



Integrated Pest Management Program

Department of Plant Science and Landscape Architecture
UConn Extension

Selected Fungicides and Bactericides Labeled for Vegetable Bedding Plants and Transplants

Fungicide	Targeted Pest	Labeled Crops	Comments
azoxystrobin (Heritage) 4 hr. REI Group 11	Leaf spots and blights, downy mildew, botrytis blight, powdery mildew (depending upon crop, see label).	Cole crops, bulb, cucurbits, leafy, and fruiting vegetable transplants.	Preventive and curative broad-spectrum fungicide. •
azoxystrobin & benzovindiflupyr (Mural) 12 hr. REI Group 11 and 7	Leaf spots and blights, downy mildew, powdery mildew, rhizoctonia stem rot (depending upon crop, see label).	Cucurbit and fruiting vegetable transplants grown for resale to consumers.	A broad-spectrum combination fungicide for foliar applications with translaminar activity with preventive, systemic and curative properties.
<i>Bacillus amyloliquefaciens</i> D747 (Triathlon BA) 4 hr. REI OMRI-certified product Group BM02	Fungal & bacterial leaf spots and blights, downy mildew, powdery mildew, damping-off (<i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> , <i>Phytophthora</i>) (depending upon crops, see labels).	Cole crops, bulb, cucurbit, fruiting, and leafy vegetable transplants.	Broad-spectrum, preventative biological fungicide. Begin applications when conditions in the greenhouse favor disease development.
<i>Bacillus amyloliquefaciens</i> F727 (Stargus) 4 hr. REI OMRI-certified product Group BM02	Bacterial spot & blights, botrytis blight, late blight, damping-off and root rots (<i>Fusarium</i> , <i>Phytophthora</i> , <i>Pythium</i> , <i>Rhizoctonia</i>), downy mildew (depending upon crops, see labels).	Bulb, cucurbit, fruiting, cole leafy and leafy vegetable transplants.	Broad-spectrum, preventative biological fungicide/bactericide for growing media or foliar applications. Activates ISR (induced systemic resistance).
<i>Bacillus subtilis</i> QST 713 (CEASE) 4 hr. REI OMRI-certified product Group BM02	Fungal and bacterial leaf spots, powdery mildew, <i>Botrytis</i> blight downy mildew.	Cole crops, bulb, cucurbit, leafy and fruiting vegetable transplants.	Broad-spectrum, preventative biological fungicide/bactericide. Begin applications when conditions in the greenhouse favor disease development.

<i>Bacillus amyloliquefaciens</i> ENV503 (Bella Trove Companion Maxx WP) 4 hr. REI Group BM02	Damping-off fungi, root rots, leaf spots, (fungal and bacterial), powdery mildew.	Vegetable transplants in the greenhouse.	Preventative biological fungicide/bactericide for control and suppression of soil and foliar diseases. Activates ISR (induced systemic resistance).
basic copper sulfate (Cuprofix Ultra 40 Disperss) (Cuproxat) 24/48 hr. REI Group M01	Leaf spots and blights, downy mildew, bacterial spot and blight, late blight on tomatoes (depending upon the crop, see label).	Cucumber, eggplant, pepper, tomato transplants.	Preventative contact fungicide/bactericide. Crops grown in the greenhouse may be more sensitive to copper injury so the user should determine plant sensitivity. Observe for 7 to 10 days for symptoms of injury.
boscalid & pyraclostrobin (Pageant Intrinsic) 12 hr. REI Group 7 and 11	Leaf spots and blights, powdery mildew, damping-off, crown and basal rots, downy mildew, Botrytis	Specified vegetable transplants for home consumer market.	Preventive, broad-spectrum fungicide. Pyraclostrobin has local systemic activity and translaminar activity.
<i>Clonosachy rosea</i> J1446 (LALSTOP G-46) 4 hr. REI OMRI-certified product Group BM02	Damping-off, root and stem rots (<i>Alternaria</i> , <i>Fusarium</i> , <i>Pythium</i> , <i>Phytophthora</i> , <i>Rhizoctonia</i> , and others), powdery mildew, botrytis.	Bulb, cucurbit, fruiting, leafy, brassica leafy vegetable transplants.	Preventive biological fungicide that can be incorporated into the growing media or applied as a drench or spray.
copper hydroxide Kalmor 48 hr. REI OMRI-certified product Group M01	Bacterial spot (pepper), angular leaf spot & downy mildew (cucumber), bacterial and fungal leaf spots and blights (tomato).	Cucumber, eggplant, pepper, tomato transplants.	Protectant contact fungicide/bactericide. See label for plant safety information.
copper oxychloride & copper hydroxide (Badge X2) OMRI-certified product (Badge SC) 24 hr. REI Group M01	Fungal & bacterial spots, and blights, downy mildew (depending upon crop, see labels)	Cucumber, eggplant, pepper, tomato transplants.	Contact bactericides/fungicides. Badge X2 is a low load dry copper formulation that is a mixture of two high purity copper salts: copper oxychloride and copper hydroxide. Badge® SC is a liquid formulation. See labels for plant safety information.

