

Fruiting Vegetables

Transplants

Eggplant, peppers, and tomatoes are typically started as transplants in greenhouses or artificially lit growing rooms — refer to Transplant Production, page 23.

For rapid seed germination, maintain the temperature of potting mix at 85°F. Grow eggplant seedlings between 70°F and 80°F during the day and 65°F and 70°F at night, and tomatoes and peppers between 65°F and 75°F during the day and 60°F and 65°F at night.

Pepper and eggplant seedlings should be ready for the field in six to eight weeks and tomatoes in five to seven weeks.

Before transplanting, harden seedlings by exposing them for a few days to higher light and temperatures between 60°F and 65°F. Set tomatoes in the field after the danger of frost has passed. For peppers and eggplant, wait until soil has warmed and average daily temperature reach 65°F.

Production Systems for Fresh Market

Fresh market eggplant, peppers, and tomatoes are often grown on raised beds covered with plastic mulch to promote earliness — see Using Plastic Mulch, page 27. Drip irrigation beneath the mulch provides a uniform water supply and can deliver fertilizer during the growing season. Typical beds are 30 inches across, 4 to 6 inches high, and centered 5 to 6 feet apart.

Tomatoes and eggplant: Space 1.5 to 2.5 feet apart in the row.

Peppers: Space 1 to 1.5 feet apart. Or, plant a double row of peppers with 1.5 feet between rows and 1 foot between plants.

Bare ground culture: Space rows 2.5 to 5 feet apart. *Tomatoes and eggplants:* space 1.5 to 3 feet apart in the row. *Peppers:* space 1 to 1.5 feet apart in the row.

Tomatoes may be left to grow over the ground or may be supported by cages, stakes, strings, or a trellis-weave system. Supported tomatoes produce higher quality fruit than unsupported plants and marketable yield is usually much greater. Tomatoes supported by stakes or trellises are sometimes pruned, which involves removing several or all of the branches up to the branch just below the first flower cluster when the branches are a few inches long. For tomatoes supported by vertical string, only one or

two stems are allowed to grow and so pruning continues throughout the season to remove branches that develop above the first flower cluster. Pruned plants produce larger fruit than unpruned plants, but the quantity of fruit is reduced.

Peppers and eggplant may benefit from staking if plants tend to break, lean, or lodge. If peppers are in a double row on a bed, a row of short stakes strung with twine along the outside of each row will support the plants. Peppers and eggplant may also be supported using a trellis-weave system.

Production Systems for Processing Tomatoes

Select row spacing and bed formation that will work with available harvesting equipment. Double rows 16 to 20 inches apart on 5 to 6 feet centers are common, with plants 1 to 2 feet apart in the row.

Ethephon applications accelerate and concentrate fruit ripening, thus facilitating once-over machine harvesting of processing tomatoes.

For Machine Harvest: Apply 3.25 pts. Ethrel® or Cepha® in 5 to 70 gallons of water per acre as a spray over the entire plant when 10 to 30 percent of fruits are ripe. Harvest 15 to 21 days after treatment for optimum ripe fruit accumulation.

Fertilizing

Lime: To maintain a soil pH of 6.0 to 6.8.

Fresh Market Eggplant, Peppers, and Tomatoes: Before planting, apply 30 pounds N per acre, 0 to 240 pounds per acre P_2O_5 , and 0 to 300 pounds K_2O per acre based on soil test results and recommendations from your state. At transplanting, apply a starter solution containing N and P. If the transplant flat received a heavy fertilizer feeding just prior to setting, eliminate the starter solution. Three to four weeks after transplanting, and then six to eight weeks after transplanting, apply 30 to 40 pounds N per acre as a sidedressing. Sidedressing may be replaced by supplying N through the drip irrigation system at about 1 pound N per acre per day. Reduce the amount of fertilizer N applied by the value of N credits from green manures, legume crops grown in the previous year, compost and animal manures, and

soils with more than 3 percent organic matter. The total amount of N from fertilizer (including starter) and other credits should be 100 to 120 pounds per acre. K_2O may also be supplied through drip irrigation at a rate of 1 to 1.5 pounds per acre per day for peppers and eggplant, and 1.5 to 2.5 pounds per acre per day for tomatoes. Reduce the amount of K_2O applied before planting by the amount that will be supplied through drip irrigation.

Processing Tomatoes: Before planting, apply 40 pounds N per acre, and P_2O_5 and K_2O based on soil test results and recommendations from your state. At transplanting, apply a starter solution containing N and P. Four to five weeks after transplanting or after first fruit, set sidedress with 40 to 50 pounds N per acre. Reduce the amount of fertilizer N applied by the amount of N credits from green manures, legume crops grown in the previous year, compost and animal manures, and soils with more than 3 percent organic matter. The total amount of N from fertilizer (including starter) and other credits should be 80 to 100 pounds per acre.

Calcium: Tomatoes and peppers are susceptible to calcium deficiency even when adequate calcium levels are present in the soil. Deficiency results in a disorder called “blossom end rot.” It often occurs under conditions of inadequate or excessive watering and/or excessive N fertilization with an ammonium source. Where the soil pH has been adjusted to 6.0 or higher, additional soil-applied calcium does not correct the disorder.

Environmental Factors

There are a number of tomato problems related to environmental and nutrient factors.

Sunscald: Fruit exposed to the sun may overheat and develop sunscald. The affected area turns white and does not ripen. The tissue may shrivel and sink in. It is most common when foliage does not shade fruit exposed to hot afternoon sun. Damage is usually confined to the area of the fruit with greatest exposure to the sun. Tomato variety, mineral nutrition, staking and pruning methods, and disease pressure can all influence the amount of foliage cover. This disorder also is observed on peppers and fruit of other vegetable crops.

Radial and concentric cracks: Rapidly growing fruit and fruit exposed to the sun tend to crack more readily. Cracking is more severe under hot, dry conditions followed by rainfall. To defend against growth cracks, select crack-resistant cultivars and carefully manage water availability (through irrigation management and the use of plastic mulch).

Zipper scars: These may be caused when the blossom sticks to the developing fruit. Zipper scars are especially common during cool weather. To avoid this problem, select resistant varieties and maintain proper greenhouse temperatures.

Catfacing: Flower buds that have been exposed to cold temperatures very early in development have shown a higher proportion of catfaced fruit. Large-fruited varieties tend to be more susceptible to this disorder. In some heirloom varieties, nearly all fruit is catfaced so it does not detract from the fruit's marketability. Variety selection is the most practical way to limit this problem. Exposure to some herbicides (2, 4-D or dicamba) can lead to similar fruit deformation.

Micro-cracks or rain checks: Very small cracks in the epidermis (called micro-cracks or rain checks) sometimes develop on fruit shoulders under highly humid conditions. Rain check is often more severe on fruit that has been exposed due to poor leaf cover. To minimize the problem, maintain healthy foliage and select varieties with good foliage cover.

Pesticide Use in Greenhouses

Before using any pesticide, always read the product label for mention of greenhouse restrictions. See Selected Information About Recommended Fungicides (page 79), Selected Information About Recommended Herbicides (page 69), and Selected Information About Recommended Insecticides (page 54).

Disease Control

Recommended Controls

Anthracnose of Fruiting Vegetables - *Colletotrichum Fungus*

Symptoms usually occur on ripe or over-ripe fruit. Winter/off-season: Rotate crops at least 2-3 years and practice fall tillage. Fruit set: Begin fungicide applications at or shortly before fruit set. Harvest: Inspect fruit for lesions.

Serenade ASO® (*Bacillus subtilis* strain QST-713)

Pepper, Tomato 2-4 qts. per acre. Substitute up to two fungicide applications in program. REI: 4-hour. PHI: 0-day. *OMRI-listed.*

Serenade Opti® (*Bacillus subtilis* strain QST-713)

Pepper, Tomato 14-20 oz. per acre. May help bacterial spot management when copper-resistant strains are present. REI: 4-hour. PHI: 0-day. *OMRI-listed.*

Aprovia Top® (*difenoconazole, benzovindiflupyr*

(solatenol)) *Eggplant, Pepper, Tomato* 10.5-13.5 fl. oz. per acre. Use of a spreader sticker is recommended. REI: 12-hour. PHI: 0-day.

Cabrio EG® (*pyraclostrobin*) *Pepper, Tomato* 8-12 oz. per acre. REI: 12-hour. PHI: 0-day.

chlorothalonil formulations (chlorothalonil) *Pepper, Tomato* See label. Several chlorothalonil formulations (e.g., Bravo®, Echo®, and Equus®) are labeled for use at various rates. REI: 12-hour. PHI: 0-day.

Fontelis® (penthiopyrad) *Pepper, Tomato* 24 fl. oz. per acre. See label for greenhouse uses. Suppression only for anthracnose. REI: 12-hour. PHI: 0-day.

Inspire Super® (difenoconazole, cyprodinil) *Pepper, Tomato* 16-20 fl. oz. per acre. Do not apply to small fruited varieties such as cherry tomato. REI: 12-hour. PHI: 0-day.

Luna Sensation® (fluopyram, trifloxystrobin) *Pepper, Tomato* 7.6 fl. oz. per acre. Suppression only for anthracnose and white mold. REI: 12-hour. PHI: 3-day.

mancozeb formulations (mancozeb) *Pepper, Tomato* See label. Several mancozeb formulations (e.g., Dithane®, Manzate®, Penncozeb®, Roper®) are labeled for use at various rates. REI: 24-hour. PHI: 5-day.

Orondis Opti Premix® (oxathiapiprolin, chlorothalonil) *Pepper, Tomato* 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day.

Priaxor® (fluxapyroxad, pyraclostrobin) *Pepper, Tomato* 4-8 fl. oz. per acre. Suppression only for Botrytis gray mold and white mold. REI: 12-hour. PHI: 0-day.

Quadris 2.08SC® (azoxystrobin) *Pepper, Tomato* 5-6.2 fl. oz. per acre. REI: 4-hour. PHI: 0-day.

Quadris Opti® (azoxystrobin, chlorothalonil) *Pepper, Tomato* 1.6 pts. per acre. REI: 12-hour. PHI: 0-day.

Quadris Top® (azoxystrobin, difenoconazole) *Pepper, Tomato* 8-14 fl. oz. per acre. REI: 12-hour. PHI: 0-day.

Revus Top® (mandipropamid, difenoconazole) *Pepper, Tomato* 5.5-7 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day.

Tanos® (famoxadone, cymoxanil) *Pepper, Tomato* 8 oz. per acre. For late blight, tank-mix with a contact fungicide with a different mode of action. Disease suppression for bacterial diseases. REI: 12-hour. PHI: 3-day.

Bacterial Canker of Tomatoes - *Clavibacter Bacteria*

The bacterium becomes systemic in the plant causing wilt and leaf/fruit/stem lesions.

Use disease-free seed and transplants. The transplant facility treatments listed for Bacterial Spot/Speck (below)

will help reduce the severity of bacterial canker. However, copper applications in the field are generally ineffective for controlling canker.

Fields with a history of canker should be planted to crops other than tomato, potato, pepper, or eggplant for at least 3 years. Sanitize machinery, seedlings, and plant production materials (transplant trays, greenhouse benches, and wooden stakes) with a disinfectant such as 10% chlorine bleach or a quaternary ammonium compound solution. Avoid working in wet fields.

Winter/off-season: Rotate crops at least 3 years and practice fall tillage. The pathogen is seedborne. Consider seed treatment with hot water or dilute chlorine bleach (see Seed Treatments, page 26).

