>

**Table 2. Label information on fungicides and nematocides of less general use (cont.)**

Fungicide	Crops and use restrictions
<b>Cymoxanil</b> (Curzate 60DF)	<b>Cucurbits:</b> downy mildew, 3 days. <sup>a</sup> <b>Potato:</b> late blight, 14 days. <sup>a</sup> <b>Tomato:</b> late blight, 3 days. <sup>a</sup> Read and follow label directions.
<b>Cyprodinil</b> (Switch 62.5WG)	<b>Beans</b> (dry and succulent, except cowpeas): gray mold, white mold. <b>Brassicas</b> (broccoli, Brussels sprout, cabbage, cauliflower, collard, kale, kohlrabi, mustard, rape, turnip): Alternaria leaf spot, Cercospora leaf spot, powdery mildew. <b>Bulb vegetables</b> (garlic, leek, onion): black mold ( <i>Aspergillus niger</i> ), Botrytis leaf blight, neck rot, purple blotch, Stemphylium leaf blight. <b>Herbs:</b> Alternaria leaf spot, Botrytis leaf blight, Fusarium blight. <b>Leafy vegetables</b> (amaranth, celery, endive, lettuce, parsley, purslane, rhubarb, Swiss chard): Alternaria leaf spot, basal rot ( <i>Phoma exigua</i> ), gray mold, powdery mildew, Sclerotinia rot.
<b>Dimethomorph</b> (Acrobat 50WP, Forum 4.18 SC)	<b>Bulb vegetables</b> (garlic, leek, onion, shallot): downy mildew. <b>Cucurbit vegetables</b> (cantaloupe, chayote, Chinese wax gourd, citron melon, cucumber, gherkin, gourd, muskmelon, pumpkin, squash, watermelon, zucchini): downy mildew, Phytophthora blight and crown rot. <b>Fruiting vegetables</b> (eggplant, pepino, pepper, tomatillo): Phytophthora blight. <b>Leafy Brassica greens:</b> downy mildew. <b>Lettuce</b> (head and leaf): downy mildew. <b>Potato:</b> late blight. <b>Tomato:</b> late blight.
<b>Ethoprop</b> (Mocap)	<b>Beans</b> (snap and lima), <b>cabbage</b> , <b>corn</b> (sweet), <b>cucumber</b> , <b>potato</b> , <b>sweet potato:</b> for nematode control. Read and follow label directions.
<b>Famoxadone + cymoxanil</b> (Tanos)	<b>Cucurbits</b> (cantaloupe, cucumber, honeydew melon, muskmelon, pumpkin, summer squash, watermelon, winter squash): Alternaria leaf blight, anthracnose, bacterial fruit blotch, downy mildew, Phytophthora blight, 3 days. <sup>a</sup> <b>Lettuce:</b> downy mildew, 3 days. <sup>a</sup> <b>Pepper</b> (all varieties): bacterial soft rot, bacterial spot, Phytophthora blight (foliar and fruit phase only), 3 days. <sup>a</sup> <b>Potato:</b> brown spot, early blight, late blight, 14 days. <sup>a</sup> <b>Tomato:</b> anthracnose, bacterial spot, bacterial speck, buckeye rot (Phytophthora species), early blight, leaf mold, late blight, Septoria leaf spot, target spot, 3 days. <sup>a</sup>
<b>Fenamidone</b> (Reason 500SC)	<b>Bulb vegetables</b> (garlic, leek, onion, shallot): for control of downy mildew and purple blotch. Apply on 5- to 10-day intervals. Do not apply within 7 days of harvest. <b>Cucurbits:</b> for control of Alternaria leaf spot and downy mildew. Apply on 5- to 10-day intervals. Do not apply within 14 days of harvest. <b>Lettuce:</b> for control of downy mildew. Apply on 5- to 10-day intervals. Do not apply within 2 days of harvest.

**Table 2. Label information on fungicides and nematicides of less general use (cont.)**

Fungicide	Crops and use restrictions
<b>Fenamidone (cont.)</b> (Reason 500SC) (cont.)	<b>Potato and other tuberous and corm vegetables</b> (artichoke, canna, cassava, chayote, ginger, sweet potato, yam): for control of early blight, late blight, and white rust. Read and follow label directions. Do not apply within 14 days of harvest. <b>Tomato:</b> for control of early blight, late blight, and Septoria leaf spot. Apply at 5- to 10-day intervals. Do not apply within 14 days of harvest.
<b>Fenamiphos</b> (Nemacur 15G)	<b>Brussels sprout, cabbage, eggplant, garlic, okra, pepper</b> (non-bell): for nematode control. Read and follow label directions.
<b>Fludioxonil</b> (Maxim 4FS)	<b>Sweet corn:</b> seed treatment for seedborne and soilborne fungi causing seed decay, damping-off, and seedling blights. Read and follow label directions.
(Maxim)	<b>Potato:</b> potato seed protectant. Read and follow label directions.
<b>Fosetyl-AL</b> (Aliette)	<b>Broccoli, Brussels sprout, cabbage, Chinese broccoli, Chinese cabbage</b> (bok choy and Napa), <b>Chinese mustard cabbage, cauliflower, collard, kale, kohlrabi, mustard greens, mustard spinach, rape greens:</b> downy mildew, 3 days. <sup>a</sup> <b>Chinese waxgourd, citron melon, cucumber, gherkin, gourd</b> (edible), <i>Momordica</i> spp., <b>muskmelon, pumpkin, summer and winter squash, watermelon:</b> downy mildew, 0 days (12 hours). <sup>a</sup> <b>Ginseng:</b> Phytophthora root rot, Alternaria leaf blight, 31 days. <sup>a</sup> Read and follow label directions. <b>Leafy vegetables</b> (except Brassica vegetables): downy mildew, 3 days. <sup>a</sup> <b>Onion</b> (dry bulb): downy mildew, 7 days. <sup>a</sup> <b>Tomato:</b> Phytophthora root rot, damping-off ( <i>Pythium</i> spp.).
<b>Iprodione<sup>c</sup></b> (Rovral)	<b>Beans:</b> <sup>d</sup> gray mold ( <i>Botrytis</i> ), white mold ( <i>Sclerotinia</i> ). <b>Broccoli:</b> blackleg. <b>Carrot:</b> Alternaria blight, black crown rot, no more than 4 applications. <b>Chinese mustard:</b> Alternaria leaf spot, no more than 4 applications. <b>Garlic:</b> white rot, no more than 1 application. <b>Lettuce:</b> lettuce drop, bottom rot, no more than 3 applications, 14 days. <sup>a</sup> <b>Onion</b> (dry bulb): Botrytis leaf blight, Botrytis neck rot, Alternaria purple blotch, no more than 5 applications. <b>Potato:</b> early blight, white mold, no more than 4 applications, 14 days. <sup>a</sup> The following crops may be rotated after harvest: <b>beans, broccoli, carrot, garlic, lettuce, onion</b> (dry bulb), <b>peanut, potato</b> . The following crops may be rotated 1 month following the last iprodione application: <b>cotton, root crops, tomato</b> . Read and follow label directions. <b>Cucurbits:</b> powdery mildew, gummy stem blight, 0 days. <sup>a</sup>
<b>Kresoxim-methyl</b> (Sovran)	<b>Cucurbits:</b> powdery mildew, gummy stem blight, 0 days. <sup>a</sup>

**Table 2. Label information on fungicides and nematicides of less general use (cont.)**

Fungicide	Crops and use restrictions
<b>Mefenoxam</b> (Apron XL LS)	<b>Beets, carrot, legume vegetables, okra, spinach:</b> seed treatment for control of <i>Pythium</i> and <i>Phytophthora</i> causing damping-off, seed rot, and systemic downy mildew diseases. Read and follow label directions for these uses, as well as seed treatments for export.
(Ridomil Gold Bravo)	<b>Broccoli, Brussels sprout, cabbage, cauliflower:</b> downy mildew, <i>Alternaria</i> leaf spot, 7 days. <sup>a</sup> Read and follow label directions. <b>Cucumber, melon, squash:</b> downy mildew, anthracnose, <i>Cercospora</i> leaf spot, gummy stem blight (black rot), leaf blight, scab. Read and follow label directions. <b>Onion</b> <sup>c</sup> (dry bulb, seed, green): downy mildew, <i>Botrytis</i> leaf blight (blast), purple blotch; dry, 7 days, <sup>a</sup> and green, 21 days. <sup>a</sup> Read and follow label directions. <b>Potato:</b> late blight, early blight, storage rots ( <i>Pythium</i> leak; pink rot caused by <i>Phytophthora</i> ), 14 days. <sup>a</sup> Read and follow label directions. <b>Tomato:</b> late blight, early blight, <i>Phytophthora</i> fruit rot, gray leaf spot, gray leaf mold, <i>Septoria</i> leaf spot, anthracnose, <i>Alternaria</i> fruit rot (black mold), <i>Rhizoctonia</i> fruit rot, <i>Botrytis</i> gray mold, 14 days. <sup>a</sup> Read and follow label directions.
(Ridomil Gold Copper)	<b>Carrot, radish:</b> diseases caused by oomycetes, 7 days. <sup>a</sup> Read and follow label directions. <b>Cucurbits:</b> downy mildew, 5 days. <sup>a</sup> Read and follow label directions. <b>Onion</b> (dry bulb, seed, green), <b>garlic:</b> downy mildew, dry, 10 days, <sup>a</sup> and green, 7 days. <sup>a</sup> Read and follow label directions. <b>Pepper:</b> <i>Pythium</i> damping-off, <i>Phytophthora</i> crown rot, 7 days. <sup>a</sup> Read and follow label directions. <b>Potato:</b> late blight, early blight, storage rots ( <i>Pythium</i> leak; pink rot caused by <i>Phytophthora</i> ), 7 days. <sup>a</sup> Read and follow label directions. <b>Spinach:</b> white rust, downy mildew, 21 days. <sup>a</sup> Read and follow label directions. <b>Tomato:</b> <i>Phytophthora</i> fruit rot, late blight, 14 days. <sup>a</sup> Read and follow label directions.
(Ridomil Gold EC)	<b>Asparagus:</b> <i>Phytophthora</i> crown and spear rot. Read and follow label directions. <b>Beans</b> (all), <b>lentils, peas, soybeans</b> (edible): <i>Pythium</i> damping-off and root rot. When applied preplant and incorporated in the top 2 in. of soil with a surface application, or in a 7-in. band at planting. Read and follow label directions. <b>Cole crops:</b> <i>Pythium</i> damping-off, <i>Phytophthora</i> basal stem rot. Surface applications may be broadcast at planting, incorporated into the upper 2 in. of soil. Seven-inch band applications are also labeled. Read and follow label directions. <b>Cucurbits:</b> <i>Pythium</i> damping-off, cottony leak. Applications may be in a 7-in. band over the row at planting or broadcast. Broadcast applications should be incorporated into the top 2 in. of soil. Read and follow label directions. <b>Eggplant, pepper:</b> <i>Pythium</i> damping-off, <i>Phytophthora</i> crown rot, 7 days. <sup>a</sup> <b>Lettuce</b> (head), <b>onion, spinach:</b> <i>Pythium</i> damping-off. Apply either broadcast or banded at planting. Read and follow label directions.