copper octanoate (Camelot O) (Grotto) 4 hr. REI OMRI-certified products Group M01	Bacterial & fungal leaf spots, powdery mildew, downy mildew, early blight, late blight, and others (depending upon crop, see labels).	Cole crops, cucurbit, lettuce, onion, tomato, eggplant, pepper transplants.	Contact fungicides/bactericides. See label for plant safety information.
copper sulfate pentahydrate (Phyton 35) 24/48 hr. REI Group M01	Fungal and bacterial leaf spots, downy mildew, powdery mildew, <i>Botrytis</i> blight, and late blight on tomatoes.	Cole crops, cucurbit, eggplant, pepper, and tomato transplants.	Systemic, preventive, and curative bactericide/ fungicide. Thorough coverage needed. See label for plant safety information.
cyazofamid (Segway O) 12 hr. REI Group 21	Pythium damping-off on tomato and pepper transplants, Phytophthora blight, crown, and root rot on pepper transplants.	Tomato and pepper greenhouse transplants.	Locally systemic fungicide. Apply as a drench.
cyprodinil & fludioxonil (Palladium) 12 hr. REI Group 9 & 12	Damping-off, crown rot (<i>Phytophthora spp.</i>), downy mildew on herbs	Vegetable transplants grown for retail sale to consumers including cole crops, cucurbits, and fruiting vegetables.	Combination of a protectant fungicides with contact and systemic activity.
difenoconazole & pydiflumetofen (Postiva) 12 hr. REI Group 3 & 7	Cucurbit vegetables: leaf spots and blights, powdery mildew. Tomatoes: early blight, Septoria leaf spot, powdery mildew.	Cucurbit and fruiting vegetables for retail sale to consumers.	Broad spectrum, preventive and systemic fungicides.
fenhexamid (Decree 50 WDG) 12 hr. REI Group 17	Botrytis blight	Tomatoes, cucumber, leafy greens (except spinach) transplants.	Preventative translaminar fungicide. .
fludioxonil (Spirato GHN) 12 hr. REI Group 12	Leaf blight and spots, powdery mildew, botrytis blight, (depending upon crop, see label).	Cucurbit, cole leafy, leafy, and fruiting vegetable transplants.	Protectant fungicide for certain vegetable seedlings and transplants.
<i>Gliocladium virens</i> GL-21 (SoilGard) 4 hr. REI	Damping-off: <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Sclerotium</i> , <i>Phytophthora</i> and <i>Fusarium</i>	Vegetable transplants.	Preventive biological fungicide.

OMRI certified product Group BM02			
hydrogen peroxide & peroxyacetic acid (ZeroTol 2.0) 1 hr. REI (spray)	Downy mildew, powdery mildew, leaf spots and blights.	Cucurbit, fruiting, and leafy vegetable transplants.	Contact fungicide. Strong oxidizing agent. See label for plant safety information.
Hydrogen peroxide & hydrogen dioxide (PERPose Plus) 0/1 hr. REI OMRI approved product	Bacterial leaf spot, powdery mildew, downy mildew, Botrytis Blight.	Vegetable crops in greenhouses.	Works by contact. Strong oxidizing agent. Do not apply in dry, extremely hot conditions. Do not combine with any other pesticide or fertilizer.
insecticidal soap: potassium salts of fatty acids (Kopa Insecticidal Soap) (M-Pede) 12 hr. REI OMRI-certified products	Powdery Mildew	Cucurbit, fruiting, and leafy vegetable transplants (see labels).	Contact fungicides. Short residual activity. See labels for plant safety information.
mancozeb (Protect DF) 24 hr. REI Group MO3	Anthrachnose, fungal leaf spots and blights, downy mildew (depending upon crop, see label).	Cucumber, melon, squash, and tomato transplants.	Contact, protectant fungicide.
mandipropamid (Micora) 4 hr. REI Group 40	Downy mildews, Phytophthora blight (suppression), late blight on tomatoes (depending upon crop, see label).	Basil and leafy and vegetable transplants grown in an enclosed greenhouse with permanent flooring for resale to consumers.	Contact, protectant and translaminar fungicide for vegetable and basil transplants for sale to consumers.
mefenoxam (Subdue MAXX) 48 hr. REI Group 4	Basal stem rot (<i>Phyophthora</i> spp.) Damping-off (<i>Pythium</i>) Downy Mildew on Cole crops.	Cole crops, bulb, cucurbit, leafy and fruiting vegetable transplants grown for retail sales to consumers.	Systemic fungicide.
mineral Oil (SuffOil- X) 4 hr. REI OMRI-certified product	Powdery mildew	Cucumber, eggplant, melon, pepper, pumpkin, squash, and tomato transplants.	Contact fungicide. See label for plant safety information.