Greenhouse: Inspect seedlings for disease and apply one or two fixed copper product applications. Tank-mix copper product with mancozeb (see bacterial spot/speck below).

Planting: Do not plant seedlings that have symptoms of bacterial canker.

Fruit Set: Inspect plants for symptoms of bacterial canker.

Harvest: Inspect fruit. Avoid saving seed.

Tanos® (famoxadone, cymoxanil) *Pepper, Tomato* 8 oz. per acre. For late blight, tank-mix with a contact fungicide with a different mode of action. Disease suppression for bacterial diseases. REI: 12-hour. PHI: 3-day.

Bacterial Speck of Tomatoes - *Pseudomonas Bacteria*

Regalia® (*Reynoutria sachalinensis*) *Pepper, Tomato* 1-4 qts. per acre. Use in a program with copper products. REI: 4-hour. PHI: 0-day. *OMRI-listed.*

Serenade ASO® (*Bacillus subtilis* strain QST-713) *Pepper, Tomato* 2-4 qts. per acre. Substitute up to two fungicide applications in program. REI: 4-hour. PHI: 0-day. *OMRI-listed.*

Serenade Opti® (*Bacillus subtilis* strain QST-713) *Pepper, Tomato* 14-20 oz. per acre. May help bacterial spot management when copper-resistant strains are present. REI: 4-hour. PHI: 0-day. *OMRI-listed.*

OMRI-listed indicates that the product is listed by the Organic Materials Review Institute (OMRI.org) and therefore may be acceptable for use in organic production. Check with your certifier before use.

copper formulations (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Pepper, Tomato* See label. Several formulations of copper products e.g., Badge®, Champ®, Cueva®, Cuprofix®, Kentan®, Kocide®, Nordox®) are labeled for use. Copper-resistant strains are common in the Midwest. Mancozeb products (e.g., Dithane®, Manzate®, Penncozeb®, Roper®) when tank-mixed with copper products, allow more copper to become available on the leaf surface and so may help manage copper-resistant bacterial strains. REI: see label. PHI: 0-day.

Tanos® (famoxadone, cymoxanil) *Pepper, Tomato* 8 oz. per acre. For late blight, tank-mix with a contact fungicide with a different mode of action. Disease suppression for bacterial diseases. REI: 12-hour. PHI: 3-day.

Bacterial Spot of Tomatoes/Peppers - Xanthomonas Bacteria

Lesions of this disease can be found on leaves, stems, and fruit. Use disease-free seed and/or transplants.

Copper Resistance: Strains of the bacterium that cause bacterial spot on tomato that are resistant to copper products are common in the Midwest. Actigard®, Agri-mycin 17®, mancozeb products, Tanos®, and Serenade Max® used as labeled may help manage copper-resistant strains.

Winter/Off-season: Rotate crops at least 2 years and practice fall tillage. Purchase seed tested for these diseases. Consider seed treatment with hot water or dilute Clorox (see Seed Treatments, page 26).

Greenhouse: Scout and apply fixed copper alternated with streptomycin (Agri-mycin 17®, Firewall 17WP®, Streptrol®).

Planting: Do not plant seedlings with symptoms of bacterial spot/speck. Apply fixed copper product tank-mixed with mancozeb on 7-10 day schedule, depending on disease pressure, beginning within 1 week after transplanting.

Harvest: Inspect fruit. Avoid saving seed.

Regalia® (Reynoutria sachalinensis) *Pepper, Tomato* 1-4 qts. per acre. Use in a program with copper products. REI: 4-hour. PHI: 0-day. *OMRI-listed.*

Serenade ASO® (Bacillus subtilis strain QST-713) *Pepper, Tomato* 2-4 qts. per acre. Substitute up to two fungicide applications in program. REI: 4-hour. PHI: 0-day. *OMRI-listed.*

Serenade Opti® (Bacillus subtilis strain QST-713) *Pepper, Tomato* 14-20 oz. per acre. May help bacterial spot management when copper-resistant strains are present. REI: 4-hour. PHI: 0-day. *OMRI-listed.*

Actigard® (acibenzolar-s-methyl) *Pepper, Tomato* 0.3-0.75 oz. per acre. Begin season with lower rates and increase as plant canopy increases. Do not exceed 6 oz. per season. REI: 12-hour. PHI: 14-day.

copper formulations (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Pepper, Tomato* See label. Several formulations of copper products e.g., Badge®, Champ®, Cueva®, Cuprofix®, Kentan®, Kocide®, Nordox®) are labeled for use. Copper-resistant strains are common in the Midwest. Mancozeb products (e.g., Dithane®, Manzate®, Penncozeb®, Roper®) when tank-mixed with copper products, allow more copper to become available on the leaf surface and so may help manage copper-resistant bacterial strains. REI: see label. PHI: 0-day.

streptomycin formulations (Streptomycin sulfate) *Pepper, Tomato* See label. Agrimycin 17®, Firewall 17WP®, and Streptrol® are labeled at various rates. Apply one or two times to seedlings, alternated with a fixed copper product compound (see below) beginning at the two-leaf stage. Not labeled for use after transplanting (greenhouse only). REI: 12-hour. PHI: NA

Tanos® (famoxadone, cymoxanil) *Pepper, Tomato* 8 oz. per acre. For late blight, tank-mix with a contact fungicide with a different mode of action. Disease suppression for bacterial diseases. REI: 12-hour. PHI: 3-day.

Buckeye Rot of Tomatoes - Phytophthora Fungus

These diseases are favored by heavy rains and waterlogged soils. Symptoms include discolored fruit and declining plants.

Rotate away from tomato, pepper, vine crops, or snap beans for 3 years. Avoid low areas of fields. Plastic mulch may reduce splash infection.

Winter/Off-season: Rotate crops at least every 3 years and practice fall tillage. Avoid poorly drained soils. Use raised beds. Mulch may lessen buckeye rot's impact.

Planting: Consider fungicide drench. Regular fungicide schedule may lessen impact of buckeye rot.

copper formulations (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Tomato* See label. Fixed copper products may improve efficacy of fungicides against *Phytophthora* blight when tank mixed at labeled rates. REI: see label. PHI: 0-day.

Gavel 75DF® (zoxamide, mancozeb) *Tomato* 1.5-2 lbs. per acre. REI: 48-hour. PHI: 5-day.

Orondis Opti Premix® (oxathiapiprolin, chlorothalonil) *Pepper, Tomato* 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day.

Orondis Ultra Premix® (oxathiapiprolin, mandipropamid) *Tomato* 5.5-8 fl. oz. per acre. Alternate with fungicides that have a different mode of action. REI: 4-hour. PHI: 1-day.

Quadris 2.08SC® (azoxystrobin) *Pepper, Tomato* 5-6.2 fl. oz. per acre. REI: 4-hour. PHI: 0-day.

Quadris Opti® (azoxystrobin, chlorothalonil) *Pepper, Tomato* 1.6 pts. per acre. REI: 12-hour. PHI: 0-day.

Ridomil Gold Copper® (mefenoxam, copper hydroxide) *Tomato* See label. Rates and PHI vary depending on whether crop is processing or fresh market tomato. REI: 48-hour. PHI: See label.

Tanos® (famoxadone, cymoxanil) *Pepper, Tomato* 8 oz. per acre. For late blight, tank-mix with a contact fungicide with a different mode of action. Disease suppression for bacterial diseases. REI: 12-hour. PHI: 3-day.

Early Blight of Tomatoes - *Alternaria* Fungus

This disease initially cause lesions on lower leaves of the tomato plant. Plant resistant varieties. Use wilt resistant "VF" cultivars, and avoid fields with a wilt history. Tomato plants weakened by wilt disease may be more prone to leaf blights. Practice 3-4-year rotation with unrelated crops. Rotate out of fields with a history of early blight or *Septoria* leaf spot.

Group 11 Resistance: Strains of the fungus that causes early blight that are resistant to group 11 fungicides have been observed in Indiana and Ohio. Group 11 products labeled for tomato and early blight include Cabrio® and Quadris®. Tank-mix group 11 fungicides with products that have a different mode of action, or alternate group 11 fungicides with fungicides that have a different group number. See Selected Information About Recommended Fungicides (page 79) for more information.

Winter/Off-season: Use crop rotations of at least 3-4 years for early blight.

Planting: Begin protective fungicide applications on a 7-14 day schedule.

Variety selection *Tomato* Select crop varieties for competitiveness, disease resistance, and regional adaptability.

Aprovia Top® (difenoconazole, benzovindiflupyr (solatenol)) *Eggplant, Pepper, Tomato* 10.5-13.5 fl. oz. per acre. Use of a spreader sticker is recommended. REI: 12-hour. PHI: 0-day.

Cabrio EG® (pyraclostrobin) *Pepper, Tomato* 8-12 oz. per acre. REI: 12-hour. PHI: 0-day.

chlorothalonil formulations (chlorothalonil) *Pepper, Tomato* See label. Several chlorothalonil formulations (e.g., Bravo®, Echo®, and Equus®) are labeled for use at various rates. REI: 12-hour. PHI: 0-day.

Endura® (boscalid) *Pepper, Tomato* 2.5-3.5 oz. per acre. REI: 12-hour. PHI: 0-day.

Fontelis® (penthiopyrad) *Pepper, Tomato* 16-24 fl. oz. per acre. See label for greenhouse uses. REI: 12-hour. PHI: 0-day.

Inspire Super® (difenoconazole, cyprodinil) *Pepper, Tomato* 16-20 fl. oz. per acre. Do not apply to small fruited varieties such as cherry tomato. REI: 12-hour. PHI: 0-day.

Luna Sensation® (fluopyram, trifloxystrobin) *Pepper, Tomato* 5-7.6 fl. oz. per acre. REI: 12-hour. PHI: 3-day.

Luna Tranquility® (fluopyram, pyrimethanil) *Pepper, Tomato* 11.2 fl. oz. per acre. Disease suppression of powdery mildew. REI: 12-hour. PHI: 1-day.

mancozeb formulations (mancozeb) *Pepper, Tomato* See label. Several mancozeb formulations (e.g., Dithane®, Manzate®, Penncozeb®, Roper®) are labeled for use at various rates. REI: 24-hour. PHI: 5-day.

Miravis Prime® (pydiflumetofen, fludioxonil) *Pepper, Tomato* 9.2-11.4 fl. oz. per acre. Use high rate for gray mold, suppression only. REI: 12-hour. PHI: 0-day.

Priaxor® (fluxapyroxad, pyraclostrobin) *Pepper, Tomato* 4-8 fl. oz. per acre. Suppression only for *Botrytis* gray mold and white mold. REI: 12-hour. PHI: 0-day.

Quadris 2.08SC® (azoxystrobin) *Pepper, Tomato* 5-6.2 fl. oz. per acre. REI: 4-hour. PHI: 0-day.

OMRI-listed indicates that the product is listed by the Organic Materials Review Institute (OMRI.org) and therefore may be acceptable for use in organic production. Check with your certifier before use.

Quadris Opti® (azoxystrobin, chlorothalonil) *Pepper, Tomato* 1.3-1.6 pts. per acre. REI: 12-hour. PHI: 0-day.

Revus Top® (mandipropamid, difenoconazole) *Pepper, Tomato* 5.5-7 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day.

Switch 62.5WG® (cyprodinil, fludioxonil) *Pepper, Tomato* 11-14 oz. per acre. Do not apply to small fruited varieties in the greenhouse. REI: 12-hour. PHI: 0-day.