**Table 2. Label information on fungicides and nematicides of less general use (cont.)**

Fungicide	Crops and use restrictions
<b>Mefenoxam (cont.)</b> (Ridomil Gold EC)	<b>Root and tuber vegetables</b> (beet, carrot, radish, sweet potato): Read and follow label directions. <b>Tomato:</b> Pythium damping-off, as well as Pythium and Phytophthora fruit and root rots. Apply either broadcast or banded immediately before or after planting. Incorporate with irrigation. Read and follow label directions.
Ridomil Gold GR)	<b>Leafy vegetables</b> (excluding spinach), <b>lettuce</b> (head, leaf): Pythium damping-off. Applications may be made banded over the row or preplant incorporated. Read and follow label directions. <b>Spinach:</b> Pythium damping-off, white rust ( <i>Albugo occidentalis</i> ), downy mildew. Applications may be made preplant incorporated or preemergence. Read and follow label directions. <b>Tomato:</b> Pythium damping-off. Pythium and Phytophthora fruit and root rots, 7 days. <sup>a</sup> Read and follow label directions.
(Ridomil Gold MZ)	<b>Cucumber, melon, summer squash:</b> downy mildew, 5 days. <sup>a</sup> Read and follow label directions. <b>Onion</b> (dry bulb): downy mildew, 7 days. <sup>a</sup> Read and follow label directions. <b>Potato:</b> late blight, early blight, storage rots (Pythium leak; Phytophthora pink rot), 14 days. <sup>a</sup> Read and follow label directions. <b>Tomato:</b> late blight, 5 days. <sup>a</sup> Read and follow label directions.
(Ridomil Gold PC)	<b>Beans</b> (dry and green): <sup>d</sup> damping-off and seed and seedling rots caused by <i>Pythium</i> and <i>Rhizoctonia</i> . Apply 12 oz per 1,000 ft of row at planting time. Read and follow label directions.
<b>Metalaxyl</b> (Allegiance FL)	<b>Beets, carrot, cucumber, seed and pod vegetables, spinach, sweet corn, popcorn:</b> seed treatment for the control of Pythium damping-off and in certain crops for early-season <i>Phytophthora</i> control. Read and follow label directions for these uses, as well as seed treatments for export use.
<b>Myclobutanil</b> (Nova)	<b>Asparagus:</b> for control of rusts. Begin applying to developing ferns after harvest has taken place. Repeat application on a schedule that does not exceed 14-day intervals. Apply with a spray adjuvant. Do not spray within 180 days of harvest. <b>Beans</b> (snap): for control of rust and pot tip rot ( <i>Rhizoctonia</i> ). Begin application when rust is first observed; continue on a 7- to 10-day schedule, 0 days. <sup>a</sup> <b>Cucurbits:</b> for control of powdery mildew. Begin application at first sign of disease development and continue on a 7- to 10-day application schedule. Do not apply more than 1.5 lb product (0.6 lb active ingredient) per acre per crop per year. Application may be made up to and including the day of harvest. Read and follow label directions. <b>Tomato:</b> for control of powdery mildew. Begin application at the first sign of disease, and continue application on a schedule that does not exceed 21-day intervals, 0 days. <sup>a</sup> Read and follow label directions carefully.
<b>Oxamyl</b> (Vydate L)	<b>Carrot, cucurbits, eggplant, pepper, potato, sweet potato:</b> for nematode control. Apply before or at planting. Apply in transplant water for pepper or as foliar spray for pepper and vine crops, 7 days. <sup>a</sup> Read and follow label directions.

**Table 2. Label information on fungicides and nematicides of less general use (cont.)**

Fungicide	Crops and use restrictions
<b>PCNB</b> (Terraclor)	<p><i>Field use</i>—<b>Beans</b> (dry, snap, succulent): protective fungicide for control of root and stem rot caused by <i>Rhizoctonia solani</i>. Spray planting furrow and covering soil at planting. Apply only at planting time and avoid spraying directly on seed. Read and follow label directions.</p> <p><b>Broccoli, Chinese broccoli, Brussels sprout, cabbage, Chinese cabbage</b> (tight-heading only), <b>cauliflower</b>: for control of clubroot and wirestem or black root. For effective control of clubroot, thoroughly mix Terraclor with the soil. Read and follow label directions.</p> <p><i>Bedding plants</i>—<b>Beans, broccoli, Brussels sprout, cabbage, cauliflower, pepper, tomato</b>: soil drench to seedlings grown in containers or beds prior to transplanting for the control of root/stem rot and damping-off caused by <i>Rhizoctonia solani</i> and <i>Pellicularia filamentosa</i>. Read and follow label directions.</p>
<b>Phosphorous acid</b> (Agri-Fos)	<p><b>Asparagus</b>: Phytophthora crown and spear rot, 0 days.<sup>a</sup></p> <p><b>Brassicas</b>: downy mildew, 0 days.<sup>a</sup></p> <p><b>Carrot</b>: Pythium and Phytophthora rot, 0 days.<sup>a</sup></p> <p><b>Cucurbits</b>: Phytophthora blight, gummy stem blight, downy mildew, 0 days.<sup>a</sup></p> <p><b>Eggplant</b>: gummy stem blight, Pythium rot, Phytophthora rot, 0 days.<sup>a</sup></p> <p><b>Ginseng</b>: Phytophthora root rot and foliar blight, 0 days.<sup>a</sup></p> <p><b>Leafy vegetables</b> (amaranth, arugula, cardoon, celery, chervil, corn salad, endive, fennel, parsley, radicchio, rhubarb, spinach, Swiss chard): downy mildew, 0 days.<sup>a</sup></p> <p><b>Legumes</b>: Pythium rot, Phytophthora rot, 0 days.<sup>a</sup></p> <p><b>Okra</b>: Pythium rot, Phytophthora blight, 0 days.<sup>a</sup></p> <p><b>Onion</b>: downy mildew, 0 days.<sup>a</sup></p> <p><b>Potato, sweet potato, yams</b>: pink rot (<i>Phytophthora</i> spp.), Pythium leak (<i>Pythium</i> spp.), late blight, 0 days.<sup>a</sup></p> <p><b>Tomato</b>: Late blight, 0 days.<sup>a</sup></p>
(Phostrol)	<p><b>Asparagus</b>: Phytophthora crown and spear rot, 0 days.<sup>a</sup></p> <p><b>Brassicas</b>: downy mildew, 0 days.<sup>a</sup></p> <p><b>Cucurbits</b>: downy mildew, Phytophthora blight, 0 days.<sup>a</sup></p> <p><b>Ginseng</b>: Phytophthora root rot and foliar blight, 0 days.<sup>a</sup></p> <p><b>Leafy vegetables</b> (except Brassica vegetables): downy mildew, 0 days.<sup>a</sup></p> <p><b>Onions</b> (dry bulb): downy mildew, 0 days.<sup>a</sup></p> <p><b>Peas</b>: downy mildew, Phytophthora disease, Pythium rot, 0 days.<sup>a</sup></p> <p><b>Potatoes</b>: pink rot (<i>Phytophthora</i> spp.) and Pythium leak (<i>Pythium</i> spp.), 0 days.<sup>a</sup></p> <p><b>Tomato</b>: Phytophthora root rot.</p>
(ProPhyt)	<p><b>Brassicas</b>: downy mildew, 0 days.<sup>a</sup></p> <p><b>Cucurbits</b>: downy mildew, 0 days.<sup>a</sup></p> <p><b>Leafy vegetables</b> (lettuce, spinach): downy mildew, 0 days.<sup>a</sup></p> <p><b>Legume vegetables</b>: downy mildew, 0 days.<sup>a</sup></p> <p><b>Potato</b>: late blight, 0 days.<sup>a</sup></p> <p><b>Tomato, tomatillo</b>: late blight, 0 days.<sup>a</sup></p>

**Table 2. Label information on fungicides and nematicides of less general use (cont.)**

Fungicide	Crops and use restrictions
<b>Propamocarb hydrochloride</b> (Previcur Flex)	<p><b>Cucurbits:</b> for control of downy mildew. Begin foliar applications when conditions are favorable for disease development but before infection. Continue on 7- to 14-day intervals. Do not apply within 2 days of harvest.</p> <p><b>Lettuce:</b> for control of downy mildew. Start applications before infection and continue on 7- to 10-day intervals. Do not apply within 2 days of harvest.</p> <p><b>Peppers:</b> for control of <i>Pythium</i> spp. and <i>Phytophthora</i> spp. Read and follow label directions.</p> <p><b>Potato:</b> for control of early blight and late blight. Do not apply within 14 days of harvest.</p> <p><b>Tomatoes:</b> for control of late blight. Read and follow label directions. Do not apply within 5 days of harvest.</p>
<b>Propiconazole</b> (Tilt)	<p><b>Celery:</b> early blight (<i>Cercospora</i>), late blight (<i>Septoria</i>), 14 days.<sup>a</sup> Read and follow label directions.</p> <p><b>Corn</b> (sweet and pop): Helminthosporium leaf blights, rusts, gray leaf spot, eyespot. Sweet corn, 14 days.<sup>a, b</sup> Do not apply more than 16 fl oz per acre. Do not apply to popcorn after silking. Do not harvest for forage within 14 days of application for sweet corn or 30 days for popcorn. Read and follow label directions.</p>
<b>Prothioconazole</b> (Proline 480SC)	<p><b>Chickpea:</b> Ascochyta blight, 7 days.<sup>a</sup></p> <p><b>Lentils:</b> Ascochyta blight, 7 days.<sup>a</sup></p>
<b>Pyraclostrobin</b> (Cabrio, Headline)	<p><b>Brassica head and stem</b> (broccoli, Brussels sprout, cabbage, Chinese cabbage, cauliflower, kohlrabi), <b>Brassica leafy green</b> (broccoli raab, Chinese cabbage, collard, kale, mustard green, rape green), <b>bulb vegetables</b> (garlic, leek, onion, shallot), <b>cucurbits</b> (chayote, Chinese waxgourd, citron melon, cucumber, gherkin, gourd, <i>Momordica</i> spp., muskmelon, pumpkin, summer squash, watermelon, winter squash), <b>fruiting vegetables</b> (eggplant, ground cherry, pepino, pepper, tomatillo, tomato), <b>leaf vegetables</b> (except Brassicas), leaves of root and tuber vegetables (except sugarbeet), <b>root vegetables</b> (black salsify, carrot, celeriac, chervil, chicory, edible burdock, garden beet, ginseng, horseradish, oriental radish, parsley, parsnip, radish, rutabaga, Spanish salsify, skirret, turnip), <b>tuber and corm vegetables</b> (arracacha, arrowroot, cassava, Chinese artichoke, chufa, dasheen, edible canna, Jerusalem artichoke, leren, potato, sweet potato, true yam, turmeric, yam bean).</p>
(Pristine)	<p><b>Beans</b> (dry beans): Alternaria leaf and pod spot, anthracnose, Ascochyta blight, Botrytis gray mold, Cercospora leaf spot, downy mildew, Mycosphaerella blight, powdery mildew, rust, Septoria leaf spot, white mold, 21 days.<sup>a</sup></p> <p><b>Bulb vegetables</b> (garlic, leek, onion): Botrytis leaf blight, downy mildew, purple blotch, Stemphylium leaf blight and stalk rot, 7 days.<sup>a</sup></p> <p><b>Carrot:</b> Alternaria leaf spot, Cercospora leaf spot, powdery mildew, southern root rot (<i>Sclerotium rolfsii</i>), 0 days.<sup>a</sup></p>

