

Fruiting Vegetables - Horticulture

Major update by Ben Phillips, Liz Maynard – Oct 2020
Reviewed by Liz Maynard, Brad Bergefurd – Aug 2022

Crop Description

Eggplants (*Solanum melongena*): In the Midwest the primary eggplant varieties grown are tear-drop shaped and deep purple. There are many other types of eggplant and these should be considered when there is demand for them in your markets. Traditionally many types have been associated with specific cultures or cuisines. There are longer and thinner types that look more like summer squashes, and smaller and rounder types that are shaped more like beefsteak and cherry tomatoes. They come in a variety of colors from white, green, pink, purple, brown, and striped. There are also ornamental eggplants that make bright orange and red fruits shaped like miniature pumpkins, which can be dried.

Peppers (*Capsicum annuum*, *C. chinense*, *C. baccatum*, *C. frutescens*, and *C. pubescens*): Similar to eggplants, there are pepper types that are closely tied with specific cultures. The most common species grown for midwestern markets is *C. annuum*, which includes sweet green and colored bell peppers, as well as other sweet and hot peppers including banana, Hungarian wax, Italian, jalapeño, serrano, and poblano. These are grown for both fresh market and processing. The four other cultivated species include much hotter peppers that rate above 50,000 on the Scoville scale that is used to measure pepper pungency. These can be a strong niche market, but a little goes a long way, and these smaller-fruited types produce large numbers of fruit per plant. Clearly labeling varieties from seeding to sale is important to prevent look-alike sweet and hot peppers from being confused.

Tomatoes (*Solanum lycopersicum*): There are many types of tomatoes that differ in their fruit shape, size, color, and plant growth habits. Larger beefsteak tomatoes are juicy. Roma and plum types contain less juice and are better for canning and processing. Stuffing tomatoes are large like a beefsteak but without as much flesh or juice inside, leaving a hollow cavity like a pepper. Grape and cherry types tend to be sweeter. Determinate and semi-determinate plants grow 3 to 4 feet tall when trellised. Indeterminate plants continue to grow in height for the entire season and are almost always trellised or otherwise supported.

Planting and Spacing

Fresh market eggplant, peppers, and tomatoes are often grown on raised beds covered with plastic mulch to promote earliness. 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. Bare ground production uses row spacings of 2-1/2 to 5 feet.

Eggplant for fresh market: Space plants 1-1/2 to 2-1/2 feet apart in the row on beds, or 1-1/2 to 3 feet apart in bare ground rows. Eggplants may benefit from staking and support from a trellis-weave system if plants tend to break, lean, or lodge. Eggplants require full sun and well-drained soil. Eggplants grow best with warm soil, and hot weather.

Peppers for fresh market: Space plants 1 to 1-1/2 feet apart in a single or double row on beds, or 1 to 1-1/2 feet apart in bare ground rows. Peppers may benefit from staking and support from a trellis-weave system 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 for processing: Hand harvest is common for processing peppers, and similar spacings are used as for fresh market production. For machine harvested crops, select row spacing and bed formation that will work with available harvesting equipment.

Tomatoes for fresh market: Space plants 1-1/2 to 2-1/2 feet apart in the row on beds, or 1-1/2 to 3 feet apart in bare ground rows. 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 a 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.

Tomatoes for machine harvest and processing: 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.

Fertilizing

pH: Maintain a soil pH of 6.0 to 6.8.

Eggplant, Peppers, and Tomatoes for Fresh Market:

Before planting, apply 30 pounds N per acre, 0 to 240 pounds P₂O₅ per acre, and 0 to 300 pounds K₂O per acre based on soil test results and recommendations from your state. At transplanting, a starter solution at a rate of 1 cup (8 ounces) per plant is recommended. If the transplant flat receives a heavy fertilizer feeding just prior to setting, the starter solution can be eliminated.

Sidedress with 30 to 40 pounds N per acre three to four weeks after transplanting, and then again six to eight weeks after transplanting. Sidedressing may be replaced by supplying N through a 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% organic matter. The total amount of N from fertilizer (including starter) and other credits should be 100 to 120 pounds per acre.

K₂O may also be supplied through drip irrigation at a rate of 1 to 1-1/2 pounds per acre per day for peppers and eggplant, and 1-1/2 to 2-1/2 pounds per acre per day for tomatoes. Reduce the amount of K₂O applied before planting by the amount that will be supplied through drip irrigation.