Tanos® (famoxadone, cymoxanil) *Pepper, Tomato* 6-8 fl. oz. per acre. REI: 12-hour. PHI: 3-day.

Fusarium wilt of tomato

Variety selection *Tomato* Select crop varieties for competitiveness, disease resistance, and regional adaptability.

Gray Mold of Multiple Crops - Botrytis Fungus

Botran 75W® (dichloro-nitroaniline) *Pepper, Tomato* 1 lb. per 100 gals. of water. Labeled for stem phase of gray mold. Apply to stems up to a height of 24 inches. Young plants may be injured. REI: see label. PHI: 0-day.

Cabrio EG® (pyraclostrobin) *Pepper, Tomato* 12-16 oz. per acre. Suppression only for Botrytis gray mold and white mold. REI: 12-hour. PHI: 0-day.

chlorothalonil formulations (chlorothalonil) *Pepper, Tomato* See label. Several chlorothalonil formulations (e.g., Bravo®, Echo®, and Equus®) are labeled for use at various rates. REI: 12-hour. PHI: 0-day.

Endura® (boscalid) *Pepper, Tomato* 9-12.5 oz. per acre. Suppression only. REI: 12-hour. PHI: 0-day.

Fontelis® (penthiopyrad) *Pepper, Tomato* 16-24 fl. oz. per acre. See label for greenhouse uses. REI: 12-hour. PHI: 0-day.

Inspire Super® (difenoconazole, cyprodinil) *Pepper, Tomato* 16-20 fl. oz. per acre. Do not apply to small fruited varieties such as cherry tomato. REI: 12-hour. PHI: 0-day.

Luna Sensation® (fluopyram, trifloxystrobin) *Pepper, Tomato* 7.6 fl. oz. per acre. Suppression only for anthracnose and white mold. REI: 12-hour. PHI: 3-day.

Luna Tranquility® (fluopyram, pyrimethanil) *Pepper, Tomato* 11.2 fl. oz. per acre. Disease suppression of powdery mildew. REI: 12-hour. PHI: 1-day.

Miravis Prime® (pydiflumetofen, fludioxonil) *Pepper, Tomato* 9.2-11.4 fl. oz. per acre. Use high rate for gray mold, suppression only. REI: 12-hour. PHI: 0-day.

Orondis Opti Premix® (oxathiapiprolin, chlorothalonil) *Pepper, Tomato* 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day.

Pageant Intrinsic® (boscalid, pyraclostrobin) *Pepper, Tomato* 23 oz. per acre. Labeled for greenhouse-/high tunnel-grown tomatoes. Do not apply on seedlings meant for transplanting in the field. REI: 12-hour. PHI: 0-day.

Priaxor® (fluxapyroxad, pyraclostrobin) *Pepper, Tomato* 4-8 fl. oz. per acre. Suppression only for Botrytis gray mold and white mold. REI: 12-hour. PHI: 0-day.

Scala SC® (pyrimethanil) *Pepper, Tomato* 7 fl. oz. per acre. See label for precautions. REI: 12-hour. PHI: 1-day.

Switch 62.5WG® (cyprodinil, fludioxonil) *Pepper, Tomato* 11-14 oz. per acre. Do not apply to small fruited varieties in the greenhouse. REI: 12-hour. PHI: 0-day.

Late Blight of Tomatoes - Phytophthora Oomycete chlorothalonil formulations (chlorothalonil) *Pepper, Tomato* See label. Several chlorothalonil formulations (e.g., Bravo®, Echo®, and Equus®) are labeled for use at various rates. REI: 12-hour. PHI: 0-day.

Gavel 75DF® (zoxamide, mancozeb) *Tomato* 1.5-2 lbs. per acre. REI: 48-hour. PHI: 5-day.

Orondis Opti Premix® (oxathiapiprolin, chlorothalonil) *Pepper, Tomato* 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day.

Orondis Ultra Premix® (oxathiapiprolin, mandipropamid) *Tomato* 5.5-8 fl. oz. per acre. Alternate with fungicides that have a different mode of action. REI: 4-hour. PHI: 1-day.

Presidio® (fluopicolide) *Tomato* 3-4 fl. oz. per acre. Must be tank-mixed with a product with a different mode of action. REI: 12-hour. PHI: 2-day.

Priaxor® (fluxapyroxad, pyraclostrobin) *Tomato* 8 fl. oz. per acre. Suppression only for late blight. REI: 12-hour. PHI: 0-day.

Ranman 400SC® (cyazofamid) *Tomato* 2.75 fl. oz. per acre. For Buckeye rot and Phytophthora blight, apply to base of plant or in transplant water. See label for details. REI: 12-hour. PHI: 0-day.

Revus Top® (mandipropamid, difenoconazole) *Pepper, Tomato* 5.5-7 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day.

Zampro® (ametoctradin, dimethomorph) *Tomato* 14 fl. oz. per acre. REI: 12-hour. PHI: 4-day.

Leaf Blight of Tomatoes - Septoria Fungus

This disease initially cause lesions on lower leaves of the tomato plant. Plant resistant varieties. Use wilt resistant "VF" cultivars, and avoid fields with a wilt history.

Tomato plants weakened by wilt disease may be more prone to leaf blights. Practice 3-4-year rotation with unrelated crops. Rotate out of fields with a history of early blight or Septoria leaf spot.

Group 11 Resistance: Strains of the fungus that causes early blight that are resistant to group 11 fungicides have been observed in Indiana and Ohio. Group 11 products labeled for tomato and early blight include Cabrio® and Quadris®. Tank-mix group 11 fungicides with products that have a different mode of action, or alternate group 11 fungicides with fungicides that have a different group number. See Selected Information About Recommended Fungicides (page 79) for more information.

Winter/Off-season: Use crop rotations of at least 2-3 years.

Planting: Begin protective fungicide applications on a 7-14 day schedule.

Aprovia Top® (difenoconazole, benzovindiflupyr (solatenol)) *Eggplant, Pepper, Tomato* 10.5-13.5 fl. oz. per acre. Use of a spreader sticker is recommended. REI: 12-hour. PHI: 0-day.

Cabrio EG® (pyraclostrobin) *Pepper, Tomato* 8-12 oz. per acre. REI: 12-hour. PHI: 0-day.

chlorothalonil formulations (chlorothalonil) *Pepper, Tomato* See label. Several chlorothalonil formulations (e.g., Bravo®, Echo®, and Equus®) are labeled for use at various rates. REI: 12-hour. PHI: 0-day.

Fontelis® (penthiopyrad) *Pepper, Tomato* 16-24 fl. oz. per acre. See label for greenhouse uses. REI: 12-hour. PHI: 0-day.

Inspire Super® (difenoconazole, cyprodinil) *Pepper, Tomato* 16-20 fl. oz. per acre. Do not apply to small fruited varieties such as cherry tomato. REI: 12-hour. PHI: 0-day.

Luna Sensation® (fluopyram, trifloxystrobin) *Pepper, Tomato* 5-7.6 fl. oz. per acre. REI: 12-hour. PHI: 3-day.

Luna Tranquility® (fluopyram, pyrimethanil) *Pepper, Tomato* 11.2 fl. oz. per acre. Disease suppression of powdery mildew. REI: 12-hour. PHI: 1-day.

mancozeb formulations (mancozeb) *Pepper, Tomato* See label. Several mancozeb formulations (e.g., Dithane®, Manzate®, Penncozeb®, Roper®) are labeled for use at various rates. REI: 24-hour. PHI: 5-day.

Miravis Prime® (pydiflumetofen, fludioxonil) *Pepper, Tomato* 9.2-11.4 fl. oz. per acre. Use high rate for gray mold, suppression only. REI: 12-hour. PHI: 0-day.

Priaxor® (fluxapyroxad, pyraclostrobin) *Pepper, Tomato* 4-8 fl. oz. per acre. Suppression only for Botrytis gray mold and white mold. REI: 12-hour. PHI: 0-day.

Quadris 2.08SC® (azoxystrobin) *Pepper, Tomato* 5-6.2 fl. oz. per acre. REI: 4-hour. PHI: 0-day.

Quadris Opti® (azoxystrobin, chlorothalonil) *Pepper, Tomato* 1.3-1.6 pts. per acre. REI: 12-hour. PHI: 0-day.

Revus Top® (mandipropamid, difenoconazole) *Pepper, Tomato* 5.5-7 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day.

Tanos® (famoxadone, cymoxanil) *Pepper, Tomato* 8 oz. per acre. For late blight, tank-mix with a contact fungicide with a different mode of action. Disease suppression for bacterial diseases. REI: 12-hour. PHI: 3-day.

Leaf Mold of Tomatoes - Passalora Fungus

This disease causes yellow lesions on the upper side of the tomato leaf. It is common in greenhouse and high tunnel tomatoes but is less common in open field tomatoes.

Winter/Off-season: Rotate crops at least 2-3 years and practice fall tillage. Use sanitation in greenhouse tomatoes.

Greenhouse: Scout for disease.

Planting: Control relative humidity in the greenhouse by venting and pruning. Labeled fungicides may help control leaf mold.

Variety selection *Tomato* Select crop varieties for competitiveness, disease resistance, and regional adaptability.

Gavel 75DF® (zoxamide, mancozeb) *Tomato* 1.5-2 lbs. per acre. REI: 48-hour. PHI: 5-day.

Inspire Super® (difenoconazole, cyprodinil) *Pepper, Tomato* 16-20 fl. oz. per acre. Do not apply to small fruited varieties such as cherry tomato. REI: 12-hour. PHI: 0-day.