**Table 2. Label information on fungicides and nematicides of less general use (cont.)**

Fungicide	Crops and use restrictions
<b>Pyraclostrobin (cont.)</b> (Pristine) (cont.)	<b>Cucurbits</b> (chayote, Chinese waxgourd, citron melon, cucumber, gherkin, gourds, <i>Momordica</i> spp., muskmelon, pumpkin, summer squash, winter squash): <i>Alternaria</i> blight, anthracnose, <i>Cercospora</i> leaf spot, downy mildew, gummy stem blight, powdery mildew, 0 days. <sup>a</sup>
<b>Pyrimethanil</b> (Scala SC)	<b>Bulb vegetables</b> (garlic, leek, onion, shallot): for control of <i>Botrytis</i> leaf blight and neck rot and purple blotch. Apply on 7- to 14-day intervals. Do not apply within 7 days of harvest. <b>Potato and other tuberous and corm vegetables</b> (arrachata, arrowroot, artichoke, canna, cassava, chayote, ginger, yam). Read and follow label directions. Do not apply within 7 days of harvest. <b>Tomatoes:</b> for control of early blight and gray mold. Apply on 7- to 14-day intervals. Do not apply within 1 day of harvest.
<b>Streptomycin</b>	<b>Beans:</b> halo blight, seed treatment. <b>Pepper, tomato:</b> apply at 2-leaf stage (200-ppm spray). <b>Potato:</b> seed-piece treatment only (100-ppm dip or dust). Soak cut seed pieces less than 30 min. Do not use treated seed for food or feed. Read and follow label directions.
<b>Sulfur</b>	Exempt when used with good agricultural practices. See label.
<b>Terbufos</b> (Counter 15G)	<b>Corn</b> (sweet and pop): apply in band or furrow at planting. Read and follow label directions.
<b>Thiabendazole</b> (Mertect 340F)	<b>Carrot:</b> storage rot (gray mold, white mold) control. <b>Sweet potato:</b> treatment of seed against black rot, scurf, and foot rot. Do not use treated roots for food or feed. <b>Potato:</b> seed-piece treatment to control <i>Fusarium</i> tuber rot. Do not treat seed potatoes after cutting. Read and follow label directions.
<b>Thiophanate-methyl</b> (Topsin M 70W, Topsin M WSB)	<b>Beans:</b> white mold, gray mold. Snap or dry beans, 14 days <sup>a</sup> ; lima, 28 days. <sup>a</sup> <b>Cucurbits:</b> anthracnose, gummy stem blight, powdery mildew, target spot, 0 days. <sup>a</sup> <b>Onion:</b> white rot. Apply in-furrow at planting. Read and follow label directions.
<b>Thiram</b>	<b>Beans, beet, broccoli, Brussels sprout, cabbage, cantaloupe, carrot, castor beans, cauliflower, collard, corn</b> (sweet), <b>cucumber, eggplant, endive, kale, kohlrabi, lettuce, mustard, okra, onion, peas, pepper, pumpkin, radish, spinach, squash, Swiss chard, tomato, turnip, watermelon:</b> seed treatment. WARNING: Do not use treated seed for food, feed, or oil. <b>Onion:</b> furrow treatment. <b>Tomato:</b> for leaf spots and fruit rot, 0 days. <sup>a</sup> Read and follow label directions.

**Table 2. Label information on fungicides and nematicides of less general use (cont.)**

Fungicide	Crops and use restrictions
<b>Trifloxystrobin</b> (Flint)	<b>Cucurbits:</b> for control of downy mildew, powdery mildew, 0 days. <sup>a</sup> Follow label directions carefully. <b>Eggplant, groundcherry, pepino, pepper, tomatillo, tomato:</b> powdery mildew, early blight, gray leaf spot, late blight, 3 days. <sup>a</sup> Follow label directions.
(Gem)	<b>Potato:</b> early blight, late blight, 7 days. <sup>a</sup>
<b>Triflumizole</b> (Procure 50WS)	<b>Cucurbits</b> (cucumber, melons, summer squash, watermelon): for control of Alternaria leaf spot, Cercospora leaf spot, downy mildew, fruit and stem rot, 5 days. <sup>a</sup> Begin applications when plants are in the 2-leaf stage and repeat at 7- to 10-day intervals when environmental conditions are conducive for disease development.
<b>Triphenyltin hydroxide</b> (Super Tin)	<b>Potato:</b> for control of early blight and late blight, 3 days. <sup>a</sup> Begin applications at the first sign of disease or when late blight is reported in the area.
<b>Vinclozolin</b> (Ronilan)	<b>Beans</b> (snap, common, lima): gray mold, white mold, 14 days. <sup>a</sup> Do not make more than 2 applications per season or more than 2 lb of the product per season. Read and follow label directions. <b>Lettuce</b> (head or leaf): Sclerotinia drop, 28 days. <sup>a</sup> No more than 6 lb per acre per season. <b>Onion</b> (dry): white rot, Botrytis blight, neck rot, 18 days. <sup>a</sup> No more than 10 lb per acre per season.
<b>Ziram</b> (Ziram 76DF)	<b>Tomato</b> (not cherry tomato): anthracnose, early blight, Septoria leaf spot, 7 days. <sup>a</sup> Do not apply more than 24 lb of product per acre per crop cycle. Read and follow label directions.
<b>Zoxamide</b> (Gavel 75DF)	<b>Tomato</b> (not cherry tomato): anthracnose, early blight, Septoria leaf spot, 7 days. <sup>a</sup> Do not apply more than 24 lb of product per acre per crop cycle. Read and follow label directions. <b>Tomato:</b> for control of buckeye rot, early blight, gray leaf spot, late blight, leaf mold, Septoria leaf spot, bacterial speck, bacterial spot, 5 days. <sup>a</sup> Start applications when seedlings emerge or transplants are set and repeat at 7- to 10-day intervals. For bacterial diseases, use a full rate of fixed-copper fungicide in tank-mixed combinations with a full rate of Gavel 75DF. Follow label directions carefully.

<sup>a</sup>Number of days between last application and harvest.<sup>b</sup>There are many other copper materials, but these are most widely available and labeled for use on vegetable crops. Exempt from tolerance if used with good agricultural practices; not exempt if used at the time of harvest or after harvest. See label.<sup>c</sup>Phytotoxicity to crop or follow-up crop. See label.<sup>d</sup>Do not feed treated tops or forage to livestock.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008**