Tomatoes for Processing: Apply 2/3 of total N fertilizer before planting. Total fertilizer N required is 90 to 150 pounds per acre depending on previous crop, so 60 to 100 pounds may be applied before planting. Also apply 0 to 240 pounds P₂O₅ per acre, and 0 to 300 pounds K₂O per acre based on soil test results and recommendations from your state. Or, split the K₂O application and on sandy soils apply 1/3 and on heavier soils apply 2/3 of the K₂O before planting and the remainder two to three weeks after transplanting, before flowering. At transplanting, apply a starter solution containing N and P.

Sidedress with 30 to 50 pounds N per acre two to three weeks after transplanting before flowering. If using a split K₂O application, apply the remainder of K₂O at this time also. 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% organic matter.

Physiological Disorders

There are several tomato problems related to environmental and nutrient factors that are not infectious diseases caused by pathogens.

Blossom End Rot: 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 is 6.0 or higher, additional soil-applied calcium does not correct the disorder. To limit this problem, choose less susceptible varieties, avoid drastic moisture fluctuations with irrigation monitoring and mulches, and maintain soil pH and calcium levels in desired range.

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 (e.g, 2, 4-D or dicamba) can lead to similar fruit deformation.

Cracks, radial and concentric: 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, maintain healthy foliage, and carefully manage water availability through irrigation management and the use of plastic mulch.

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.

Sunscaud: Fruit exposed to the sun may overheat and develop sunscaud. 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.

Color and ripening disorders: Yellow shoulder/internal white tissue, blotchy ripening, and graywall affect color

development and ripening. They can be caused by pests, environmental conditions, and/or nutrient imbalances, but are generally complex and not well-understood. They can be a major quality issue for both fresh market and processing tomato. Inadequate potassium is linked to this disorder, and research in processing tomatoes has shown that adequate potassium early in tomato plant development is necessary, as well as during fruit development. Competing nutrients, such as magnesium and calcium are also a factor. The 'Hartz Ratio' calculator, available online through The Ohio State University provides a way to assess risk of the disorder in processing tomatoes based on soil properties.

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.

Harvesting

Eggplant for fresh market: Harvests can take place every few days once fruits ripen to a glossy finish. Fruit sizes depend on variety. When the skin sheen gets dull and seeds turn brown, they are past their prime. Fruit quality diminishes late in the season. Fruit should be handled carefully to avoid bruising. Time from transplanting to harvest ranges from 80 to 100 days.

Peppers for fresh market and processing: Harvests can take place every few days once fruit reaches marketable size or color. Careful selection of early-ripening varieties and passing up green harvests will maximize the yield of colored fruits in our northern climate. Fruit quality diminishes late in the season. Time from transplanting to harvest ranges from 70 to 100 days.

Tomatoes for fresh market: Harvests can take place every few days once fruits start to ripen. Small-fruited varieties such as 'cocktail', grape, or cherry tomatoes can be harvested 'on the vine' by cutting clusters of fruit. To avoid unnecessary extra handling, place these clusters directly into sales containers. Time from transplanting to harvest ranges from 70 to 90 days.

Tomatoes for machine harvest and processing: Ethephon applications may be used to accelerate and concentrate fruit ripening, facilitating once-over machine harvesting of processing tomatoes. If needed, apply 3.25 pts. Ethephon 2SL in 5 to 70 gallons of water per acre as a spray over the entire planting when 10 to 30% of fruits are ripe. Harvest 15 to 21 days after treatment for optimum ripe fruit accumulation. Time from transplanting to harvest ranges from 90 to 110 days.

Fruiting Vegetables - Diseases

Reviewed by Mohammad Babadoost, Cesar Escalante – Aug 2024

Anthracnose of Fruiting Vegetables - Colletotrichum Fungus

Symptoms usually occur on ripe or over-ripe fruit. Begin fungicide applications at or shortly before fruit set.

Non-Pesticide

Eggplant, Pepper, Tomato | Use pathogen-free seed and disease-free transplants. Hot water seed treatment may reduce this seedborne disease. Use temperatures and times of 122 F for 25 minutes for eggplants and tomato, and 125 F for 30 minutes for pepper. Rotate to non-Solanaceous crops for 3-4 years. Use raised beds, staking, and mulch to improve drainage, air flow, and reduce splashing. Prompt destruction of the finished crop with tillage to rapidly break down tissue is an important method to prevent pathogen build-up. Anaerobic soil disinfestation (ASD) is an effective biological treatment for greenhouse and high tunnel soils that contain this pathogen.