Product/Disease Ratings for All Fruiting Vegetables¹

Product (REI/PHI) ²	Common Name MOA or FRAC code: fungicides with a number as the MOA code should be tank-mixed or alternated with a different MOA code according to the label.	Anthraco- nose (tomato)	Anthraco- nose (pepper)	Bacterial Canker	Bacterial Spot/Speck	Botrytis Gray Mold	Buckeye Rot	Early Blight	Septoria Leaf Blight	Late Blight (tomato)	Phytophthora Blight (pepper)	Leaf Mold	White Mold	Comments
Actigard® (12/24)	acibenzolar-S-methyl (P)				F									Not for bell pepper. Do not apply to stressed plants.
Agri-Mycin 17®, Ag Strep-tomycin®	streptomycin sulfate (25)				F									For use on tomato/pepper seedlings produced for transplanting only.
Aprovia Top® (12/20)	benzovindiflupyr (7), difenconazole (3)	VG	ID			ID		VG	VG			ID		Alternate with chlorothalonil for anthracnose.
Botran® (12/10)	2, 6-dichloro-4-nitroaniline (29)					G								Application to seedlings may result in injury.
Bravo®, Echo®, Equus® (12/0)	chlorothalonil (M)	G	G			F		F	G	VG		F		Effective against a wide range of fungal diseases. Not for greenhouse use.
Cabrio® (12/0)	pyraclostrobin (11)	G	VG			F		VG	VG	P			S	
Contans WG® (4/NA)	CON/M/91-08 (NA)												F	Pepper only.
copper (many trade names) (24/0)	copper (M)	F	F	P	F	P		F	F	F				Tank-mix with mancozeb products to overcome copper resistance in bacterial spot strains.
Curzate 60DF® (12/3)	cymoxanil (27)									VG				Translaminar systemic activity against tomato late blight.
Dithane®, Manzate®, Pennco-zeb® (24/5)	mancozeb (M)	F	G					G	G	F		F		Be sure product is labeled on pepper.
Elumin® (12/2)	ethaboxam (22)										G			Same FRAC group as Gavel®
Endura® (3/9)	boscalid (7)					VG		VG						Increase spray volumes as plants grow.
Fontelis® (12/0)	penthiopyrad (7)	S	S			G		VG	VG					
Gavel® (48/5)	mancozeb (M), zoxamide (22)						F	G	G	F		F		May be used with copper products to manage bacterial spot.
Inspire Super® (12/0)	difenconazole (3), cyprodinil (9)	F	F				G	VG	G			G		
Luna Sensation® (12/3)	fluopyram (7), trifloxystrobin (11)	S	VG			G		ID	VG				G	Alternate with chlorothalonil for anthracnose.
Luna Tranquility® (12/1)	fluopyram (7), pyrimethanil (9)					ID		VG	VG					
Miravis Prime (12/0)	pydiflumeton (7), fludioxonil (12)		VG					ID	VG			ID		Alternate with chlorothalonil for anthracnose.
Orondis Opti® (4/3)	oxathiapropilil (U15), chloro-thalonil (M)									VG	VG			
Orondis Ridomil Gold SL® (48/28)	oxathiapropilil (U15), mfenoxam (4)										VG			Apply to soil at planting.
Orondis Ultra® (4/1)	oxathiapropilil (U15), mandip-ropamid (40)									VG	VG			
Presidio® (12/2)	fluopicolide (43)									VG	G			
Previcur Flex® (12/5)	propamocarb hydrochloride (28)									VG				
Priaxor® (12/0)	fluxapyroxad (7), pyraclostrobin (11)	G	G			F		VG	G	S			S	
Quadris® (4/0)	azoxystrobin (11)	G	VG				P	VG	VG	P				
Quadris Top® (12/0)	azoxystrobin (11), difenconazole (3)	G	VG					VG	VG			G		
Ranman® (12/0)	cyazofamid (21)									VG	G			
Reason® (12/14)	fenamidone (11)							VG	VG	S	S			
Revus Top® (12/1)	mandipropamid (40), difenconazole (3)	G						G	G	G		G		Not labeled on pepper.
Ridomil Gold GR®, Ridomil Gold SL® (48/7)	mefenoxam (4)						G			VG*	G*			*Effective against sensitive isolates only.
Scala® (12/1)	pyrimethanil (9)					G		G						Label includes greenhouse instructions.
Switch® (12/0)	cyprodinil (9), fludioxonil (12)					G		VG						Do not apply to cherry or grape tomatoes in the greenhouse.
Tanos® (12/3)	cymoxanil (27), famoxadone (11)	F	G	S	S		S	G	G	G		G		Tank-mix with manzate or other EBDC.
Zampro® (12/4)	amitotradin (45), dimethomorph (40)									VG	P			
Zing® (48/5)	zoxamide (22), chlorothalonil (M)							G	G	VG				

¹Fungicide rating code: VG=very good. G=good. F=fair. P=poor. S=suppression only. ID=labeled, but insufficient data to allow rating. Based on research and experience of the authors.

²REI (re-entry interval) in hours: do not enter or allow workers to enter areas treated during the REI period. PHI (pre-harvest interval) in days: the minimum time that must pass between the last pesticide application and crop harvest..

mancozeb formulations (mancozeb) *Pepper, Tomato* See label. Several mancozeb formulations (e.g., Dithane®, Manzate®, Penncozeb®, Roper®) are labeled for use at various rates. REI: 24-hour. PHI: 5-day.

Miravis Prime® (pydiflumetofen, fludioxonil) *Pepper, Tomato* 9.2-11.4 fl. oz. per acre. Use high rate for gray mold, suppression only. REI: 12-hour. PHI: 0-day.

Revus Top® (mandipropamid, difenoconazole) *Pepper, Tomato* 5.5-7 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day.

Tanos® (famoxadone, cymoxanil) *Pepper, Tomato* 8 oz. per acre. For late blight, tank-mix with a contact fungicide with a different mode of action. Disease suppression for bacterial diseases. REI: 12-hour. PHI: 3-day.

Powdery Mildew of Tomatoes/Peppers - Leveillula Fungus

Aprovia Top® (difenoconazole, benzovindiflupyr (solatenol)) *Eggplant, Pepper, Tomato* 10.5-13.5 fl. oz. per acre. Use of a spreader sticker is recommended. REI: 12-hour. PHI: 0-day.

Cabrio EG® (pyraclostrobin) *Pepper, Tomato* 8-16 oz. per acre. REI: 12-hour. PHI: 0-day.

Inspire Super® (difenoconazole, cyprodinil) *Pepper, Tomato* 16-20 fl. oz. per acre. Do not apply to small fruited varieties such as cherry tomato. REI: 12-hour. PHI: 0-day.

Luna Sensation® (fluopyram, trifloxystrobin) *Pepper, Tomato* 5-7.6 fl. oz. per acre. REI: 12-hour. PHI: 3-day.

Luna Tranquility® (fluopyram, pyrimethanil) *Pepper, Tomato* 11.2 fl. oz. per acre. Disease suppression of powdery mildew. REI: 12-hour. PHI: 1-day.

Miravis Prime® (pydiflumetofen, fludioxonil) *Pepper, Tomato* 9.2-11.4 fl. oz. per acre. Use high rate for gray mold, suppression only. REI: 12-hour. PHI: 0-day.

Priaxor® (fluxapyroxad, pyraclostrobin) *Tomato* 6-8 fl. oz. per acre. REI: 12-hour. PHI: 0-day.

Quadris 2.08SC® (azoxystrobin) *Pepper, Tomato* 5-6.2 fl. oz. per acre. REI: 4-hour. PHI: 0-day.

Quadris Opti® (azoxystrobin, chlorothalonil) *Pepper, Tomato* 1.6 pts. per acre. REI: 12-hour. PHI: 0-day.

Quadris Top® (azoxystrobin, difenoconazole) *Pepper, Tomato* 8-14 fl. oz. per acre. REI: 12-hour. PHI: 0-day.

Root-Knot Nematode

Variety selection *Tomato* Select crop varieties for competitiveness, disease resistance, and regional adaptability.

Southern Blight of Tomatoes/Peppers/Eggplant - Sclerotium Fungus

This disease is normally observed in southern climates or during seasons with above normal temperatures.

Crop rotations with small grains and deep plowing crop residue should help to reduce inoculum.

Fontelis® (penthiopyrad) *Pepper, Tomato* 1-1.6 fl. oz. per 1,000 row ft. Apply to base of plant as directed spray 5-10 days after transplanting and 14 days later. Follow up with effective fungicide as needed. REI: 12-hour. PHI: 0-day.

Tomato Spotted Wilt Virus (TSWV)

This virus is carried by thrips and can cause major loss to tomatoes if they infect young plants. Both viruses are more common in greenhouse and high tunnel situations. Since ornamental plants can be a source of thrips, avoid growing ornamental plants such as flowers from plugs with tomatoes either as transplants or with mature tomatoes. Controlling thrips may slow the spread of the virus in greenhouse and field. See also Impatiens necrotic spot virus.

Variety selection *Tomato* Select crop varieties for competitiveness, disease resistance, and regional adaptability.

White Mold (Timber Rot) of Multiple Crops - Sclerotinia Fungus

This disease may be more common in greenhouses and high tunnels than in open fields. The fungus that causes this disease is soilborne and often results in a woody appearance of the lower stem of the tomato plant. Avoid fields with history of the problem. Pathogen has a large host range.

Winter/Off-season: Use long rotations with corn or small grains. Growers should avoid rotations with tomato, pepper, potato, and snap bean.

Greenhouse/Planting: White mold may be common where tomato is grown yearly in the same soil such as under a greenhouse structure.

Fruit Set: Inspect plants for symptoms of white mold.

Cabrio EG® (pyraclostrobin) *Pepper, Tomato* 12-16 oz. per acre. Suppression only for Botrytis gray mold and white mold. REI: 12-hour. PHI: 0-day.

Endura® (boscalid) Eggplant, Pepper, Tomato 12.5 oz. per acre. REI: 12-hour. PHI: 0-day.

Luna Sensation® (fluopyram, trifloxystrobin) Pepper, Tomato 7.6 fl. oz. per acre. Suppression only for anthracnose and white mold. REI: 12-hour. PHI: 3-day.

Priaxor® (fluxapyroxad, pyraclostrobin) Pepper, Tomato 4-8 fl. oz. per acre. Suppression only for Botrytis gray mold and white mold. REI: 12-hour. PHI: 0-day.

Weed Control

Recommended Controls

The fruiting vegetables are warm-season crops nearly always started as transplants. When growers transplant crops onto black or other opaque plastic mulch, they sometimes use herbicides underneath the mulch, depending on the weed pressure and labor available to pull weeds by hand. Weeds between beds are typically controlled with cultivation, hand hoeing, herbicides, or a combination of the three. Weeds along the edge of the plastic mulch can be a particular challenge for cultivation equipment, and shielded or directed herbicide applications can help with control there.

Fresh market crops are also grown without plastic mulch, and similar weed control measures are used. Organic mulches (such as straw) can also provide good weed control in and between rows if applied in a thick enough mat before weeds emerge.

Burndown or Directed/Shielded Application Broadleaf and Grass Weeds

glyphosate formulations (glyphosate) Eggplant, Pepper, Tomato Use formulations containing 3 lbs. ae per gal. (4 lbs. isopropylamine salt per gal.) at 1-5 qt. per acre or formulations containing 4.5 lbs. ae per gal. (5 lbs. potassium salt per gal.) at 0.66-3.3 qt. per acre. Broadcast 3 days before transplanting, or apply between crop rows with hooded or shielded sprayers. Use low rate for annuals and higher rates for perennials. See label for suggested application volume and adjuvants. Remove herbicide residue from plastic mulch prior to transplanting. Do not apply to row-middles of tomato or tomatillo. REI: 4-hour. PHI: 14-day.

paraquat formulations (paraquat) Eggplant, Pepper, Tomato 2-4 pt. per acre of 2.0 lb. per gal. formulations or 1.3-2.7 pt. per acre of 3 lb. per gal. formulations. Add 1 qt. COC (1% v/v) or 0.5 pt. NIS

(0.25% v/v) per 25 gal. of solution and apply to weeds less than 6 inches tall. Apply prior to transplanting or after direct-seeding, but before crop emergence. The lowest rate can be applied directed between rows. Do not make more than 3 applications per year. Certified applicators must successfully complete an EPA-approved training program before mixing, loading, and/or applying paraquat. REI: 24-hour. PHI: 30-day for tomato RUP.

Burndown or Directed/Shielded Application Broadleaf Weeds

Aim EC® (carfentrazone) Eggplant, Pepper, Tomato 0.5-2 fl. oz. per acre. Apply a minimum of 1 day prior to transplanting or 7 days prior to direct-seeding, or apply between crop rows with hooded sprayer. Do not allow spray to contact crop. Add 1 qt. COC (1% v/v) or 0.5 pt. NIS per 25 gal. of spray solution (0.25% v/v). Weeds must be actively growing and less than 4 inches tall. Do not exceed 6.1 fl. oz. per acre per season. REI: 12-hour. PHI: 0-day.

Preemergence Broadleaf and Grass Weeds

Command 3ME® (clomazone) Pepper 0.67-2.67 pt. per acre. Not for banana pepper. Use lower rate on coarse soils, and higher rate on fine soils. Apply before transplanting. Set plant roots below herbicide. May cause temporary bleaching of crop leaves. REI: 12-hour.