Vegetable and disease	Treatment	Remarks
<b>ASPARAGUS</b>		
Fusarium crown and root rot	Obtain crowns from a reliable source. Avoid fields with a history of crown and root rot. Avoid excessive cutting. Avoid acidic (low-pH) and poorly drained soils.  Mancozeb (e.g., Dithane and Penncozeb) are labeled for treating roots by dipping. Most dry formulations are labeled at 1 lb per 100 gal. water. Liquid formulations are mostly labeled at 0.8 qt per 100 gal. water.	
Phytophthora crown and spear rot	Agri-Fos at 1.25 to 2.5 qt per acre or Phostrol at 2 to 5 pt per acre. Aliette WDG at 5 lb per acre.  Ridomil Gold 4EC at 1 pt per acre over bed.	Do not apply to ferns beginning to senesce. Apply once per season to fully expanded ferns. 110 days PHI. Apply 30 to 60 days before harvest. Make second application just before harvest. 1 day PHI.
Rust and Cercospora leaf spot	Chlorothalonil (e.g., Bravo, Echo, Equus) at 1.8 to 3.6 lb per acre for most dry formulations or 2 to 4 pt per acre for most flowable formulations.  Mancozeb (e.g., Dithane, Penncozeb) at 2 lb per acre for dry formulations or 1.6 qt per acre for flowable formulations.	Apply after harvest and at 14- to 28-day intervals. Protecting ferns during summer is essential for good yields. 190 days PHI.  Begin applications to the developing ferns after harvest. Repeat on a schedule of less than 14 days. 180 days PHI.
<b>BEANS (SNAP, DRY WAX, AND LIMA)</b>		
Most diseases	When possible, use rotations of 2 to 3 years or longer between crops and practice strict sanitation.	
Seed decay, damping-off, seed-borne stem blights	Plant only western-grown, certified pathogen-free seed in a seedbed that is warm (60° to 65°F), well prepared, and well drained. Treat seed with Allegiance FL, Apron XL plus thiram, captan, Dynasty, or Protégé and insecticide.	
Seedling diseases and root rots	Ridomil Gold EC at 0.5 to 1 pt per acre at planting, or Ridomil PC 11G at 0.75 lb per 1,000 ft of row at planting.	Applications may be made pre-plant incorporated, or as a soil-surface spray after planting.
Bacterial blights (brown spot, halo blight, common blight)	Plant only western-grown, certified pathogen-free seed. Utilize crop rotations of 2 to 3 years. Avoid cultivating when beans are wet.  Field applications of fixed copper fungicides. Applications rates vary widely with product and formulation.	Do not use copper on fresh-market lima bean.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>BEANS (SNAP, DRY WAX, AND LIMA) (CONT.)</b>		
Rust, anthracnose (dry bean)	Follow 2- to 3-year rotation schedules.	Rotate with nonhost crops.
	Plant rust-resistant varieties.	Rust-resistant varieties are available.
	Amistar at 2.0 oz per acre for rust and 2.0 to 5.0 oz per acre for anthracnose.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0 days PHI.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	Begin applications during early bloom or when disease threatens. 14 days PHI.
	Endura at 8 to 11 oz per acre.	Rust only. Apply at beginning of flowering or prior to onset of disease. Make second application at full bloom if necessary. 21 days PHI.
	Headline at 6.9 oz per acre.	Begin applications at the beginning of flowering. Do not make more than 2 applications of Headline or other group II fungicides per year. 21 days PHI.
	Manex at 1.2 to 1.6 qt per acre or Maneb 15DF or Maneb 80WP at 2.0 lb per acre.	Spray on a 7-day interval. 30 days PHI.
	Quadris at 6.0 fl oz per acre for rust and 6.0 to 15.5 fl oz per acre for anthracnose.	Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 0 days PHI.
	Quadris Opti at 1.6 to 2.4 pt per acre.	Do not make more than 2 applications of Quadris Opti before alternating to a non-group-II fungicide. 14 days PHI.
	Topsin 70WP at 1 to 2 lb per acre. Topsin 4.5L at 30 to 40 fl oz per acre if 1 application and 20 to 30 fl oz if 2 applications are made.	Anthracnose only. Apply once if applied at 50 to 70% full bloom. Apply twice if first application is at 10 to 30% full bloom and second application is 4 to 7 days later (peak bloom). 28 days PHI.
Rust (snap bean)	Follow 2- to 3-year rotation schedules.	Rotate with nonhost crops.
	Rust-resistant varieties are available.	Several races of the pathogen are known.
	Amistar at 2.0 oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0 days PHI.
	Endura at 8 to 11 oz per acre.	Apply at beginning of flowering or prior to onset of disease. Make second application at full bloom if necessary. 7 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>BEANS (SNAP, DRY WAX, AND LIMA) (CONT.)</b>		
Rust (snap bean) (cont.)	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates. Headline at 6 to 9 oz per acre.	Begin applications at first sign of disease. 7 days PHI. Begin applications at the beginning of flowering. Do not make more than 2 applications of Headline or other group II fungicides per year. 7 days PHI.
	Nova 40W at 4 to 5 oz per acre. Quadris at 6.0 fl oz per acre.	0 days PHI. Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 0 days PHI.
Asian soybean rust	Headline at 6.0 to 9.0 fl oz per acre mixed with an adjuvant and a non-group-II fungicide.  Amistar at 2.0 to 5.0 oz per acre.	Snap bean, dry bean, and lima bean do not appear to be very susceptible to Asian soybean rust. However, growers should monitor the epidemics and scout fields. 21 days PHI. Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0 days PHI.
White mold and gray mold	Avoid fields with history of white mold or with poor drainage. Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.  Endura 70WG at 8 to 11 oz per acre.  Rovral 75WG at 1.0 to 1.33 lb per acre for flowable formulations.  Switch at 11 to 14 oz per acre.  Topsin 70WP at 1 to 2 lb per acre. Topsin 4.5L at 30 to 40 fl oz per acre if 1 application and 20 to 30 fl oz if 2 applications are made.	Gray mold on snap bean only. Apply at weekly intervals. 7 days PHI. See remarks for Endura under rust. 7 days PHI for snap bean. 21 days PHI for lima and dry beans. Apply at first bloom and again at full bloom. Do not apply after full bloom. Observe restrictions on feeding of forage. 0 days PHI. Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 7 days PHI. Apply once if applied at 50 to 70% full bloom. Apply twice if first application is at 10 to 30% full bloom and second application 4 to 7 days later (peak bloom). 14 days PHI for dry, snap, and lima beans.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>BEANS (SNAP, DRY WAX, AND LIMA) (CONT.)</b>		
Soybean cyst nematode	Rotate at least 2 to 3 years with corn, small grains, alfalfa, or other nonhost crops.	Do not include soybeans in the rotation.
Mosaic virus diseases	Plant varieties with resistance to common mosaic, NY 15 strain of common mosaic, and bean yellow mosaic.	Bush Blue Lake 274, Cherokee, Goldcup, Provider, Tendercrop.
<b>BEET (GARDEN), SWISS CHARD</b>		
Seed rot, damping-off, seedborne leaf spot	Sow seed in a well-prepared seedbed. Treat seed with Apron XL or Allegiance FL (for <i>Pythium</i> ), captan, or thiram. Make sure boron levels are adequate.	Several soluble boron formulations are available.
Cercospora leaf spot	Amistar at 3.0 to 5.0 oz per acre.	Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 0 days PHI.
	Cabrio at 8 to 12 oz per acre.	Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 0 days PHI.
	Quadris at 9.2 to 15.4 fl oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0 days PHI.
	Switch at 11 to 14 oz per acre.	Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 7 days PHI.
<b>CARROT, PARSNIP</b>		
Seed rot, damping-off	Treat seed with captan or thiram. Plant in a well-drained seedbed. Avoid overwatering. Apron XL and Allegiance FL can be used to control <i>Pythium</i> damping-off on carrot.	
Cercospora leaf spot, Alternaria leaf blight	Use 3- to 4-year crop rotations. Amistar at 2 to 5 oz per acre for Alternaria diseases and 3 to 5 oz per acre for Cercospora leaf spot. Carrot: 3 to 5 oz per acre for both diseases.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>CARROT, PARSNIP (CONT.)</b>		
Cercospora leaf spot, Alternaria leaf blight (cont.)	Cabrio at 8 to 12 oz per acre.	Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 0 days PHI.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates. Endura at 4.5 oz per acre.	0 days PHI for carrot. 10 days PHI for parsnip. Carrot only. Apply no more than twice before alternating to a fungicide with a different mode of action. 0 days PHI.
	Pristine at 8 to 10.5 oz per acre.	Carrot only. Apply no more than twice before alternating to a fungicide with a different mode of action. 0 days PHI.
	Quadris at 6.0 to 15.5 fl oz per acre for Alternaria diseases and 9.2 to 15.4 fl oz per acre for Cercospora leaf spot. Carrot: 9.0 to 15.5 fl oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0 days PHI.
	Quadris Opti at 2.4 pt per acre.	Carrot only. Do not make more than 1 application of Quadris Opti before alternating to a non-group-II fungicide. 0 days PHI.
	Rovral at 1 to 2 pt per acre for flowable (F) formulations or 1/3 to 1 1/3 lb per acre for dry formulations. Switch at 11 to 14 oz per acre.	Alternaria leaf blight on carrot only. When tank-mixed with another fungicide registered for use on carrot, use low rate. 0 days PHI. Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 7 days PHI.
Powdery mildew	Pristine at 8 to 12 oz per acre.	See remarks on Cercospora leaf spot.
White mold	Use a crop rotation of 3 to 4 years.	
Aster yellow	Use an insecticide to control leafhoppers that transmit the disease.	Effective early-season leafhopper control is essential. Control must occur before leafhoppers feed.
Root-knot nematode	Methyl bromide or sodium methyl dithiocarbamate or Vydate L.	Carrot only. Sample fields for plant parasitic nematodes before planting. Methyl bromide and sodium methyl dithiocarbamate give best results when nematode populations are moderate to high. Vydate gives adequate control when populations are low to moderate.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>CELERY, PARSLEY</b>		
Seed rot, damping-off	Conditions that favor rapid seed germination limit damping-off severity. Treat seeds with hot water, then captan and thiram. Ridomil Gold EC at 1 to 2 pt per acre applied preplant to control damping off.	Avoid excessive irrigation and poorly drained soils.  Apply preplant to the soil surface and incorporate to a depth of 2 inches. 21 days PHI.
Leaf blights and spots (celery only)	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates. Amistar at 3 to 5 oz per acre or Quadris at 9.0 to 15.5 fl oz per acre.  Quadris Opti at 2.4 to 3.7 pt per acre.  Switch at 11 to 14 oz per acre.	Follow the label directions. 7 days PHI. Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI. Do not make more than 2 foliar applications before alternating to a fungicide with different mode of action. 7 days PHI. After two applications of Switch, alternate with another fungicide with a different mode of action. 0 days PHI.
Powdery mildew	Amistar at 4 to 5 oz per acre or Quadris at 12 to 15.5 fl oz per acre.	Do not make more than 2 applications of either Amistar or Quadris before alternating to a fungicide with a different mode of action. 0 days PHI.
<b>CRUCIFER CROPS: BROCCOLI, BRUSSELS SPROUT, CABBAGE, CAULIFLOWER, CHINESE CABBAGE, COLLARD, KALE, KOHLRABI, MUSTARD, RADISH, RUTABAGA</b>		
Seed rot, damping-off	Plant only western-grown, hot water-treated seed. Apply thiram or captan after hot water treatment. 4-year or longer crop rotation. Ridomil Gold EC at 1 to 2 pt per acre for Pythium damping-off and basal stem rot caused by <i>Phytophthora</i> spp.	Rotate to noncruciferous crops. Preplant incorporation into soil or soil-surface application at planting.
Alternaria leaf spot	3- to 4-year crop rotation. Amistar at 2 to 5 oz per acre or Quadris at 6.2 to 15.4 fl oz per acre.  Cabrio at 12 to 16 oz per acre.	Rotate to noncruciferous crops. Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI. 3 days PHI for collard, kale, and mustard. 0 days PHI for others.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>CRUCIFER CROPS: BROCCOLI, BRUSSELS SPROUT, CABBAGE, CAULIFLOWER, CHINESE CABBAGE, COLLARD, KALE, KOHLRABI, MUSTARD, RADISH, RUTABAGA (CONT.)</b>		
Alternaria leaf spot (cont.)	Chlorothalonil (e.g., Bravo, Echo, Equus) at 1.4 lb per acre for dry formulations and 1.5 pt per acre for flowable formulations. <b>Not for use on collard, kale, or mustard.</b>	Not for use on collard, kale, or mustard. 7 days PHI.
	Copper compounds at various rates.	0 days PHI.
	Endura at 6 to 9 oz per acre.	14 days PHI for collard, kale, and mustard. 0 days PHI for all others.
	Maneb (e.g., Maneb, Manex) at various rates, depending on crop and formulation.	10 days PHI for kale. 14 days PHI for collard, mustard, and turnip greens. 7 days PHI for all others.