Pesticide

Aprovia Top (difenoconazole, benzovindiflupyr) *Eggplant, Pepper, Tomato* | 10.5-13.5 fl. oz. per acre. Use of a spreader sticker is recommended. REI: 12-hour. PHI: 0-day. FRAC 03, FRAC 07.

azoxystrobin products (azoxystrobin) *Tomato* | Several formulations are labeled at various rates (Acadia LFC, AZteroid FC 3.3, Dexter SC, Heritage, Quadris, Satori). Use 34.3% formulations at 3.9-9.7 fl. oz. per acre. Use 22.9% formulations at 6.0-15.5 fl. oz. per acre. Use 18.4% formulations at 6.3-7.8 fl. oz. per acre. Use 50% formulations (Heritage) on greenhouse transplants only at 0.024-0.08 oz. per 1,000 sq. ft. REI: 4-hour. PHI: 0-day. FRAC 11.

Azterknot (azoxystrobin, Reynoutria sachalinensis extract) *Tomato* | 5.9-7.4 fl. oz. per acre. REI: 4-hour. PHI: 0-day. FRAC 11, FRAC P05.

Cabrio EG (pyraclostrobin) *Eggplant, Pepper, Tomato* | 8-12 oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 11.

Cevya (mefentrifluconazole) *Eggplant, Pepper, Tomato* | 3-5 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 03.

chlorothalonil products (chlorothalonil) *Eggplant, Pepper* | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 54% (720) formulations at 1.5 pt. per acre. Use 82.5% (WDG) formulations at 1.4 lb. per acre. REI: 12-hour. PHI: 3-day. FRAC M05.

Flint Extra (trifloxystrobin) *Eggplant, Pepper, Tomato* | 3.0-3.8 fl. oz. per acre. Use Gem 500 SC at same rate. Use Flint (50%) formulation at 3-4 fl. oz. per acre. REI: 12-hour. PHI: 3-day. FRAC 11.

Fontelis (penthiopyrad) *Eggplant, Pepper, Tomato* | 16-24 fl. oz. per acre for all diseases listed here except anthracnose at 24 fl. oz. Suppression only for anthracnose. In the greenhouse use a rate of 0.75 fl. oz. per gallon per 1,360 sq. ft. REI: 12-hour. PHI: 0-day. FRAC 07.

Inspire Super (difenoconazole, cyprodinil) *Eggplant, 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. FRAC 03, FRAC 09.

mancozeb products (mancozeb) *Pepper, Tomato* | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Use 37% formulations at 0.6-2.4 qt. per acre. Use 75% and 80% formulations at 0.75-3.0 lb. per acre. REI: 24-hour. PHI: 5-day. FRAC M03.

Mettle 125ME (tetraconazole) *Eggplant, Pepper, Tomato* | 6-8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 03.

Orondis Opti (oxathiapiprolin, chlorothalonil) *Eggplant, Pepper, Tomato* | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day. FRAC 49, FRAC M05.

Pageant Intrinsic (boscalid, pyraclostrobin) *Eggplant, Pepper, Tomato* | Rates are as follow per acre: Powdery mildew at 9.7-18 oz.; gray mold at 23 oz. Do not apply on seedlings meant for transplanting in the field. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Pageant Intrinsic (boscalid, pyraclostrobin) *Tomato* | Rates are as follows per acre.: Gray mold, 23 oz.; anthracnose and early blight 12.25-23 oz. Labeled for greenhouse-/high tunnel-grown tomatoes. Do not apply on seedlings meant for transplanting in the field. For Pythium and Rhizoctonia spp. use 12-18 oz. per 100 gals. water. Do not apply on seedlings meant for transplanting in the field. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Priaxor (fluxapyroxad, pyraclostrobin) *Eggplant, Pepper, Tomato* | 6-8 fl. oz. per acre. Late blight, 8 fl. oz. per acre. Gray mold and white mold suppression only. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Quadris 2.08SC (azoxystrobin) *Pepper, Tomato* | 5-6.2 fl. oz. per acre. REI: 4-hour. PHI: 0-day. FRAC 11.

Quadris Opti (azoxystrobin, chlorothalonil) *Tomato* | 1.6 per pts. per acre REI: 12-hour. PHI: 0-day. FRAC 11, FRAC M05.

Quadris Top (azoxystrobin, difenoconazole) *Pepper, Tomato* | 8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC 03.