Devrinol DF-XT® (napropamide) Eggplant, Pepper, Tomato 2-4 lbs. per acre. Use lower rate on coarse sandy soils and higher rate on heavy clay soils and between rows. Apply and incorporate before transplanting. Applied prior to laying plastic mulch. After harvest or prior to planting succeeding crops, deep moldboard or disk plow. Do not seed alfalfa, small grains, sorghum, corn, or lettuce for 12 months after application. REI: 24-hour.

Dual Magnum (s-metolachlor) at the following rates:

Note: Registered for use in eggplant and pepper grown in Illinois, Michigan, and Indiana only: applicators must have state 24c label. Illinois label expires March 25, 2024. Michigan label expires December 31, 2021. REI: 24-hour.

Eggplant 0.5-1.33 pt. per acre. Apply before transplanting or within 48 hours after transplanting. Do not exceed 1 application and 1.33 pts. per acre per year. PHI: 60-day.

Pepper 0.5-1.0 pt. per acre. Apply before transplanting and do not incorporate, or apply within 48 hours after transplanting. Reduce risk

of crop injury by applying after transplanting and by using a directed spray rather than spraying over the top of transplants. Do not exceed 1 pt. per acre or 1 application per crop. PHI: 60-day.

Tomato 1-2 pt. per acre. Use lower rate on coarse soils. Apply prior to transplanting, or as a directed spray after transplanting. Apply as a directed spray to direct-seeded tomatoes at least 4 inches tall. When using a directed spray, minimize contact with the crop. Crop injury may occur under unfavorable growing conditions. See label for additional precautions. PHI: 30-day if rate does not exceed 1.33 pt. per acre per year, 90-day if rate exceeds 1.33 pt. per acre per year.

Prowl H2O® (pendimethalin) *Eggplant, Pepper, Tomato* 1 to 3 pt. per acre. For use under plastic, apply as a band to top of bed after bed formation and before laying plastic, and/or apply to row middles after transplanting. On bare ground, apply and incorporate before transplanting, or apply before transplanting without incorporation, or apply to established plants as a directed spray. Avoid root contact with Prowl-treated soil and avoid any contact with leaves or stems of crop. REI: 24-hour. PHI: 21-day for tomato, 70-day for pepper and eggplant.

trifluralin formulations (trifluralin) at the following rates:

Pepper Use 4EC formulations at 1-2 pt. per acre .10G formulations at 5-10 lb. per acre. Broadcast and incorporate before transplanting. May cause early stunting if growing conditions are unfavorable. To minimize injury, dip transplant roots in carbon slurry (2 lbs. per gal.) prior to planting, or include 2 oz. of carbon per gal. of transplant water. Use low rate on coarse soils with less than 2% organic matter. Not effective on muck or high organic matter soils. REI: 12-hour.

Tomato Use 4EC formulations at 1-2 pts. per acre. Use 10G formulations at 5-10 lbs. per acre. Direct-seeded: Apply as a directed spray between rows at thinning. Transplanted: Broadcast and incorporate before transplanting, or apply directed spray between rows after transplanting and incorporate. May cause early stunting if growing conditions are unfavorable. To minimize injury, dip transplant roots in carbon slurry (2 lbs. per gal.) prior to planting, or include 2 oz. of carbon per gal. of transplant water. Use low rate

on coarse soils with less than 2% organic matter. Not effective on muck or high organic matter soils. REI: 12-hour.

Preemergence Broadleaf Weeds

League® (imazosulfuron) at the following rates:

Pepper 4.0-6.4 oz. per acre. Apply between rows after peppers are well-established and at least 10 inches tall. Avoid contact with crop and with surface of plastic mulch if present. Or apply as a directed spray under the pepper canopy and contacting no more than the lower 2 inches of stem and avoiding contact with fruit. If small, emerged weeds are present include a manufacturer-approved surfactant. REI: 12-hour. PHI: 21-day.

Tomato 4.0-6.4 oz. per acre. *Transplanted, bare ground:* Apply to a prepared planting bed at least 1 day before transplanting. *Transplanted, plasticulture:* Apply to a prepared planting bed just prior to laying plastic mulch and at least 1 day before transplanting. *Over the top:* Apply to established direct-seed tomatoes from 4-5 leaf stage through early bloom stage or transplanted tomatoes from 3-5 days after transplanting through early bloom stage. *Directed spray:* Apply from crop row to row middle of established plants with at least 4-5 leaves. If small emerged weeds are present include a manufacturer-approved surfactant. REI: 12-hour. PHI: 21-day.

Matrix SG® (rimsulfuron) *Tomato* 1-4 oz. per acre. Can be applied at 2-4 oz. per acre for preemergence weed control. Apply at 1-2 oz. per acre for postemergence weed control to tomato plants of at least the cotyledon stage. Add 0.5 pt. of NIS per 25 gal. of spray solution (0.25% v/v) if emerged weeds are present. Apply when weeds are less than 1 inch tall. Soil activity requires rainfall within 5 days of application. If crop is stressed, chlorosis may occur. Do not exceed 4 oz. per acre per year. REI: 4-hour. PHI: 45-day.

metribuzin formulations (metribuzin) *Tomato* 4F formulations: 0.5-1 pt. per acre. 75DF formulations: 0.33-0.66 lb. per acre. Broadcast and incorporate before transplanting, or broadcast after transplants are established. Or, use 4F formulations at up to 2 pts. per acre, or 75DF formulations at 1.33 lbs. per acre and apply a directed spray between crop rows after transplants are established. May be applied preplant incorporated with trifluralin products for

improved weed control. Crop injury may occur if applied over the top of plants within 3 days of cool, wet, or cloudy weather. Wait at least 14 days between applications. Do not exceed 2 pts. of 4F formulations, or 1.33 lbs. of 75DF formulations per acre per season. REI: 12-hour. PHI: 7-day.

Reflex® (fomesafen) Pepper and Tomato in Michigan only. 1 pt. per acre. Applicators must have a 24c label. Michigan label expires December 31, 2023. Apply before transplanting. For use under plastic, apply after bed formation and before laying plastic. Use only once in two years on the same soil. See rotational crop restrictions. Use on transplanted tomato and pepper only. REI: 24-hour. PHI: 60-day for pepper, 70-day for tomato.

Sandea® (halosulfuron) at the following rates:

Eggplant, Pepper 0.5-1.0 oz. per acre. *Row middles only:* Apply to row middles avoiding contact with the crop and plastic mulch, if present. If weeds

are present, add 0.5 pt. NIS per 25 gal. of solution (0.25% v/v). REI: 12-hour. PHI: 30-day.

Tomato 0.5-1.0 oz. per acre. *Direct-seeded:* Apply over the top once tomatoes have at least 4 true leaves through 30 days prior to harvest. To minimize risk of crop injury, apply as a directed/shielded spray. *Transplanted:* Apply to the soil surface after final soil preparation or bed shaping and just before applying plastic mulch. Wait at least 7 days after application before transplanting. Or apply a minimum of 14 days after transplanting over the top or as a directed/shielded spray. *Row middles on bare ground or plastic mulch:* Apply to row middles avoiding contact with the crop and plastic mulch, if present.

If weeds are present, add 0.5 pt. NIS per 25 gal. of solution (0.25% v/v). Do not exceed 2 applications or 2 oz. per acre per 12 month period. REI: 12-hour. PHI: 30-day.

Herbicides for All Fruiting Vegetables¹

Products (REI/PHI)	Common Name	Timing and Application Location Relative to Crop ²			Incorporated	Timing Relative to Weeds		Weed Groups Controlled			Crops ³		
		Before Transplanting	After Transplanting, between rows only	Postemergence		Preemergence	Postemergence	Annual Grasses	Small-seeded Broadleaves	Broadleaves	Tomato	Pepper	Eggplant
Aim EC® (12h/-)	carfentrazone	X	X				X		X	X	X	X	X
Command 3ME® (12h/-)	clomazone	X				X		X	X	X		X	
Dacthal W-75®, Dacthal Flowable® (12h/-)	DCPA			X		X		X			X		X
Devrinol 50DF® (12h)	napropamide	X			Yes	X		X	X		X	X	X
Dual Magnum® (24h/30-90d)	s-metolachlor	X	X			X		X	X		X	X	
Gramoxone® (12h to 24h)	paraquat	X	X				X	X	X	X	X	X	X
Matrix® (4h/ 45d)	rimsulfuron	X		X		X	X	X	X	X	X		
Poast® (12h/20d)	sethoxydim			X			X	X			X	X	X
Prefar 4E® (12h/-)	bensulide	X			Yes	X		X				X	
Prowl H2O® (12h/70d)	pendimethalin	X	X			X		X	X		X	X	X
Roundup®, others (12h/14d)	glyphosate	X	X				X	X	X	X	X	X	X
Sandea® (12h/30d)	halosulfuron	X	X	X		X	X		X	X	X	X	X
Select Max®, others (12h/20d)	clethodim			X			X	X			X	X	X
Spartan 4F® (12h/-)	sulfentrazone	X				X			X	X	X		
Treflan®, others (12h/-)	trifluralin	X	X		Yes	X		X	X		X	X	X
Tricor®, others (12h/7d)	metribuzin	X	X	X		X	X		X	X	X		

¹For effectiveness against specific weeds, see Relative Effectiveness of Herbicides for Vegetable Crops (page 68), and read label. This table does not include all label information. Be sure to read and follow all instructions and precautions on the herbicide label. Herbicides can cause serious crop injury and yield loss if not used properly.

²X=permitted for at least one crop.

³X=may be used for that crop.

Spartan 4F® (sulfentrazone) *Tomato* 2.25-8.0 fl. oz. per acre. Apply before transplanting as a broadcast or banded application. Will also control nutsedge. Do not use on soils classified as sand, which have less than 1% organic matter. Do not exceed 12 fl. oz. per year. REI: 12-hour.

Preemergence Grass Weeds

Dacthal Flowable® (DCPA) *Eggplant, Tomato* Dacthal Flowable® at 6-14 pts. per acre. Apply 4-6 weeks after transplanting or when direct-seeded plants are 4-6 in. tall and when growing conditions favor good plant growth. May be applied over the top of transplants. REI: 12-hour.

Dacthal W75® (DCPA) *Eggplant, Pepper, Tomato* 6-14 lbs. per acre. Apply 4-6 weeks after transplanting when growing conditions favor good plant growth. May be applied over the top of transplants. REI: 12-hour.

Prefar 4E® (bensulide) *Eggplant, Pepper* 5-6 qts. per acre. Use low rate on soils with less than 1% organic matter. Apply and incorporate before planting. REI: 12-hour.

Postemergence Broadleaf Weeds

League® (imazosulfuron) See details in the Preemergence Broadleaf Weeds section of this chapter.

Matrix SG® (rimsulfuron) See details in the Preemergence Broadleaf Weeds section of this chapter.

metribuzin formulations (metribuzin) See details in the Preemergence Broadleaf Weeds section of this chapter.

Sandea® (halosulfuron) See details in the Preemergence Broadleaf Weeds section of this chapter.