Black leg	3- to 4-year crop rotation.	Rotate to noncruciferous crops.
	Plant disease-free seeds or seedlings.	Hot-water seed treatment helps to eliminate seedborne pathogens.
	Cabrio at 12 to 16 oz per acre.	0 days PHI.
	Rovral at 2 pt per acre for flowable formulations or 2 lb per acre for dry formulations.	Broccoli only. Apply at 2- to 4-leaf stage. 0 days PHI.
Black rot	3- to 4-year crop rotation.	Rotate to noncruciferous crops.
	Plant pathogen-free seeds or transplants.	Hot-water seed treatment helps to eliminate soilborne pathogen.
	Plant disease-resistant cabbage varieties.	Several varieties with partial resistance are available.
	Actigard at 1 oz per acre. Suppression only.	Do not apply to plants stressed by drought, herbicide injury, or other factors. 0 days PHI.
	Fixed-copper formulations at various rates.	Read and follow label directions. 0 days PHI.
Club root	Plant disease-free transplants.	Club root may be carried in transplants.
	7-year or longer crop rotation. Improve soil conditions.	Rotate to noncruciferous crops. Avoid poorly drained soils with a history of club root. Crop losses can be avoided by raising the pH to 7.2 to 7.5.
	Terrachlor at various rates. Mix terrachlor with soil.	Transplants: Mix 3 pt in 100 gal. of water and use 0.5 pt per plant. Band applications: 5 to 6 gal. per acre in 25 gal. water, or 55 fl oz per 1,000 ft of row. Broadcast applications: 7.5 gal. in 30 gal. of water.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>CRUCIFER CROPS: BROCCOLI, BRUSSELS SPROUT, CABBAGE, CAULIFLOWER, CHINESE CABBAGE, COLLARD, KALE, KOHLRABI, MUSTARD, RADISH, RUTABAGA (CONT.)</b>		
Downy mildew	3- to 4-year crop rotation. Plant disease-resistant broccoli varieties. Acrobat at 6.4 oz per acre or Forum at 6 fl oz per acre. Suppression only. Aliette at 2 to 5 lb, Agri-Fos at 1.25 to 2.5 qt, Phostrol at 2.5 to 5.0 pt, or ProPhyt at 2 to 4 pt per acre. Amistar at 2 to 5 oz per acre or Quadris at 6.2 to 15.4 fl oz per acre. Cabrio at 12 to 16 oz per acre.  Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates. Ridomil Gold Bravo at 1.5 lb per acre.	Rotate to noncruciferous crops. Several resistant varieties are available. Tank-mix with another fungicide. Do not make more than 2 sequential applications. 0 days PHI. Read and follow label directions.  Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI. 3 days PHI for collard, kale, and mustard; 0 days PHI for all others. Not for use on collard, kale, mustard, or turnip greens. 7 days PHI. Not for use on collard, kale, mustard, or turnip greens. 7 day PHI.
Fusarium yellows	Plant Fusarium-yellow-resistant varieties.	Many resistant varieties are available.
Powdery mildew	Cabrio at 12 to 16 oz per acre.  Endura at 6 to 9 oz per acre.  Microthiol Special at 3 to 10 lb per acre.	3 days PHI for collard, kale, and mustard; 0 days PHI for all others. Not for turnip greens. No more than 2 applications. 0 days PHI for broccoli, Brussels sprout, cabbage, and cauliflower. 14 days PHI for all others. Apply at early leaf stage. Repeat applications every 10 to 14 days or as needed.
Rhizoctonia bottom rot	Cabrio at 12 to 16 oz per acre.  Endura at 6 to 9 oz per acre. Suppression only.	Not for turnip greens. 3 days PHI for collard, kale, and mustard. 0 day PHI for all others. See remarks on powdery mildew.
Sclerotinia stem rot	Endura at 6 to 9 oz per acre.	See remarks on powdery mildew.
White rust	Amistar at 2 to 5 oz per acre or Quadris at 6.0 to 15.5 fl oz per acre. Cabrio at 12 to 16 oz per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI. Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 0 days PHI.
Wirestem	Terrachlor at various rates.	See remarks on club root.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>CUCURBITS: CUCUMBER, MUSKMELON OR CANTALOUPE, PUMPKIN, SQUASH, WATERMELON</b>		
General recommendations	Use a crop rotation of 3 to 4 years. Grow resistant varieties wherever possible.	Rotation with noncucurbit crops.
Seed rot, damping-off, seedborne diseases	Plant only certified, western-grown seed treated with thiram or captan. Seed treatment with Apron XL LS at 0.64 fl oz per 100 lb seed. Ridomil Gold EC at 1 to 2 pt per acre.	Apron XL LS can prevent seed rot and damping-off up to 5 weeks. Can be applied as a broadcast or banded at planting.
Alternaria leaf blight	3- to 4-year crop rotation. Amistar at 3.5 to 5.0 oz, Quadris at 11.0 to 15.4 fl oz, or Quadris Opti at 3.2 pt per acre.	Rotate with noncucurbit crops. Do not apply more than once before alternating to a fungicide with a different mode of action. 1 day PHI for all three fungicides.
	Cabrio at 12 to 16 oz per acre or Pristine at 12.5 to 18.5 oz per acre.	Do not apply Cabrio or Pristine more than once before alternating to a fungicide with a different mode of action. 0 days PHI for both fungicides.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	0 days PHI.
	Gavel at 1.5 to 2.0 lb per acre.	See label detail for crops. 5 days PHI.
	Mancozeb (e.g., Dithane, penncozeb) at various rates.	See label detail for crops. 5 days PHI.
	Maneb (e.g., Maneb, Manex) at various rates.	5 days PHI.
	Reason at 5.5 fl oz per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. Read and follow label directions. 14 days PHI.
	Tanos at 8 oz per acre.	Mix with a contact fungicide with a different mode of action. 3 days PHI.
Angular leaf spot (cucumber, muskmelon, watermelon)	Plant resistant varieties. Copper fungicides.	Several resistant varieties of cucumber are available. Read and follow label directions.
Anthracnose (cucumber, muskmelon, watermelon)	Plant resistant varieties. 3- to 4-year crop rotation. Amistar at 3.5 to 5.0 oz, Quadris at 11.0 to 15.4 fl oz, or Quadris Opti at 3.2 pt per acre.	Resistant varieties of cucumber are available. Rotate with noncucurbit crops. See remarks on Alternaria leaf blight.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>CUCURBITS: CUCUMBER, MUSKMELON OR CANTALOUPE, PUMPKIN, SQUASH, WATERMELON (CONT.)</b>		
Anthracnose (cucumber, muskmelon, watermelon) (cont.)	Cabrio at 12 to 16 oz or Pristine at 18.5 oz per acre. Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates. Mancozeb (e.g., Dithane, Penncozeb) at various rates. Tanos at 8.0 oz per acre.	See remarks on Alternaria leaf blight. 0 days PHI. 0 days PHI. See label detail on crops. 5 days PHI. See remarks on Alternaria leaf blight.
Bacterial fruit blotch (primarily muskmelon and watermelon)	Plant uncontaminated seed. Sanitize the greenhouse thoroughly. Plow contaminated fields in fall. 2-year crop rotation. Apply copper fungicides. Tanos at 8 to 10 oz per acre. Disease suppression only.	The pathogen is primarily seed-borne. The pathogen can survive in greenhouses. Fall plowing minimizes pathogen survival. Rotate with noncucurbit crops. Copper may reduce disease severity. See remarks on Alternaria leaf blight.
Bacterial leaf and fruit spot	2-year crop rotation. Plant pathogen-free seed. Weekly application of copper fungicides.	Rotate with noncucurbit crops. The pathogen is seedborne. Begin application when fruits are 4 inches in diameter.
Bacterial wilt	Apply insecticides to control cucurbit beetles.	Disease control depends on control of striped and spotted cucumber beetles. Apply insecticide only when beetles are present.
Downy mildew	Plant resistant varieties. Acrobat at 6.4 oz per acre or Forum at 6 fl oz per acre.  Agri-Fos at 1.25 pt, Phostrol at 2.5 to 5.0 pt, or ProPhyt at 2 to 4 pt per acre. Aliette at 2 to 5 lb per acre. Use 2 to 3 lb when tank-mixed with another fungicide. Use 3 to 5 lb when used alone. Amistar at 3.5 to 5.0 oz, Quadris at 11 to 15.5 fl oz, or Qudris Opti at 3.2 pt per acre.	Several cucumber varieties are resistant. Acrobat or Forum must be applied as a tank mix with a fungicide active against downy mildew. Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 0 days PHI. 0 days PHI. 3 days PHI. See remarks on Alternaria leaf spot. 1 day PHI for all three fungicides.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>CUCURBITS: CUCUMBER, MUSKMELON OR CANTALOUPE, PUMPKIN, SQUASH, WATERMELON (CONT.)</b>		
Downy mildew (cont.)	Cabrio at 8 to 12 oz per acre or Pristine at 12.5 to 18.5 oz per acre. Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates. Curzate at 3.2 oz per acre.	Begin applications before disease development. 0 days PHI. 0 days PHI.
	Flint at 4.0 oz per acre.	Use in combination with a labeled fungicide (e.g., copper, mancozeb, or chlorothalonil). Do not apply Flint more than once before alternating to a fungicide with a different mode of action. 0 days PHI.
	Maneb (e.g., Maneb, Manex) at various rates.	5 days PHI.
	Mancozeb (e.g., Dithane, Manzate, Penncozeb) at various rates.	5 days PHI.
	Previcur Flex at 1.2 pt per acre.	2 days PHI.
	Ranman at 2.1 to 2.75 fl oz per acre.	Alternate with a fungicide with a different mode of action. 0 days PHI.
	Reason at 5.5 fl oz per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. Read the label and follow the directions. 14 days PHI.
	Ridomil Gold Bravo at 2 lb per acre. Ridomil Gold MZ at 1.5 to 2.0 lb per acre dry or 2.5 pt per acre flowable.	Do not use Ridomil Gold MZ with pumpkin. 0 days PHI for Ridomil Gold Bravo. 5 days PHI for Ridomil Gold MZ.
	Tanos at 8 oz per acre.	See remarks for Tanos on Alternaria leaf blight. 3 days PHI.
Fusarium fruit rot	Long rotations of noncucurbit crops. Avoid field with a history of the Fusarium problem.	No resistant varieties are available. Fusarium fruit rot is often observed in the fields where other diseases are present.
Fusarium wilt (muskmelon)	Plant resistant muskmelon varieties.	Several resistant varieties are available.
Fusarium wilt (watermelon)	Plant watermelon varieties with resistance.	Rotation with noncucurbit crops will decrease incidence of the wilt.
Gummy stem blight/black rot	3- to 4-year crop rotation. Agri-Fos at 1.25 qt per acre. Amistar at 3.5 to 5.0 oz per acre, Quadris at 11.0 to 15.5 fl oz per acre, or Quadris Opti at 3.2 pt per acre.	Rotate with noncucurbit crops. 0 days PHI. See remarks on Alternaria leaf blight. 1 day PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>CUCURBITS: CUCUMBER, MUSKMELON OR CANTALOUPE, PUMPKIN, SQUASH, WATERMELON (CONT.)</b>		
Gummy stem blight/black rot (cont.)	Cabrio at 12 to 16 oz per acre.	Begin application before disease development. See remarks on Alternaria leaf blight. 0 days PHI.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	0 days PHI.
	Mancozeb (e.g., Dithane, Penncozeb) at various rates.	Do not apply mancozeb products to pumpkins. 5 days PHI.
	Pristine at 12.5 to 18.5 oz per acre.	See remarks on Alternaria leaf blight. 0 days PHI.
Nematodes (muskmelons and watermelons)	Methyl bromide. Sodium methyl dithiocarbamate. Telon II or Telon C-35 Vydate L.	Methyl bromide or sodium methyl dithiocarbamate gives best results when nematode populations are moderate to high. Vydate is used when nematode populations are low to moderate.
Phytophthora and Pythium fruit and root rot, foliar blight	3-year or longer crop rotation. Avoid fields with a history of the diseases on cucurbits, eggplants, peppers, and tomatoes. Acrobat at 6.4 oz per acre or Forum at 6.0 fl oz per acre. Apron XL LS at 6.4 fl oz per 100 lb seed. Ranman at 2.75 fl oz per acre.	No resistant variety is available.  See remarks on downy mildew. 0 days PHI. Only for direct-seeded plants.  Alternate application of Ranman with a fungicide with a different mode of action. 0 days PHI.
Plectosporium blight (pumpkin and squash)	3- to 4-year crop rotation. Management activities that control black rot should also control Plectosporium blight. Cabrio at 12 to 16 oz per acre. Flint at 1.5 to 2.0 oz per acre.	Rotate with noncucurbit crops.  Follow label directions. 0 days PHI. See remarks on downy mildew.
Powdery mildew	Plant resistant varieties wherever possible.  Amistar at 3.5 to 5.0 oz per acre. Quadris at 11.0 to 15.5 fl oz per acre. Quadris Opti at 3.2 pt per acre. Cabrio at 12 to 16 oz per acre.  Flint at 1.5 to 2.0 oz per acre.	Watermelons are generally unaffected. Partially resistant cucumber, muskmelon, and pumpkin varieties are available. See remarks on Alternaria leaf blight. 1 day PHI.  See remarks on Alternaria leaf blight. 0 days PHI. See remarks on downy mildew. 0 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>CUCURBITS: CUCUMBER, MUSKMELON OR CANTALOUPE, PUMPKIN, SQUASH, WATERMELON (CONT.)</b>		
Powdery mildew (cont.)	Nova at 2.5 to 5.0 oz per acre. Pristine at 12.5 to 18.5 oz per acre.  Topsin M 70WP at 0.5 lb per acre or Topsin 4.5 FL at 10 fl oz per acre.	0 days PHI. See remarks on Alternaria leaf blight. 0 days PHI. 1 day PHI.