pentachloronitrobenzene PCNB (Terraclor 400) 12 hr. REI Group 14	Root and stem rot, damping off (<i>Rhizoctonia solani</i> , <i>Pellicularia filamentosa</i>).	Vegetable bedding plants (broccoli, Brussel sprouts, cabbage, cauliflower, pepper, and tomato).	Protectant contact fungicide. Apply as a soil drench.
phosphorus acid (Fosphite) 4 hr. REI Group P07	Anthrachnose, bacterial leaf spot downy mildew, powdery mildew, root rots (<i>Phytophthora</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Rhizoctonia</i>).	Brassica, cucurbit, and leafy vegetable transplants.	Systemic fungicide. See label for plant safety information.
phosphorus acid (Kphite 7LP) 4 hr. REI Group PO7	Anthrachnose, downy mildew, powdery mildew, bacterial leaf spots, and root rots (<i>Phytophthora</i> , <i>Pythium</i> , <i>Rhizoctonia</i> , and <i>Fusarium</i>).	Brassica, cucurbit, and miscellaneous food crops.	Systemic fungicide. See label for plant safety information.
phosphorous acid & hydrogen peroxide (OxiPhos) 4 hr. REI	Downy mildew, powdery mildew, black rot (cole crops), leaf spots and blights (depending upon crops, see label)	Bulb, cole, cucurbit, fruiting, and leafy vegetable transplants.	Strong oxidizing agent. Do not use at higher than labeled rate as leaf burn may result.
polyoxin D zinc salt (Affirm WDG) 4 hr. REI Group 19	Cucurbit vegetables: Powdery mildew, botrytis, <i>Corynespora</i> leaf spot, early blight Fruiting vegetables: Powdery mildew, <i>Botrytis</i> , early blight, suppression of anthracnose.	Cucurbit and fruiting vegetables (eggplant, pepper, tomato) transplants.	Preventative and curative fungicide. Active ingredient (polyxin) is a natural antibiotic and fermentation product of a soil bacterium.
potassium bicarbonate (Milstop) 1 hr. REI (Kaligreen) 4 hr. REI OMRI-certified products	Powdery mildew, botrytis, and others.	Broccoli, Brussel sprouts, cabbage, cantaloupe, cauliflower, celery, cucumber, eggplant, lettuce, okra, pepper, tomato, and squash transplants.	Contact, eradicant fungicides. Through coverage essential. Potassium bicarbonate disrupts the potassium ion balance in the fungus cell, causing the cell walls to collapse.
<i>Reynoutria sachalinensis</i> extract (Regalia GC) 4 hr. REI OMRI-certified product Group P05	Powdery mildew, downy mildew, bacterial leaf spot, early & late blight, <i>Alternaria</i> leaf spot, botrytis blight, damping-off (depends upon crop, see label)	Bulb, leafy cole, cucurbit, leafy and fruiting vegetable transplants.	Preventive, biological fungicide with translaminar activity. Plant activator. Formulation of an extract from giant knotweed. Use preventatively to increase the natural defense system of plants.