Postemergence Grass Weeds

clethodim formulations (clethodim) at the following rates:

Eggplant, Pepper Use 2 lb. per gal. formulations at 6-8 fl. oz. per acre with 1 qt. COC per 25 gal. of spray solution (1% v/v). Do not exceed 32 fl. oz. per acre per season. Use 0.97 lb. per gal. formulations at 9-16 fl. oz. per acre with 0.5 pt. NIS per 25 gal. of spray solution (0.25% v/v). Do not exceed 64 fl. oz. per acre per season. Use low rates for annual grasses, the high rates for perennial grasses. Spray on actively growing grass. Wait at least 14 days between applications. REI: 24-hour. PHI: 20-day.

clethodim formulations (clethodim) *Tomato* Use 2 lb. per gal. formulations at 6-16 fl. oz. per acre with 1 qt. COC per 25 gals. of spray solution (1% v/v). Do not exceed 32 fl. oz. per acre per season. Use 0.97 lb. per gal. formulations at 9-32 fl. oz. per acre with 0.5 pt. NIS per 25 gal. of spray solution (0.25% v/v). Do not exceed 64 fl. oz. per acre per season. Use low rates for annual grasses, the high rates for perennial grasses. Spray on actively growing grass. Wait at least 14 days between applications. REI: 24-hour. PHI: 20-day.

Poast (sethoxydim) *Eggplant, Pepper, Tomato* 1.0-1.5 pt. per acre. Add 1 qt. COC per 25 gal. of spray solution (1% v/v). Spray on actively growing grass. Use high rate on quackgrass. Do not exceed 4.5 pt. per acre per season. REI: 12-hour. PHI: 20-day for eggplant and tomato, 7-day for peppers.

Insect Control

Recommended Controls

Aphids

Conserve natural enemies by avoiding broad-spectrum insecticide applications.

Limiting the use of some insecticides will conserve predators and parasites that help control aphid populations.

Conserve or introduce natural enemies *Eggplant, Pepper, Tomato* Numerous biological control agents are produced for deployment into greenhouse cropping systems. Biocontrols are the enemy of the enemy. Some can be purchased and deployed, and others can be conserved through non-crop habitat management and careful pesticide use.

M-Pede® (potassium salts of fatty acids) *Eggplant, Pepper, Tomato* 1-2% by volume. Must contact target insects to be effective. REI: 12-hour. PHI: 0-day. OMRI-listed.

Actara® (thiamethoxam) *Eggplant, Pepper, Tomato* 2-3 oz. per acre. Do not exceed 11 oz. per acre per season. REI: 12-hour. PHI: 0-day.

Admire Pro® (imidacloprid) *Eggplant, Pepper, Tomato* 1.3-2.2 fl. oz. per acre foliar application for eggplant, pepper, and tomato. 7.0-10.5 fl. oz. per acre soil application on eggplant and tomato, up to 14 fl. oz. per acre for pepper. Do not exceed 6.7 fl. oz. per acre

OMRI-listed indicates that the product is listed by the Organic Materials Review Institute (OMRI.org) and therefore may be acceptable for use in organic production. Check with your certifier before use.

for foliar applications. Do not exceed 10.5 fl. oz. per acre for soil applications on eggplant and tomato, or 14 fl. oz. for pepper. REI: 12-hour. PHI: 0-day for foliar application, or 21-day for soil application.

Assail 30SG® (acetamiprid) *Eggplant, Pepper, Tomato* 2-4 oz. per acre. Do not exceed 16 oz. per acre per season. REI: 12-hour. PHI: 7-day.

Beleaf 50SG® (flonicamid) *Eggplant, Pepper, Tomato* 2.0-4.28 fl. oz. per acre. Do not exceed 8.4 oz. per acre per season. REI: 12-hour. PHI: 0-day.

dimethoate formulations (dimethoate) *Pepper, Tomato* 0.5-0.6 pt. per acre for 4E and 400 formulations on pepper. 0.5-1.0 pt. per acre for 4E and 400 formulations on tomato. 0.75-1.5 pts. per acre for 2.67EC formulations on pepper and tomato. REI: see label. PHI: 0-day for pepper, 7-day for tomato.

Fulfill® (pymetrozine) *Eggplant, Pepper, Tomato* 2.75 oz. per acre. Do not exceed 5.5 oz. per acre per season. REI: 12-hour. PHI: 0-day.

Lannate LV® (methomyl) *Eggplant, Pepper, Tomato* 0.75-3.0 pts. per acre. Do not exceed 21 pts. per acre per season. REI: 48-hour. PHI: 1-day for tomato, 3-day for pepper, 5-day for eggplant. *RUP*

malathion formulations (malathion) *Eggplant, Pepper, Tomato* 5EC formulations use 1.5-2.5 pts. per acre for eggplant, 1.0-2.5 pts. per acre for pepper, 1.5 pts. per acre for tomato. 57EC formulations use 1.0-1.5 pts. per acre on eggplant, 1.25-1.5 pts. per acre on pepper, 1.0-1.25 pts. per acre for tomato. 8E formulations use 1.0-1.56 pts. per acre for pepper, 1.5 pt. per acre for tomato. REI: 12-hour. PHI: 1-day for tomato, 3-day for eggplant and pepper.

Movento® (spirotetramat) *Eggplant, Pepper, Tomato* 4-5 fl. oz. per acre. Do not exceed 10 fl. oz. per acre per season. REI: 24-hour. PHI: 1-day.

Orthene 97 Soluble® (acephate) *Pepper* For Bell Pepper: Application rate is 0.5-1 lb. per acre. For all other peppers: Application rate is 0.5 lb. per acre. REI: 24-hour. PHI: 7-day.

Platinum 75SG® (thiamethoxam) *Eggplant, Pepper, Tomato* 1.66-3.67 oz. per acre. Soil application. Do not exceed 3.67 oz. per acre per season. REI: 12-hour. PHI: 30-day.

Sivanto Prime® (flupyradifurone) *Eggplant, Pepper, Tomato* 7-12 fl. oz. per acre foliar application, or 21-28 fl. oz. per acre soil application. REI: 4-hour. PHI: 1-day for foliar application, or 45-day for soil application.

Vydate L® (oxamyl) *Eggplant, Pepper, Tomato* 2-4 pts. per acre. Do not exceed 12 pts. per acre per season for pepper. Do not exceed 16 pts. per acre per season for eggplant. Do not exceed 32 pts. per acre per season for tomato. REI: 48-hour. PHI: 1-day for eggplant, 3-day for tomato, 7-day for pepper. *RUP*

Caterpillars

There are many caterpillar pests of fruiting vegetables, including corn earworm/tomato fruitworm, tomato hornworm, tomato pinworm, European corn borer, cutworms, loopers, and armyworms. Always check the label for the specific list of caterpillars that the product can be used on.

Bacillus thuringiensis formulations for Lepidopterans

(*Bacillus thuringiensis aizawai* strain ABTS-1857, *Bacillus thuringiensis aizawai* strain GC-91, *Bacillus thuringiensis kurstaki* strain ABTS-351, *Bacillus thuringiensis kurstaki* strain EVB-113-19, *Bacillus thuringiensis kurstaki* strain SA-11)

Eggplant, Pepper, Tomato Various Bt products are available for control of young caterpillars (Agree®, Biobit®, Dipel®, Javelin®, etc.) Different Bt subspecies have different control properties. Check labels for rates, timing of application and required safety equipment. REI: 4-hour. PHI: 0-day.

Ambush® (permethrin) *Eggplant, Pepper, Tomato* Check label for specific caterpillars. 6.4-12.8 fl. oz. per acre for eggplant and pepper. 3.2-12.8 fl. oz. per acre for tomato. Do not exceed 38.4 fl. oz. per acre for eggplant or tomato. Do not exceed 51.2 fl. oz. per acre per season for pepper. REI: 12-hour. PHI: 0-day for tomato, 3 day for eggplant and pepper. *RUP*

Asana XL® (esfenvalerate) *Eggplant, Pepper, Tomato* 2.9-9.6 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 67.8 fl. oz. per acre per season for eggplant and pepper. Do not exceed 96.9 fl. oz. per acre per season for tomato. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. *RUP*

Avaunt 30WDG® (indoxacarb) *Eggplant, Pepper, Tomato* 2.5-3.5 fl. oz. per acre. Can control European Corn Borer in bell pepper only. Use at higher rate for fruitworms and armyworms. Check label for specific caterpillars. Do not exceed 14 oz. per acre per season. REI: 12-hour. PHI: 3-day.

Baythroid XL® (beta-cyfluthrin) *Eggplant, Pepper, Tomato* 1.6-2.8 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 16.8 fl. oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 0-day for tomato, 7-day for eggplant and pepper. *RUP*.

Brigade 2EC® (bifenthrin) *Eggplant, Pepper, Tomato* 2.1-6.4 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 12.8 fl. oz. per acre per season for eggplant and pepper. Do not exceed 25.6 fl. oz. per acre per season for tomato. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. *RUP*.

Coragen® (chlorantraniliprole) *Eggplant, Pepper, Tomato* 1.0-7.5 fl. oz. per acre. Check label for specific caterpillars. Can be applied as either a foliar application or via drip chemigation. Chemigation will provide up to 30 days of control. Do not exceed 15.4 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day.

Danitol 2.4EC® (fenpropathrin) *Eggplant, Pepper, Tomato* 10.67 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 42.67 fl. oz. per acre per season. REI: 24-hour. PHI: 3-day. *RUP*.

Diazinon AG500® (diazinon) *Tomato* 2-4 qts. per acre. Check label for specific caterpillars. Apply to soil and incorporate before planting. Do not exceed 4 qts. per acre per season. REI: 2-day. *RUP*.

Entrust SC® (spinosad) *Eggplant, Pepper, Tomato* 3-8 fl. oz. per acre. Check label for specific caterpillars. Observe resistance management restrictions. Do not exceed 29 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day. *OMRI-listed*.

Exirel® (cyantraniliprole) *Eggplant, Pepper, Tomato* 7.0-13.5 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 61.7 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day.

Harvanta® (cyclaniliprole) *Eggplant, Pepper, Tomato* 10.9-16.4 fl. oz. per acre. Do not exceed 65.6 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day.

Intrepid 2F® (methoxyfenozideqts,) *Eggplant, Pepper, Tomato* 4-16 oz. per acre. Check label for specific caterpillars. Do not exceed 64 oz. per acre per season. REI: 4-hour. PHI: 1-day.

Lannate LV® (methomyl) *Eggplant, Pepper, Tomato* 1.5-3.0 pts. per acre. Check label for specific caterpillars. Do not exceed 15 pts. per acre for eggplant. Do not exceed 12 pts. per acre for pepper. Do not exceed 21

pts. per acre per season for tomato. REI: 48-hour. PHI: 1-day for tomato, 3-day for pepper, 5-day for eggplant. *RUP*.

Mustang Maxx® (zeta-cypermethrin) *Eggplant, Pepper, Tomato* 2.24-4.0 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 24 fl. oz. per acre per season. Allow at least 7 days between applications. REI: 12-hour. PHI: 1-day. *RUP*.

Orthene 97® Soluble (acephate) *Pepper* 0.75-1.0 lb. per acre. Check label for specific caterpillars. For bell pepper only. REI: 24-hour. PHI: 7-day.

Permethrin 3.2EC® (permethrin) *Eggplant, Pepper, Tomato* 4-8 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 80 fl. oz. per acre per season for eggplant. Do not exceed 64 fl. oz. per acre per season for pepper. Do not exceed 48 fl. oz. per acre per season for tomato. REI: 12-hour. PHI: 0-day for tomato, 3-day for eggplant and pepper. *RUP*.

Radiant 1SC® (spinetoram) *Eggplant, Pepper, Tomato* 5-10 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 34 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day.

Rimon 0.83EC® (novaluron) *Eggplant, Pepper, Tomato* 9-12 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 36 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day.

Sevin XLR Plus® (carbaryl) *Eggplant, Pepper, Tomato* 1-2 qts. per acre. Check label for specific caterpillars. Do not exceed 8 qts. per acre per season. REI: 12-hour. PHI: 3-day.