Scab (cucumber)	Plant resistant varieties.  3- to 4-year crop rotation. Amistar at 3.5 to 5.0 oz per acre. Quadris at 11.0 to 15.5 fl oz per acre. Chlorothalonil (e.g., Bravo, Echo) at various rates. Mancozeb (e.g., Dithane, Pennco- zeb) at labeled rates.	Several cucumber varieties are resis- tant to scab.  See remarks on Alternaria leaf blight. 1 day PHI. 0 days PHI. 5 days PHI.
Virus diseases	Control insect vectors. For squash mosaic virus, plant virus-free seed.	Most viruses are transmitted by aphids. Insect control, however, will not effectively reduce virus incidence in late-season crops. Early planting will reduce virus infection.
<b>EGGPLANT</b>		
Seed rot, damping-off, and seed- ling diseases	Plant hot water-treated seed. Treat the seed with captan or thiram. Avoid fields with a history of Verti- cillium wilt.	
Verticillium wilt	Crop rotation with small grains.  Fumigation with Vapam (37.5 to 75.0 gal. per acre) under plastic mulch.	Long rotations out of solanaceous crops. Allow at least 21 days between ap- plication of fumigant and trans- planting.
<b>HORSERADISH</b>		
Leaf spots ( <i>Alternaria and Cerco- spora</i> )	2-year crop rotation. Amistar at 2 to 5 oz per acre. Quadris at 6.0 to 15.5 fl oz per acre.  Cabrio at 8 to 12 oz per acre.	Rotate with nonhost crops. Do not apply more than once before application of a fungicide with a different mode of action. 0 days PHI. Do not make 2 sequential applica- tions before alternating to a fungi- cide with a different mode of ac- tion. 0 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>HORSERADISH (CONT.)</b>		
White rust	Amistar at 2 to 5 oz per acre. Quadris 6.0 to 15.5 fl oz per acre. Cabrio at 8 to 16 oz per acre.	See remarks on leaf spots. 0 days PHI. See remarks on leaf spots. 0 days PHI.
Bitter rot	Control leafhoppers that spread the disease agent.	Use insecticides.
Turnip mosaic virus	Plant virus-free rootstocks.	
<b>LETTUCE, ENDIVE</b>		
Seed rot, damping-off	Conditions that favor rapid germination limit damping-off. Previcur Flex at various rates for leaf lettuce before or after transplanting in greenhouse. Ridomil Gold EC at 1 to 2 pt per acre.	Avoid excessive irrigation and poorly drained soils. Follow label directions. 2 days PHI. Apply preplant to the soil surface and incorporate. 21 days PHI.
Downy mildew	Plant downy mildew-resistant varieties. Acrobat at 6.4 oz per acre or Forum at 6.0 fl oz per acre. Agri-Fos at 2 qt per acre or Phostrol at 2.5 to 5.0 pt per acre. Aliette at 3 to 5 lb per acre (alone) or 2 to 3 lb per acre when tank-mixed with another fungicide. Amistar at 4 to 5 lb per acre or Quadris at 12.0 to 15.5 fl oz per acre. Copper sulfate at various rates. Previcur Flex at 2 pt per acre. Reason at 5.5 to 8.2 oz per acre.  Tanos at 8 oz per acre.	0 days PHI. 0 days PHI. 3 days PHI.  Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI. Follow label directions. 2 days PHI. Do not make more than 1 application before alternating to a fungicide with a different mode of action. Follow label directions. 2 days PHI. Do not make more than 1 application before alternating to a fungicide with a different mode of action.
Powdery mildew	Amistar at 4 to 5 oz per acre or Quadris at 12.3 to 15.4 fl oz per acre. Switch at 10 to 12 oz per acre.	See remarks on downy mildew. 0 days PHI. Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 7 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>LETTUCE, ENDIVE (CONT.)</b>		
Rhizoctonia bottom rot, Sclerotinia drop	Avoid fields with poorly drained soils and a history of the disease. Amistar at 0.125 to 0.25 oz per 1,000 row ft or Quadris at 0.40 to 0.80 fl oz per 1,000 row ft. Endura at 8 to 11 oz per acre.  Rovral at 1.5 to 2.0 pt per acre for flowable or 1.0 to 1.3 lb per acre for Rovral 75WP.	Follow the directions on the labels. 0 days PHI.  Do not make more than 2 sequential applications before alternating to a fungicide with a different mode of action. 14 days PHI. Follow label directions. 14 days PHI.
<b>MINT (PEPPERMINT AND SPEARMINT)</b>		
Powdery mildew	Amistar at 2 to 5 oz per acre. Quadris at 6.0 to 15.5 fl oz per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI for fresh mint. 7 days PHI for processing mint.
Rust, Septoria leaf spot	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates. Nova at 4 to 5 oz per acre.	Follow label directions. 80 days PHI. For rust only. 30 days PHI.
Verticillium wilt	Use wilt-resistant varieties of peppermint. Rotate plantings after no more than 3 to 4 years.	
<b>OKRA</b>		
Fusarium wilt	Avoid fields with a history of Fusarium wilt. Crop rotation of several years may reduce Fusarium wilt severity.	Plant field to nonhost crops.
<b>ONION, GARLIC, LEEK, CHIVE, SHALLOT</b>		
Alternaria purple blotch and Botrytis leaf blight (all types)	3- to 4-year crop rotation.  Amistar at 2 to 4 oz per acre for purple blotch and 3 to 5 oz per acre for Botrytis leaf blight. Quadris at 6.0 to 12.0 fl oz per acre for purple blotch and 9.0 to 15.5 fl oz per acre for Botrytis leaf blight.  Cabrio at 8 to 12 oz per acre for purple blotch and 12 oz per acre for Botrytis leaf blight.  Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	Rotation out of onions or related vegetables. Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0 days PHI.  Do not apply Cabrio more than twice before alternating to a fungicide with a different mode of action. 7 days PHI. 7 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>ONION, GARLIC, LEEK, CHIVE, SHALLOT</b>		
Alternaria purple blotch and Botrytis leaf blight (all types) (cont.)	Endura at 6.8 oz per acre.	Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 7 days PHI.
	Maneb at 2 to 3 lb per acre or Manex at 1.6 to 2.4 qt per acre.	7 days PHI.
	Pristine at 10.5 to 18.5 oz per acre for purple blotch and 14.5 to 18.5 oz for Botrytis leaf blight.	Do not make more than 2 applications before alternating to a fungicide with a different mode of action.
	Quadris Opti at 1.6 to 3.2 pt per acre.	Purple blotch only. Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI.
	Reason at 5.5 fl oz per acre.	Purple blotch only. Do not apply more than once before alternating to a fungicide with a different mode of action. 7 days PHI.
	Scala at 18 oz per acre (9 oz per acre in tank mixes.) Switch at 11 to 14 oz per acre.	Tank mixes should include broad-spectrum fungicides. 7 days PHI. 7 days PHI.
Alternaria purple blotch and Botrytis leaf blight (dry bulb, garlic only)	Aliette at 2 to 3 lb per acre.	Purple blotch only. 7 days PHI.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	7 days PHI.
	Mancozeb (e.g., Dithane, Manzate, Manex II, Penncozeb) or maneb (e.g., Maneb, Manex) at various rates.	Mancozeb is not labeled for use on pumpkin. 7 days PHI.
	Rovral at 1.0 to 1.5 pt per acre or Rovral WG at $\frac{2}{3}$ to 1.0 lb per acre.	7 days PHI.
Botrytis neck rot	Wind-row plants until neck tissues are dry before storage.	Artificially drying may be necessary (forced heated air at 93° to 95°F for 5 days).
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	7 days PHI.
	Maneb 75DF or Maneb 80WP at 2 to 3 lb per acre or Manex at 1.6 to 2.4 qt per acre.	7 days PHI.
Downy mildew	Acrobat at 6.4 oz per acre or Forum at 6.0 fl oz per acre.	Do not apply more than twice before alternating to a fungicide with a different mode of action. 0 days PHI.
	Agri-Fos at 1.25 qt per acre.	7 days PHI.
	Aliette at 2 to 3 lb per acre.	7 days PHI.
	Amistar at 3 to 5 oz per acre or Quadris at 9.0 to 15.5 fl oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 7 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>ONION, GARLIC, LEEK, CHIVE, SHALLOT</b>		
Downy mildew (cont.)	Cabrio at 12 oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 7 days PHI.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	7 days PHI.
	Mancozeb (e.g., Dithane, Manzate, Manex II, Penncozeb) or maneb (e.g., Manex, Maneb) at various formulations and rates.	7 days PHI.
	Maneb at 2 to 3 lb per acre or Manex at 1.6 to 2.4 qt per acre.	7 days PHI.
	Phostrol at 2.5 to 3.75 pt per acre.	0 days PHI.
	Pristine at 18.5 oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 7 days PHI.
	Quadris Opti at 2.4 to 3.7 pt per acre.	Green bunching onions and leeks only. Do not make more than 1 application before alternating to a fungicide in group II. 14 days PHI.
	Reason at 5.5 fl oz per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. 7 days PHI.
	Ridomil Gold Bravo at 2.0 lb per acre.	7 days PHI.
	Ridomil Gold MZ at 2.5 lb per acre.	5 days PHI.
Fusarium basal rot	Plant Fusarium-resistant varieties.	Elba Globe, Spartan Banner, and Harvestmore are resistant.
<b>PEAS</b>		
Seed rot and seedling damping-off	Plant western-grown seed treated with captan, Dynasty, or thiram and Apron XL LS.	Apply seed treatment just before planting. Follow label directions.
Ascochyta blight	Use pathogen-free seed and a 3-year crop rotation.	Rotate with nonhost crops.
	Amistar at 2 to 5 oz per acre or Quadris at 6.0 to 15.0 fl oz per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	14 days PHI.
	Proline at 4.3 to 5.7 fl oz per acre.	For chickpea. 7 days PHI.
	Quadris Opti at 1.6 to 2.4 pt per acre.	Not for use on cowpea. Do not apply Quadris Opti more than twice before alternating to a fungicide not in group II. 14 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>PEAS (CONT.)</b>		
Asian soybean rust	Headline at 6 to 9 fl oz per acre mixed with an adjuvant and a fungicide from a group other than group II.	Pea and cowpea do not appear to be very susceptible to Asian soybean rust. 21 days PHI.
Fusarium wilt	Plant resistant varieties. Crop rotation for several years.	Rotate with nonhost crops.
Virus diseases	Use virus-free seed. Control aphids effectively.	Several viruses that infect peas are spread by aphids.
<b>PEPPER</b>		
Anthracnose	Use pathogen-free seed / disease-free transplants. Amistar at 2 to 5 oz per acre or Quadris at 6.0 to 15.5 oz per acre. Cabrio at 8.0 to 12 oz per acre. Maneb 75DF or Maneb 80WP at 1.5 to 3.0 lb per acre or Manex at 1.2 to 2.4 qt per acre. Tanos at 8.0 to 10.0 oz per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI. Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 0 days PHI. 7 days PHI. Do not apply more than once before alternating to a fungicide with a different mode of action. 3 days PHI.
Bacterial spot	Use resistant varieties wherever possible. Use pathogen-free seed / disease-free transplants. 2-year crop rotation. Avoid working in fields when plants are wet. Copper products (e.g., Kocide, Champ, Caprofix) are labeled for greenhouse and field use. Combining a copper fungicide with Maneb will enhance effectiveness. Agri-mycin 17 at 200 ppm.	Several races of pathogen exist. Avoid planting pepper or tomato. Follow label directions. Begin application at the 2-leaf stage. Follow the label directions.
Blossom-end rot	Avoid moisture fluctuations. Avoid excessive nitrogen or potassium fertilization, rapid plant growth, and root pruning during cultivation. Maintain soil pH and calcium levels in desired range. Choose less susceptible varieties.	Blossom-end rot is caused by calcium deficiency in the fruit. Wide fluctuation in soil water levels can trigger the disorder.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>PEAS (CONT.)</b>		
Phytophthora blight	Avoid waterlogged root zones.	Planting on raised beds will increase soil drainage.
	Several-year crop rotation.	Rotate to nonhost crops.
	Use resistant varieties.	Several resistant varieties are available.
	Ridomil Gold EC at 1 pt per acre at planting.	Will not be effective in poorly drained fields. 7 days PHI.
	Acrobat at 6.4 oz per acre or Forum at 6.0 fl oz per acre.	Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 0 days PHI.
Powdery mildew	Agri-Fos at 1.5 to 2.0 qt per acre or Phostrol at 1 to 2 qt per acre.	0 days PHI.
	Maneb at 1.5 to 3 lb per acre or Manex at 1.2 to 2.4 qt per acre.	7 days PHI.
	Tanos at 8 to 10 oz per acre.	Tank-mix with an appropriate contact fungicide with a different mode of action. 3 days PHI.
Powdery mildew	Amistar at 2 to 5 oz per acre or Quadris at 6.0 to 15.5 fl oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0 days PHI.
	Cabrio at 8 to 16 oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0 days PHI.
Root-rot nematode	Avoid fields with high populations of nematodes.	
	Methyl bromide or sodium methyl dithiocarbamate or Vydate L.	Methyl bromide and sodium methyl dithiocarbamate give best results when nematode populations are moderate to high. Vydate gives adequate control when nematode populations are low to moderate.
Virus diseases	Grow resistant varieties.	
	Plant disease-free transplants.	
	Eliminate broadleaf weeds within 150 feet of field before crops are established.	Aphids may spread viruses from weeds to pepper plants.
	Oil spray timed with aphid flight periods may prevent virus transmission by aphids.	
	Light-colored and reflective mulches may deter aphids from landing on plants and transmitting the virus.	