Regev (tea tree oil, difenoconazole) *Eggplant, Pepper, Tomato* | 4-8.5 fl. oz. per acre. REI: 12-hour. PHI: 2-day. IRAC UNE, FRAC BM01, FRAC 03.

Revus Top (mandipropamid, difenoconazole) *Tomato* | 5.5-7.0 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day. FRAC 40, FRAC 03.

Rhyme (flutriafol) *Pepper, Tomato* | 5-7 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 03.

Serenade Opti (Bacillus subtilis strain QST-713) *Eggplant, Pepper, Tomato* | Use Serenade Opti at 14-20 fl. oz. per acre, or Serenade ASO at 2-4 qts. per acre. Can be used in a rotational program with effective fungicides to reduce synthetic fungicide use. REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed.*

Tanos (famoxadone, cymoxanil) *Pepper, Tomato* | Tomato: Early blight at 6-8 oz. per acre. Late blight and anthracnose at 8 oz per acre. For suppression of bacterial diseases of tomato, 8 oz. For late blight, tank-mix with a contact fungicide with a different mode of action. Pepper: Anthracnose at 8-10 fl. oz. REI: 12-hour. FRAC 11, FRAC 27.

Bacterial Canker of Fruiting Vegetables - Clavibacter Bacteria

The bacterium becomes systemic in the plant, causing wilt and leaf/fruit/stem lesions. It can occur on tomato and pepper, but is mainly a problem on tomato.

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.

Inspect seedlings for disease and discard any flats containing diseased seedlings as well as flats bordering any with diseased seedlings.

Non-Pesticide

Pepper, Tomato | Use pathogen-free seed and disease-free transplants. Hot water seed treatment may reduce this seedborne disease. Use temperatures and times of 122 F for 25 minutes for eggplants and tomato, and 125 F for 30 minutes for pepper. Practice good greenhouse sanitation of equipment, tools propagation trays/pots, and surfaces. Avoid fields with a history of the disease and rotate to non-Solanaceous crops for 3-4 years. Stake and mulch the crops to improve air flow and reduce splashing. Avoid working in wet fields. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up.

Pesticide

Tanos (famoxadone, cymoxanil) *Pepper, Tomato* | Tomato: Early blight at 6-8 oz. per acre. Late blight and anthracnose at 8 oz per acre. For suppression of bacterial diseases of tomato, 8 oz. For late blight, tank-mix with a contact fungicide with a different mode of action. Pepper: Anthracnose at 8-10 fl. oz. REI: 12-hour. FRAC 11, FRAC 27.

Bacterial Speck of Fruiting Vegetables - Pseudomonas Bacteria

Lesions of this disease can be found on leaves, stems, and fruit of peppers and tomatoes. But, it is rarely a problem for eggplants.

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.

While still in the greenhouse, scout and apply fixed copper alternated with streptomycin (Agri-mycin, AG Streptomycin). Once in the field, apply a fixed copper product tank-mixed with mancozeb on 7 day schedule, depending on disease pressure, beginning within 1 week after transplanting. Airblast sprayers with high fan speed can make an outbreak worse by sandblasting plants with droplets and opening many small wounds that become infected.

Copper Resistance: Strains of the bacterium that cause bacterial speck on tomato and Pseudomonas leaf spot on pepper that are resistant to copper products occur in the

Midwest. Actigard, streptomycin products (transplant production in greenhouses only), mancozeb products, Tanos, and Serenade used as labeled may help manage copper-resistant strains.

Non-Pesticide

Eggplant, Pepper, Tomato | Use pathogen-free seed and disease-free transplants. Hot water seed treatment may reduce this seedborne disease. Use temperatures and times of 122 F for 25 minutes for eggplants and tomato, and 125 F for 30 minutes for pepper. Practice good greenhouse sanitation of equipment, tools propagation trays/pots, and surfaces. Avoid fields with a history of the disease and rotate to non-Solanaceous crops for 2-3 years. Stake and mulch the crops to improve air flow and reduce splashing. Avoid working in wet fields. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up.

Pesticide

Actigard (acibenzolar-s-methyl) *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. FRAC P01.

copper products (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Pepper, Tomato* | Several formulations of copper (Badge, Champ, Kocide) are labelled for use. See label for directions. Copper-resistant strains of the bacterial spot pathogen are common in the Midwest. Mancozeb products (e.g., Dithane, Manzate, Penncozeb) 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: 4 to 48-hour. PHI: 0-day. FRAC M01. *OMRI-listed*.