<p><i>Streptomyces</i> K 61 (Mycostop) 4 hr. REI OMRI-certified product Group BM02</p>	<p><i>Alternaria</i>, Botrytis blight (suppression), damping-off and root rots.</p>	<p>Many vegetable transplants. Do not treat melon seeds.</p>	<p>Preventative biological fungicide. Contains a beneficial bacterium. Apply as a soil spray or drench. Repeat applications may be needed.</p>
<p><i>Streptomyces lydicus</i> WYEC 108 (Actinovate AG) 4 hr. REI (spray) OMRI-certified product</p>	<p>Suppression of root rots (<i>Fusarium</i>, <i>Rhizoctonia</i>, <i>Pythium</i>, <i>Phytophthora</i>), downy mildew, powdery mildew, Botrytis blight.</p>	<p>Cole crop, bulb, cucurbit, fruiting, and leafy vegetable transplants.</p>	<p>Preventative biological fungicide for suppression of root rot diseases and foliar pathogens.</p>
<p>Streptomycin sulfate (Agri-mycin 50) 12 hr. REI Group 25</p>	<p>Bacterial spot and speck.</p>	<p>Tomatoes & pepper transplants.</p>	<p>Xylem mobile fungicide. Repeated applications can result in resistant bacteria.</p>
<p>Sulfur (Microthiol Disperss) 24 hr. REI Group M02 OMRI-certified product</p>	<p>Powdery mildew.</p>	<p>Many vegetables.</p>	<p>Contact fungicide. Crops grown in greenhouses may be more sensitive to sulfur injury, so trial first with the lowest label rate. See label for plant safety information. Do not use within two weeks of an oil treatment.</p>
<p><i>Swinglea glutinosa</i> extract (EcoSwing) 4 hr. REI OMRI-certified product Group BM01</p>	<p>Botrytis blight, powdery mildew, Basil downy mildew.</p>	<p>Bulb, cole crops, cucurbit, fruiting, and leafy vegetables.</p>	<p>Preventive biological fungicide. Activates ISR (induced systemic resistance). Thorough coverage is needed.</p>
<p>Thiophanate methyl (3336 F) (3336 EG) 12 hr. REI Group 1</p>	<p>Anthracoze, botrytis blight, powdery mildew.</p>	<p>Cucurbit and bean vegetable transplants.</p>	<p>Xylem mobile systemic fungicide. Resistant populations of <i>Botrytis</i> are common in the greenhouse.</p>

Thyme oil (Guarda) 0 hr. REI	Botryts, downy mildew, powdery mildew, fungal and bacterial leaf spots, damping-off.	Bulb, cole crops, cucurbits, fruiting, and leafy vegetables.	Stabilized thyme oil extract. Contact fungicide that disrupts cell membranes with some translaminar activity...
<i>Trichoderma asperellum</i> (ICC 012) & <i>Trichoderma gamsii</i> (ICC 080) (Obtego) 4 hr. REI OMRI-certified product Group BM02	Root rots (<i>Phytophthora</i> , <i>Pythium</i> , <i>Rhizoctonia</i> and <i>Thielaviopsis</i>)	Cucurbits, fruiting, and leafy vegetable transplants.	Preventive biological fungicide.
<i>Trichoderma harzianum</i> Strain T-22 (RootShield Granules) (RootShield WP) 4 hr. REI Group BM02 OMRI-certified product	Root rots (<i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> , and <i>Thielaviopsis</i>)	Many different vegetable transplants (see label).	Preventative biological fungicide. Apply as a soil drench (RootShield WP) or incorporate into greenhouse planting mix (RootShield Granules).
<i>Trichoderma harzianum</i> T-22 & <i>Trichoderma virens</i> G-41 (RootShield Plus Granules) (RootShield Plus WP) 4 hr. REI Group BM02 OMRI-certified products	Root rots (<i>Pythium</i> , <i>Phytophthora</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> and <i>Thielaviopsis</i>)	Bulb, cucurbit, fruiting, leafy and Cole crop leafy vegetable transplants.	Preventative biological fungicides. Apply as a soil drench (RootShield Plus WP) or incorporate into greenhouse planting mix (RootShield Plus Granules).
Triflumizole (Terraquard SC) 12 hr. REI Group 3	Powdery mildew	Cucumber and tomato transplants.	Protective fungicide with curative action.
<i>Ulocladium oudemansii</i> U3 Strain (BotryStop) 4 hr. REI Group BM02 OMRI-certified product	Botrytis Blight	Bulb, cucurbit, and fruiting vegetable transplants.	Preventative biological fungicide. Thorough coverage needed.

If any information in this table is inconsistent with the label, then follow the label.

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OMRI-certified product: determined by the Organic Materials Review Institute (OMRI) (<https://www.omri.org/>) to be suitable for use in certified organic production.

Fungicides are grouped by their mode of action (MoA) and each MoA group is assigned a [Fungicide Resistance Action Committee](#) (FRAC) code. Numbers and letters are used to distinguish the fungicide groups according to their cross-resistance behavior. The letters refer to P = host defense inducers, M = multi-site inhibitors. Most systemic fungicides (that are absorbed into plant tissues) are specific in their mode of action. Protectant fungicides are less likely to develop resistance problems as they have multi-site modes of action (M). To prevent the development of resistance, alternative applications among different FRAC codes with different modes of action and incorporate biological fungicides into your disease management plan. See <http://www.frac.info/>

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