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>POTATO</b>		
	Plant only certified seed tubers.	Seed-production fields should be inspected for viral, nematode, and fungal diseases.
	Good sanitation and seed-handling practices reduce losses.	
Seed-piece decay, tuberborne diseases	Plant whole tubers or cut-seed tubers that have been stored under conditions for rapid healing of cut surfaces. Store seed tubers at 40°F during winter. In spring, warm seed to 65° to 70°F for 2 to 3 weeks before cutting.	
Early blight	Plant a cultivar with some resistance to early blight. Avoid stressful conditions (e.g., drought, wetness, soil compaction) in early growth stages. 2- to 3-year crop rotation. Amistar at 2 to 5 oz per acre or Quadris at 6.2 to 12.4 fl oz per acre.  Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates. Endura at 2.5 to 4.5 oz per acre.  Gavel at 1.5 to 2 lb per acre. Gem at 2.9 to 3.8 fl oz per acre.  Headline at 6 to 9 oz per acre.  Mancozeb (e.g., Dithane, Manzate, Penncozeb) at various rates. Maneb or Manex at 0.8 to 1.6 qt per acre for liquid formulations or 1.5 to 2.0 lb per acre for dry formulations. Quadris Opti at 1.6 pt per acre.	Do not rotate with tomato. Do not make more than 1 application before alternating to a fungicide with a different mode of action. 14 days PHI. 7 days PHI.  Do not make more than 2 applications before alternating to a fungicide with a different mode of action. 30 days PHI. 3 days PHI. Do not make more than 1 application before alternating to a fungicide with a different mode of action. 7 days PHI. Do not make more than 1 application before alternating to a fungicide with a different mode of action. 3 days PHI. 14 days PHI. 14 days PHI.  Do not make more than 1 application before alternating to a fungicide not in group II. 14 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>POTATO (CONT.)</b>		
Early blight (cont.)	Reason at 5.5 to 8.2 oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 14 days PHI.
	Rovral at 11 to 21 oz per acre for dry formulations and 1 to 2 pt per acre for liquid formulations.	Follow label directions. 14 days PHI.
	Scala at 7 oz per acre.	Tank-mix with another effective early-blight fungicide. 7 days PHI.
	Super Tin 80WP at 6 to 8 oz per acre.	7 days PHI.
	Tanos at 6 oz per acre.	Follow label directions. 14 days PHI.
Fusarium dry rot	Mertect at 0.42 oz per 2,000 lb of tuber. Treat tubers before going into storage.	Apply uniformly as a fine mist. Avoid bruising at harvest. Cure wounds at 60°F before storing at 40°F. Provide adequate ventilation.
Late blight	Destroy all potato cull piles.	
	Acrobat at 4 to 6.4 oz per acre or Forum at 6.0 fl oz per acre.	4 days PHI.
	Amistar at 4.0 oz per acre or Quadris at 12.0 fl oz per acre.	See remarks on early blight. 14 days PHI.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	7 days PHI.
	Curzate at 3.2 oz per acre.	Use only in combination with a labeled contact fungicide. 14 days PHI.
	Gavel at 1.2 to 2.0 lb per acre.	14 days PHI.
	Gem at 3.8 oz per acre.	See remarks on early blight. 7 days PHI.
	Headline at 6.0 to 12.0 oz per acre.	See remarks on early blight. 3 days PHI.
	Mancozeb (e.g., Dithane, Manzate, Penncozeb) at various rates.	14 days PHI.
	Maneb or Manex at 0.8 to 1.6 qt per acre for liquid formulations or 1.5 to 2.0 lb per acre for dry formulations.	14 days PHI.
	Quadris Opti at 1.6 pt per acre.	See remarks on early blight. 14 days PHI.
	Ranman at 1.4 to 2.75 fl oz per acre.	7 days PHI.
	Reason at 5.5 to 8.2 oz per acre.	See remarks on early blight. 14 days PHI.
	Ridomil Gold Bravo at 2.5 lb per acre or Ridomil Gold MZ at 2.5 lb per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. 14 days PHI.
	Super Tin 80WP at 2.5 to 3.75 oz per acre.	7 days PHI.
Tanos at 6 to 8 oz per acre.	Follow the label directions. 14 days PHI.	