Verimark® (cyantraniliprole) *Eggplant, Pepper, Tomato* 5-10 fl. oz. per acre. For drip chemigation or soil injection. Check label for specific caterpillars. Do not exceed 30.54 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day.

Warrior II® (lambda-cyhalothrin) *Eggplant, Pepper, Tomato* 0.96-1.92 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 23 fl. oz. per acre per season. REI: 24-hour. PHI: 5-day. *RUP*.

Colorado Potato Beetle

Trident® (*Bacillus thuringiensis tenebrionis* strain SA-10) *Eggplant, Pepper, Tomato* 3-6 qts. per acre. For control of young larvae. REI: 4-hour. PHI: 0-day. *OMRI-listed*.

OMRI-listed indicates that the product is listed by the Organic Materials Review Institute (OMRI.org) and therefore may be acceptable for use in organic production. Check with your certifier before use.

abamectin formulations (abamectin) *Eggplant, Pepper, Tomato* 1.75-3.5 fl. oz. per acre for SC formulations. 8-16 fl. oz. per acre for 0.15SC formulations. Do not exceed 10.25 fl. oz. per acre per season. REI: 12-hour. PHI: 7-day. *RUP*.

Actara® (thiamethoxam) *Eggplant, Pepper, Tomato* 2-3 oz. per acre. Do not exceed 11 oz. per acre per season. REI: 12-hour. PHI: 0-day.

Admire Pro® (imidacloprid) *Eggplant, Pepper, Tomato* 1.3-2.2 fl. oz. per acre foliar application for eggplant, pepper, and tomato. 7.0-10.5 fl. oz. per acre soil application on eggplant and tomato, up to 14 fl. oz. per acre for pepper. Do not exceed 6.7 fl. oz. per acre for foliar applications. Do not exceed 10.5 fl. oz. per acre for soil applications on eggplant and tomato, or 14 fl. oz. for pepper. REI: 12-hour. PHI: 0-day for foliar application, or 21-day for soil application.

Ambush® (permethrin) *Eggplant, Tomato* 9.6 fl. oz. per acre for eggplant. 3.2-12.8 fl. oz. per acre for tomato. Do not exceed 38.4 fl. oz. per acre. REI: 12-hour. PHI: 0-day for tomato, 3-day for eggplant. *RUP*.

Asana XL® (esfenvalerate) *Eggplant, Tomato* 5.8-9.6 fl. oz. per acre. Do not apply more than 67.2 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant. *RUP*.

Assail 30SG® (acetamiprid) *Eggplant, Pepper, Tomato* 1.5-2.5 oz. per acre. Do not exceed 16 oz. per acre per season. REI: 12-hour. PHI: 7-day.

Baythroid XL® (beta-cyfluthrin) *Eggplant, Pepper, Tomato* 1.6-2.8 fl. oz. per acre. Do not exceed 16.8 fl. oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 0-day for tomato, 7-day for eggplant and pepper. *RUP*.

Brigade 2EC® (bifenthrin) *Eggplant, Pepper, Tomato* 2.1-6.4 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 12.8 fl. oz. per acre per season for eggplant and pepper. Do not exceed 25.6 fl. oz. per acre per season for tomato. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. *RUP*.

Coragen® (chlorantraniliprole) *Eggplant, Pepper, Tomato* 3.5-5 fl. oz. per acre. REI: 4-hour. PHI: 1-day.

Entrust SC® (spinosad) *Eggplant, Pepper, Tomato* 3-6 fl. oz. per acre. Observe resistance management restrictions. REI: 4-hour. PHI: 1-day. *OMRI-listed*.

Exirel® (cyantraniliprole) *Eggplant, Pepper, Tomato* 7.0-13.5 fl. oz. per acre. Do not exceed 61.7 fl. oz. per acre per season REI: 12-hour. PHI: 1-day.

Harvanta® (cyclaniliprole) *Eggplant, Pepper, Tomato* 10.9-16.4 fl. oz. per acre. Do not exceed 65.6 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day.

Mustang Maxx® (zeta-cypermethrin) *Eggplant, Pepper, Tomato* 2.24-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow at least 7 days between applications. REI: 12-hour. PHI: 1-day. *RUP*.

Permethrin® 3.2EC (permethrin) *Eggplant, Tomato* 2-8 fl. oz. per acre. Do not exceed 80 fl. oz. per acre per season for eggplant. Do not exceed 48 fl. oz. per acre per season for tomato. REI: 12-hour. PHI: 0-day for tomato, 3-day for eggplant. *RUP*.

Platinum 75SG® (thiamethoxam) *Eggplant, Pepper, Tomato* 1.66-3.67 oz. per acre. Soil Application. Do not exceed 3.67 oz. per acre per season. REI: 12-hour. PHI: 30-day.

Radiant 1SC® (spinetoram) *Eggplant, Pepper, Tomato* 5-10 fl. oz. per acre. Do not exceed 34 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day.

Rimon 0.83EC® (novaluron) *Eggplant, Pepper, Tomato* 9-12 fl. oz. per acre. Do not exceed 36 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day.

Sivanto Prime® (flupyradifurone) *Eggplant, Pepper, Tomato* 10.5-14 fl. oz. per acre. REI: 4-hour. PHI: 1-day.

Venom 70SG® (dinotefuran) *Eggplant, Pepper, Tomato* 1-4 oz. per acre. Foliar application. REI: 12-hour. PHI: 1-day.

Verimark® (cyantraniliprole) *Eggplant, Pepper, Tomato* 5-10 fl. oz. per acre. REI: 4-hour. PHI: 1-day.

Vydate L® (oxamyl) *Eggplant, Tomato* 2-4 pts. per acre. Do not exceed 16 pts. per acre per season for eggplant. Do not exceed 32 pts. per acre per season for tomato REI: 48-hour. PHI: 1-day for eggplant, 3-day for tomato. *RUP*.

Warrior II® (lambda-cyhalothrin) *Eggplant, Pepper, Tomato* 1.28-1.92 fl. oz. per acre. Do not exceed 23 fl. oz. per acre per season. Not for use against western flower thrips. REI: 24-hour. PHI: 5-day. *RUP*.

Flea Beetles

Actara® (thiamethoxam) *Eggplant, Pepper, Tomato* 2-3 oz. per acre. Do not exceed 11 oz. per acre per season. REI: 12-hour. PHI: 0-day.

Admire Pro® (imidacloprid) *Eggplant, Pepper, Tomato* Soil Application. 7.0-10.5 fl. oz. per acre for eggplant and tomato. 7-14 fl. oz. per acre for pepper. Do not exceed 10.5 fl. oz. per acre per season. REI: 12-hour. PHI: 21-day.

Ambush® (permethrin) *Eggplant, Pepper* 6.4-12.8 fl. oz. per acre. REI: 12-hour. PHI: 3-day. *RUP*.

Asana XL® (esfenvalerate) *Eggplant, Pepper, Tomato* 5.8-9.6 fl. oz. per acre. Do not apply more than 67.2 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. *RUP*.

Baythroid XL® (beta-cyfluthrin) *Eggplant, Pepper, Tomato* 2.8 fl. oz. per acre. Do not exceed 16.8 fl. oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 0-day for tomato, 7-day for eggplant and pepper. *RUP*.

Brigade 2EC® (bifenthrin) *Eggplant, Pepper, Tomato* 2.1-6.4 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 12.8 fl. oz. per acre per season for eggplant and pepper. Do not exceed 25.6 fl. oz. per acre per season for tomato. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. *RUP*.

Mustang Maxx® (zeta-cypermethrin) *Eggplant, Pepper, Tomato* 2.24-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow at least 7 days between applications. REI: 12-hour. PHI: 1-day. *RUP*.

Permethrin 3.2EC® (permethrin) *Eggplant* 4-8 fl. oz. per acre. Do not exceed 80 fl. oz. per acre per season. REI: 12-hour. PHI: 3-day. *RUP*.

Permethrin 3.2EC® (permethrin) *Pepper* 4-8 fl. oz. per acre. Bell Peppers only. Do not exceed 64 fl. oz. per acre per season. REI: 12-hour. PHI: 3-day. *RUP*.

Platinum 75SG® (thiamethoxam) *Eggplant, Pepper, Tomato* 1.66-3.67 oz. per acre. Soil Application. Do not exceed 3.67 oz. per acre per season. REI: 12-hour. PHI: 30-day.

Sevin XLR Plus® (carbaryl) *Eggplant, Pepper, Tomato* 0.5-1 qt. per acre. Do not exceed 8 qt. per acre per crop. REI: 12-hour. PHI: 3-day.

Venom 70SG® (dinotefuran) *Eggplant, Pepper, Tomato* 1-4 fl. oz. per acre foliar application, or 5-7.5 fl. oz. per acre soil application REI: 12-hour. PHI: 1-day for foliar application, or 21 day for soil application.

Warrior II® (lambda-cyhalothrin) *Eggplant, Pepper, Tomato* 1.28-1.92 fl. oz. per acre. Do not exceed 23 fl. oz. per acre per season. Not for use against western flower thrips. REI: 24-hour. PHI: 5-day. *RUP*.

Fruit Flies

Starting 2 weeks before harvest, place bait fruits in fields in late afternoon, and examine next morning. If half of the baits show eggs, spray fields immediately at 4-6 day

intervals. Treat harvested fruit and hampers as soon as filled with a dust containing 0.1% stabilized pyrethrins plus 1.0% piperonyl butoxide (such as Evergreen Pro 60-6®), and move hampers to processing plant as soon as possible.

Malathion 57EC® (malathion) *Eggplant, Pepper, Tomato* 2.5 pts. per acre. REI: see label. PHI: 1-day.

Mites

Conserve or introduce natural enemies *Eggplant, Pepper, Tomato* Numerous biological control agents are produced for deployment into greenhouse cropping systems. Biocontrols are the enemy of the enemy. Some can be purchased and deployed, and others can be conserved through non-crop habitat management and careful pesticide use.

abamectin formulations (abamectin) *Eggplant, Pepper, Tomato* 1.75-3.5 fl. oz. per acre for SC formulations. 8-16 fl. oz. per acre for 0.15SC formulations. Do not exceed 10.25 fl. oz. per acre per season. REI: 12-hour. PHI: 7-day. *RUP*.

Acramite 50WS® (bifenazate) *Eggplant, Pepper, Tomato* 0.75-1 lb. per acre. Two-spotted spider mites only. Do not exceed 1 application per season. REI: 12-hour. PHI: 3-day.

Kanemite 15SC® (acequinocyl) *Eggplant, Pepper, Tomato* 31 fl. oz. per acre. Spider mites only. REI: 12-hour. PHI: 1-day.

Movento® (spirotetramat) *Eggplant, Pepper, Tomato* 4-5 fl. oz. per acre. Russet mites and broad mites only. Do not exceed 10 fl. oz. per acre per season. REI: 24-hour. PHI: 1-day.

Nealta® (cyflumetofen) *Tomato* 13.7 fl. oz. per acre. Spider mites only. Do not exceed 27.4 fl. oz. per acre per crop. REI: 12-hour. PHI: 3-day.

Oberon 2SC® (spiromesifen) *Eggplant, Pepper, Tomato* 7-8.5 fl. oz. per acre. Do not exceed 25.5 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day.

Portal® (fenpyroximate) *Eggplant, Pepper, Tomato* 2 pt. per acre. Do not exceed 2 applications per season. REI: 12-hour. PHI: 1-day.