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>POTATO (CONT.)</b>		
Rhizoctonia canker	Avoid heavily infested fields. Plant uncontaminated seed tubers.	
Scab	Plant resistant varieties. 3- to 4-year crop rotation.	Do not apply manure or other organic matter immediately before planting. Avoid excessive liming. Maintain acidic soil pH.
Verticillium wilt	2-year or longer crop rotation.	Rotate with small grains. Control weeds.
Root-knot and lesion nematodes	Methyl bromide, sodium methyl dithiocarbamate, or Vydate L.	Avoid fields with high populations of root-knot or lesion nematodes. Methyl bromide and sodium methyl dithiocarbamate give best results when nematode populations are moderate to high. Vydate gives adequate control when nematode populations are low to moderate.
Virus diseases	Plant only certified seed tubers.  Control aphids and leafhoppers with insecticides.	Practice clean cultivation. Rouge first infected plants.
<b>RHUBARB</b>		
Ascochyta leaf spot	Fertilize in the fall for growth in the spring.	Remove older, yellow leaves or leaves with lesions in the fall.
Crown rot	Use disease-free plants.	Plant in well-drained soil.
<b>SPINACH</b>		
Damping-off	Ridomil Gold EC at 1 to 2 pt per acre.	Apply preplant to the soil surface and incorporate to a depth of 2 inches. 21 days PHI.
Downy mildew and white rust	Actigard at ¾ oz per acre.	7 days PHI.
	Aliette at 3 to 5 lb per acre (alone) or 2 to 3 lb per acre tank-mixed with another fungicide.	3 days PH.
	Agri-Fos at 2 qt per acre or Phostrol at 2.5 to 5.0 pt per acre.	0 days PHI.
	Amistar at 2 to 5 oz per acre for white rust and 4 to 15 oz per acre for downy mildew. Quadris at 6.0 to 15.5 fl oz per acre for white rust and 12.3 to 15.4 fl oz for downy mildew.	Follow label directions. 0 days PHI.
	Copper sulfate at various rates.	Follow label directions.
	Ridomil Gold EC or Ridomil Gold Copper.	Follow label directions. 21 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>SWEET CORN</b>		
Seed rot, seedling blight	Plant seed treated with captan, Dynasty, Protégé, or thiram. Plant in warm, well-drained soil.	Follow label directions.
Anthracnose	Amistar at 3 to 5 oz per acre or Quadris at 9 to 15.5 fl oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 7 days PHI.
Helminthosporium leaf blights	Plant resistant varieties. Amistar at 3 to 5 oz per acre or Quadris at 9.0 to 15.5 fl oz per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 7 days PHI.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	Do not apply to sweet corn that is to be processed. Follow label directions. 14 days PHI.
	Mancozeb (e.g., Dithane, Manzate, Penncozeb) or maneb (Maneb, Manex) at various rates. Quilt at 7 to 14 fl oz per acre.	Follow label directions. 7 days PHI.
	Tilt or Propimax at 2 to 4 fl oz per acre.	Alternate application with a fungicide other than Tilt and fungicides in group II. 14 days PHI. 14 days PHI.
	Rust	Plant rust-resistant hybrids.  Amistar at 2 to 3 oz per acre or Quadris at 6 to 9 fl oz per acre. Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates. Mancozeb (e.g., Dithane, Manzate, Penncozeb) or maneb (e.g., Maneb, Manex) at various rates. Quilt at 10.5 to 14 fl oz per acre.  Tilt or Propimax EC at 4 fl oz per acre.
Smut	Plant less susceptible hybrids. Avoid mechanical damage to corn plants.	Avoid plant stresses that enhance smut infection.
Stewart's wilt	Plant wilt-resistant hybrids. Treat the seed with an effective insecticide to control flea beetles.	Insecticide treatments are more likely to be necessary in seasons following a mild winter.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>SWEET CORN (CONT.)</b>		
Virus diseases (maize dwarf mosaic, chlorotic dwarf, wheat-streak mosaic)	Plant resistant or tolerant varieties. Control Johnsongrass and volunteer wheat.	
<b>SWEET POTATO</b>		
Black rot, root rot, Fusarium wilt, scurf	Plant resistant varieties. Plant pathogen-free seed. 3- to 4-year crop rotation. Prevent bruising tubers and maintain proper storage temperatures. Dip roots or sprouts in Mertect at 8 fl oz per 7.5 gal. water.	Dip in Mertect solution for 2 minutes and plant immediately.
Storage rot	Fumigate storage boxes.	Cure and store only healthy, blemish-free tubers.
<b>TOMATO (FIELD)</b>		
Seed decay and damping-off	Plant pathogen-free seed. Treat seeds in hot water or acidified hot water and then treat with captan or thiram.	Hot-water or acidified hot-water treatment must be carried out carefully because seed germination could be affected.
Anthracnose	3- to 4-year crop rotation. Amistar at 1.6 to 2.0 oz per acre or Quadris at 5.0 to 6.2 fl oz per acre.  Cabrio at 8.0 to 12.0 fl oz per acre.  Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates. Flint at 3 to 4 oz per acre.  Mancozeb (e.g., Dithane, Mancozeb, Penncozeb) or maneb (e.g., Maneb, Manex) at various rates. Quadris Opti at 1.6 pt per acre.  Tanos at 8 oz per acre.  Ziram at 3 to 4 lb per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI. Do not apply more than twice before alternating to a fungicide with a different mode of action. 0 days PHI. 0 days PHI. Do not apply more than once before alternating to a fungicide with a different mode of action. 3 days PHI. 5 days PHI. Do not apply Quadris Opti 21 days after transplanting or 35 days after seeding. Do not apply more than once before alternating to a fungicide with a different mode of action. 0 days PHI. Tanos should be mixed with a contact fungicide with a different mode of action and should be alternated with a fungicide with a different mode of action. 3 days PHI. Not for cherry tomatoes. 7 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>TOMATO (FIELD) (CONT.)</b>		
Bacterial canker	3-year or longer crop rotation.  Sanitize machinery and plant production materials (flats, greenhouse benches, and stakes) with bleach or other appropriate solution. Plant pathogen-free seed/disease-free transplants. Seed treatment with acidified hot water. Tanos at 8 oz per acre.	Rotate to crops other than tomato, potato, pepper, or eggplant.   Follow the protocol carefully.  See remarks on anthracnose. 3 days PHI.
Bacterial spot, bacterial spec	Plant pathogen-free seed/disease-free transplants. 2- to 3-year crop rotation. Agri-mycin at 200 ppm.  Copper compounds (e.g., Champ, Kocide, Cuprofix) at label rates. Actigard at 0.33 to 0.75 oz per acre.  Tanos at 8 oz per acre.	Begin applications at the 2-leaf stage on a 4- to 5-day schedule until transplants are in the fields. Greenhouse rates are different from field rates. Follow label directions. Up to 6 weekly applications. Follow label directions. 14 days PHI. See remarks on anthracnose. 3 days PHI.
Blossom-end rot	Plant tomato varieties less prone to blossom-end rot.	This is a disorder related to calcium deficiency. Blossom-end rot is promoted by variance in available water and excessive vine growth rate. Maintain an even irrigation schedule.
Buckeye rot	3-year crop rotation. Avoid low areas of the field.  Amistar at 1.6 to 2.0 oz per acre or Quadris at 5.0 to 6.2 fl oz per acre. Gavel at 1.5 to 2.0 lb per acre. Quadris Opti at 1.6 pt per acre.  Ridomil Gold EC at 1 pt per acre. Tanos at 8 oz per acre.	Plastic mulch may reduce splash infection. See remarks under anthracnose. 0 days PHI. Follow label directions. 5 days PHI. See remarks on anthracnose. 0 days PHI. Follow label directions. 28 days PHI. See remarks on anthracnose. 3 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>TOMATO (FIELD) (CONT.)</b>		
Early blight, Septoria leaf blight	Plant resistant varieties.	Use wilt-resistant varieties.
	3- to 4-year crop rotation.	
	Amistar at 1.5 to 2.0 oz per acre or Quadris at 5.0 to 6.2 fl oz per acre.	See remarks on anthracnose. 0 days PHI.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	0 days PHI.
	Endura at 2.5 to 3.5 oz per acre.	Early blight only. Do not make more than 2 sequential applications before alternating to a fungicide with a dif- ferent mode of action. 0 days PHI.
	Flint at 2 to 3 oz per acre for early blight and 3 to 4 oz per acre for Septoria leaf blight.	Follow label directions. 3 days PHI.
	Gavel at 1.5 to 2.0 lb per acre.	Follow label directions. 5 days PHI.
	Mancozeb (e.g., Dithane, Manzate, Penncozeb) at various rates.	5 days PHI.
	Quadris Opti at 1.6 pt per acre.	See remarks on anthracnose. 0 days PHI.
	Reason at 5.5 to 8.2 fl oz per acre.	Septoria suppression only. Do not make more than 1 application before alternating to a fungicide with a dif- ferent mode of action. 14 days PHI.
Scala at 7.0 fl oz per acre.	Early blight only. Scala may be used in greenhouses. Use only in tank mixture. Follow label directions. 1 day PHI.	
Tanos at 6 to 8 oz per acre.	See remarks on anthracnose. 3 days PHI.	
Ziram at 3 to 4 lb per acre.	Not for cherry tomatoes. 7 days PHI.	
Botrytis gray mold	Keep greenhouse temperature 70°F or higher and keep relative hu- midity below 90%.	Use ventilation or forced air.
	Lime soil and keep fertility level up.	Calcium to phosphorus ratio of 2 or higher in leaf petiole tissues aids in control.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	Field use only. Follow label directions. 0 days PHI.
	Copper compounds at various rates.	Copper used for control of bacterial diseases will reduce gray mold se- verity.
	Endura at 9.0 to 10.5 oz per acre.	See remarks on early blight. 0 days PHI.
	Scala at 7 fl oz per acre.	See remarks on early blight. 1 day PHI.
Late blight	Acrobat at 6.4 oz per acre or Forum at 6.0 fl oz per acre.	Follow label directions. 4 days PHI.
	Agri-Fos at 1.5 to 2.0 qt per acre.	0 days PHI.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>TOMATO (FIELD) (CONT.)</b>		
Late blight (cont.)	Amistar at 2.0 oz per acre or Quadris at 6.0 fl oz per acre.	See remarks on anthracnose. 0 days PHI.
	Cabrio at 8 to 16 oz per acre.	See remarks on anthracnose. 0 days PHI.
	Chlorothalonil (e.g., Bravo, Echo, Equus) at various rates.	0 days PHI.
	Curzate at 3.2 to 5.0 oz per acre.	Tank-mix with a contact fungicide. 3 days PHI.
	Flint at 4 oz per acre.	Follow label directions. 3 days PHI.
	Gavel at 1.5 to 2.0 lb per acre.	Follow label directions. 5 days PHI.
	Mancozeb (e.g., Dithane, Manzate, Penncozeb) at various rates.	Follow label directions. 5 days PHI.
	Previcur Flex at 0.7 to 1.5 pt per acre.	Tank-mix with a protectant fungicide. 5 days PHI.
	ProPhyt at 4 pt per acre.	0 days PHI.
	Quadris Opti at 1.6 pt per acre.	See remarks on anthracnose. 0 days PHI.
	Ranman at 2.1 to 2.75 fl oz per acre.	0 days PHI.
	Reason at 5.5 to 8.2 fl oz per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. 14 days PHI.
Ridomil: Several formulations are labeled for late blight control.	PHI varies by formulation. Follow label directions.	
Powdery mildew	Amistar at 1.6 to 2.0 oz per acre or Quadris at 5.0 to 6.2 fl oz per acre.	See remarks on anthracnose. 0 days PHI.
	Nova at 2.5 to 4.0 oz per acre.	0 days PHI.
	Quadris Opti at 1.6 pt per acre.	See remarks on anthracnose. 0 days PHI.
Sclerotinia stem rot	Use disease-free transplants.	Avoid fields with a history of stem blight.
Phytophthora blight	Avoid fields with a history of the disease.	The pathogen overwinters as thick-walled oospores in the soil. The spores survive several years.
	Avoid poorly drained fields.	
	Avoid close proximity to pepper or cucurbit fields that sustained Phytophthora blight in the past.	
	Ridomil Gold EC at 4 pt per acre may reduce disease incidence.	Applied to soil at planting.
	Ridomil Gold Bravo may be effective as foliar application.	Follow label directions.
	Application of Chlorothalonil or mancozeb may offer some control of the disease.	Follow label directions.

**Table 3. Recommendations on management for diseases of commercial vegetable crops for 2008 (cont.)**

Vegetable and disease	Treatment	Remarks
<b>TOMATO (FIELD) (CONT.)</b>		
Root-knot nematode	Plant root-knot-resistant varieties wherever available. Avoid fields with high populations of root-knot nematodes. Methyl bromide or sodium methyl dithiocarbamate or Vydate L.	Sample fields prior to planting tomatoes. Methyl bromide or sodium methyl dithiocarbamate gives best results when nematode populations are moderate to high. Vydate gives adequate control when nematode populations are low to moderate.

**AUTHOR**

**Mohammad Babadoost**  
*Department of Crop Sciences*