Vydate L® (oxamyl) *Eggplant* 2-4 pts. per acre. Do not exceed 16 pts. per acre per season. REI: 48-hour. PHI: 1-day. *RUP*.

Wettable Sulfur (sulfur) *Tomato* 5-30 lb. per acre. Russet mites only. Sulfur as a dust is also effective. Thorough coverage is required. Do not apply when temperatures are above 95F or during a heavy dew. REI: 24-hour. PHI:

Stink Bugs

Actara® (thiamethoxam) Eggplant, Pepper, Tomato 3.0-5.5 oz. per acre. Do not exceed 11 oz. per acre per season. REI: 12-hour. PHI: 0-day.

Azera® (azadirachtin, pyrethrins) Eggplant, Pepper, Tomato 1-3.5 pts. per acre. REI: 12-hour. PHI: 0-day. OMRI-listed.

Baythroid XL® (beta-cyfluthrin) Eggplant, Pepper, Tomato 1.6-2.8 fl. oz. per acre. Do not exceed 16.8 fl. oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 0-day for tomato, 7-day for eggplant and pepper. RUP.

Brigade 2EC® (bifenthrin) Eggplant, Pepper, Tomato 2.1-6.4 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 12.8 fl. oz. per acre per season for eggplant and pepper. Do not exceed 25.6 fl. oz. per acre per season for tomato. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. RUP.

Danitol 2.4EC® (fenpropathrin) Eggplant, Pepper, Tomato 10.67 fl. oz. per acre. Do not exceed 42.67 fl. oz. per acre per season. REI: 24-hour. PHI: 3-day. RUP.

Lannate LV® (methomyl) Pepper, Tomato 1.5-3.0 pts. per acre. Brown Marmorated Stink Bugs only. Do not exceed 21 pts. per acre per season. REI: 48-hour. PHI: 1-day for tomato, 3-day for pepper. RUP.

Mustang Maxx® (zeta-cypermethrin) Eggplant, Pepper, Tomato 3.2-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 1-day. RUP.

Venom 70SG® (dinotefuran) Eggplant, Pepper, Tomato 1-4 oz. per acre. Foliar application. REI: 12-hour. PHI: 1-day.

Warrior II® (lambda-cyhalothrin) Eggplant, Pepper, Tomato 1.28-1.92 fl. oz. per acre. Do not exceed 23 fl. oz. per acre per season. Not for use against western flower thrips. REI: 24-hour. PHI: 5-day. RUP.

Thrips

Conserve or introduce natural enemies Eggplant, Pepper, Tomato Numerous biological control agents are produced for deployment into greenhouse cropping systems. Biocontrols are the enemy of the enemy. Some can be purchased and deployed, and others can be conserved through non-crop habitat management and careful pesticide use.

Aza-Direct® (azadirachtin) Eggplant, Pepper, Tomato 1-3.5 pts. per acre. REI: 4-hour. PHI: 0-day. OMRI-listed.

Grandevo® (Chromobacterium subsugae strain PRAA4-1) Eggplant, Pepper, Tomato 2-3 lb. per acre. REI: 4-hour. PHI: 0-day. OMRI-listed.

Venerate® (Burkholderia spp. strain A396) Eggplant, Pepper, Tomato 1-8 qts. per acre. REI: 4-hour. PHI: 0-day. OMRI-listed.

abamectin formulations (abamectin) Eggplant, Pepper, Tomato 1.75-3.5 fl. oz. per acre for SC formulations. 8-16 fl. oz. per acre for 0.15SC formulations. Do not exceed 10.25 fl. oz. per acre per season. REI: 12-hour. PHI: 7-day. RUP.

Admire Pro® (imidacloprid) Eggplant, Pepper, Tomato Soil Application. 7.0-10.5 fl. oz. per acre for eggplant and tomato. 7-14 fl. oz. per acre for pepper. Do not exceed 10.5 fl. oz. per acre per season. REI: 12-hour. PHI: 21-day.

Assail 70WP® (acetamiprid) Eggplant, Pepper, Tomato 0.075 lb. or 1.7 fl. oz. per acre. REI: 12-hour. PHI: 7-day.

Azera® (azadirachtin, pyrethrins) Eggplant, Pepper, Tomato 2-3.5 pts. per acre. REI: 12-hour. PHI: 0-day. OMRI-listed.

Baythroid XL® (beta-cyfluthrin) Eggplant, Pepper, Tomato 2.1-2.8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. RUP.

Brigade 2EC® (bifenthrin) Eggplant, Pepper, Tomato 2.1-6.4 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 12.8 fl. oz. per acre per season for eggplant and pepper. Do not exceed 25.6 fl. oz. per acre per season for tomato. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. RUP.

Closer SC® (sulfoxaflor) Eggplant, Pepper, Tomato 4.25-4.5 fl. oz. per acre. REI: 12-hour. PHI: 1-day.

Entrust® (spinosad) Eggplant, Pepper, Tomato 1.25-2.5 oz. per acre. REI: 4-hour. PHI: 1-day. OMRI-listed.

Exirel® (cyantraniliprole) Eggplant, Pepper, Tomato 13.5-20.5 fl. oz. per acre. Do not exceed 61.7 fl. oz. per acre per season REI: 12-hour. PHI: 1-day.

Harvanta® (cyclaniliprole) Eggplant, Pepper, Tomato 10.9-16.4 fl. oz. per acre. Do not exceed 65.6 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day.

Minecto Pro® (cyantraniliprole, abamectin) Eggplant, Pepper, Tomato 10.0 fl. oz. per acre. REI: 12-hour. PHI: 1-day. RUP.

Movento® (spirotetramat) Eggplant, Pepper, Tomato 4-5 fl. oz. per acre. Do not exceed 10 fl. oz. per acre per season. REI: 24-hour. PHI: 1-day.

Mustang Maxx® (zeta-cypermethrin) Eggplant, Pepper, Tomato 3.2-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow 7 days between

applications. REI: 12-hour. PHI: 1-day. *RUP.*

Platinum 2SC® (thiamethoxam) *Eggplant, Pepper, Tomato* 5-11 fl. oz. per acre. REI: 12-hour. PHI: 30-day.

Radiant 1SC® (spinetoram) *Eggplant, Pepper, Tomato* 6-10 fl. oz. per acre. Do not exceed 34 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day.

Rimon 0.83EC® (novaluron) *Eggplant, Pepper, Tomato* 12 oz. per acre. Do not exceed 36 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day.

Torac 15EC® (tolfenpyrad) *Eggplant, Pepper, Tomato* 21 fl. oz. per acre. Do not exceed 42 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day.

Venom 70SG® (dinotefuran) *Eggplant, Pepper, Tomato* 1-4 fl. oz. per acre foliar application, or 5-7.5 fl. oz. per acre soil application REI: 12-hour. PHI: 1-day for foliar application, or 21 day for soil application.

Warrior II® (lambda-cyhalothrin) *Eggplant, Pepper, Tomato* 1.28-1.92 fl. oz. per acre. Do not exceed 23 fl. oz. per acre per season. Not for use against western flower thrips. REI: 24-hour. PHI: 5-day. *RUP.*

Whiteflies

Conserve or introduce natural enemies *Eggplant, Pepper, Tomato* Numerous biological control agents are produced for deployment into greenhouse cropping systems. Biocontrols are the enemy of the enemy. Some can be purchased and deployed, and others can be conserved through non-crop habitat management and careful pesticide use.

Neemix® (azadirachtin) *Eggplant, Pepper, Tomato* 4-16 fl. oz. per acre. For nymph (immature) control. REI: 4-hour. PHI: 0-day. *OMRI-listed.*

Actara® (thiamethoxam) *Eggplant, Pepper, Tomato* 3.0-5.5 oz. per acre. Do not exceed 11 oz. per acre per season. REI: 12-hour. PHI: 0-day.

Admire Pro® (imidacloprid) *Eggplant, Pepper, Tomato* 1.3-2.2 fl. oz. per acre foliar application for eggplant, pepper, and tomato. 7.0-10.5 fl. oz. per acre soil application on eggplant and tomato, up to 14 fl. oz. per acre for pepper. Do not exceed 6.7 fl. oz. per acre for foliar applications. Do not exceed 10.5 fl. oz. per acre for soil applications on eggplant and tomato, or 14 fl. oz. for pepper. REI: 12-hour. PHI: 0-day for foliar application, or 21-day for soil application.

Asana XL® (esfenvalerate) *Tomato* 5.8-9.6 fl. oz. per acre. Do not apply more than 67.2 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day. *RUP.*

Assail 30SG® (acetamiprid) *Eggplant, Pepper, Tomato* 2.5-4 oz. per acre. Do not exceed 16 oz. per acre per season REI: 12-hour. PHI: 7-day.

Brigade 2EC® (bifenthrin) *Eggplant, Pepper, Tomato* 2.1-6.4 fl. oz. per acre. Check label for specific caterpillars. Do not exceed 12.8 fl. oz. per acre per season for eggplant and pepper. Do not exceed 25.6 fl. oz. per acre per season for tomato. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. *RUP.*

Closer SC® (sulfoxaflor) *Eggplant, Pepper, Tomato* 4.25-4.5 fl. oz. per acre. REI: 12-hour. PHI: 1-day.

Coragen® (chlorantraniliprole) *Eggplant, Pepper, Tomato* 5.0-7.5 fl. oz. per acre. Can be applied as either a foliar application or via drip chemigation. Chemigation will provide up to 30 days of control. Do not exceed 15.4 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day.

Exirel® (cyantraniliprole) *Eggplant, Pepper, Tomato* 13.5-20.5 fl. oz. per acre. Do not exceed 61.7 fl. oz. per acre per season REI: 12-hour. PHI: 1-day.

Knack® (pyriproxyfen) *Eggplant, Pepper, Tomato* 8-10 fl. oz. per acre. Do not exceed 2 applications per season. REI: 12-hour. PHI: 1-day.

Movento® (spirotetramat) *Eggplant, Pepper, Tomato* 4-5 fl. oz. per acre. Do not exceed 10 fl. oz. per acre per season. REI: 24-hour. PHI: 1-day.

Oberon 2SC® (spiromesifen) *Eggplant, Pepper, Tomato* 7-8.5 fl. oz. per acre. Do not exceed 25.5 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day.

Platinum 75SG® (thiamethoxam) *Eggplant, Pepper, Tomato* 1.66-3.67 oz. per acre. Soil Application. Do not exceed 3.67 oz. per acre per season, or 1 application per season. REI: 12-hour. PHI: 30-day.

Portal® (fenpyroximate) *Eggplant, Pepper, Tomato* 2 pt. per acre. Do not exceed 2 applications per season. REI: 12-hour. PHI: 1-day.

Sivanto Prime® (flupyradifurone) *Eggplant, Pepper, Tomato* 10.5-14 fl. oz. per acre foliar application, or 21-28 fl. oz. per acre soil application. REI: 4-hour. PHI: 1-day for foliar application, or 45-day for soil application.

Venom 70SG® (dinotefuran) *Eggplant, Pepper, Tomato* 1-4 fl. oz. per acre foliar application, or 5-7.5 fl. oz. per acre soil application REI: 12-hour. PHI: 1-day for foliar application, or 21 day for soil application.

Verimark® (cyantraniliprole) *Eggplant, Pepper, Tomato* 6.75-13.5 fl. oz. per acre. Apply via drip chemigation or soil injection. REI: 4-hour. PHI: 1-day.

OMRI-listed indicates that the product is listed by the Organic Materials Review Institute (OMRI.org) and therefore may be acceptable for use in organic production. Check with your certifier before use.