LifeGard WG (Bacillus mycoides isolate J) *Eggplant, Pepper, Tomato* | 1-4.5 oz. per acre. 1-4.5 oz. per acre or 4.5 oz. per 100 gals. water. Suppression only; can be used in a rotational program with effective fungicides to reduce synthetic fungicide use REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed*.

mancozeb products (mancozeb) *Pepper, Tomato* | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Use 37% formulations at 0.6-2.4 qt. per acre. Use 75% and 80% formulations at 0.75-3.0 lb. per acre. REI: 24-hour. PHI: 5-day. FRAC M03.

Regalia (Reynoutria sachalinensis extract) *Eggplant, Pepper, Tomato* | 1-4 qts. per acre. Use in a program with

copper products. On greenhouse-produced seedlings, drench planting medium with 1-2 qts. per gal. water or dip seedlings in solution of 1-2 qts. per 100 gal. water immediately before transplanting. REI: 4-hour. PHI: 0-day. FRAC P05. *OMRI-listed*.

Serenade Opti (Bacillus subtilis strain QST-713) *Eggplant, Pepper, Tomato* | Use Serenade Opti at 14-20 fl. oz. per acre, or Serenade ASO at 2-4 qts. per acre. Can be used in a rotational program with effective fungicides to reduce synthetic fungicide use. REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed*.

Tanos (famoxadone, cymoxanil) *Pepper, Tomato* | Tomato: Early blight at 6-8 oz. per acre. Late blight and anthracnose at 8 oz per acre. For suppression of bacterial diseases of tomato, 8 oz. For late blight, tank-mix with a contact fungicide with a different mode of action. Pepper: Anthracnose at 8-10 fl. oz. REI: 12-hour. FRAC 11, FRAC 27.

Bacterial Spot of Fruiting Vegetables - Xanthomonas Bacteria

Lesions of this disease can be found on leaves, stems, and fruit of eggplants, peppers and tomatoes, but it is rarely a problem for eggplants. Infection of blossom stem of tomato prevents fruit set.

Sanitize machinery, 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.

While still in the greenhouse, scout and apply fixed copper alternated with streptomycin (Agri-mycin, Firewall, Streptrol). Once in the field, apply a fixed copper product tank-mixed with mancozeb on 5-7 day schedule, depending on disease pressure, beginning within 1 week after transplanting. Airblast sprayers with high fan speed can make an outbreak worse by sandblasting plants with droplets and opening many small wounds that become infected.

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

Non-Pesticide

Eggplant, Pepper, Tomato | Use pathogen-free seed and disease-free transplants. Hot water seed treatment may reduce this seedborne disease. Use temperatures and times of 122 F for 25 minutes for eggplants and tomato, and 125 F for 30

minutes for pepper. Practice good greenhouse sanitation of equipment, tools propagation trays/pots, and surfaces. Avoid fields with a history of the disease and rotate to non-Solanaceous crops for 2-3 years. Stake and mulch the crops to improve air flow and reduce splashing. Avoid working in wet fields. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up.

Pesticide

Actigard (acibenzolar-s-methyl) *Pepper, Tomato* | 0.3-0.75 oz. per acre for tomato. For **bell peppers with Michigan 24c label use at 0.25-0.33 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. FRAC P01.

copper products (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Pepper, Tomato* | Several formulations of copper (Badge, Champ, Kocide) are labelled for use. See label for directions. Copper-resistant strains of the bacterial spot pathogen are common in the Midwest. Mancozeb products (e.g., Dithane, Manzate, Penncozeb) 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: 4 to 48-hour. PHI: 0-day. FRAC M01. *OMRI-listed.*

LifeGard WG (Bacillus mycoides isolate J) *Eggplant, Pepper, Tomato* | 1-4.5 oz. per acre. 1-4.5 oz. per acre or 4.5 oz. per 100 gals. water. Suppression only; can be used in a rotational program with effective fungicides to reduce synthetic fungicide use REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed.*

mancozeb products (mancozeb) *Pepper, Tomato* | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Use 37% formulations at 0.6-2.4 qt. per acre. Use 75% and 80% formulations at 0.75-3.0 lb. per acre. REI: 24-hour. PHI: 5-day. FRAC M03.

Regalia (Reynoutria sachalinensis extract) *Eggplant, Pepper, Tomato* | 1-4 qts. per acre. Use in a program with copper products. On greenhouse-produced seedlings, drench planting medium with 1-2 qts. per gal. water or dip seedlings in solution of 1-2 qts. per 100 gal. water immediately before transplanting. REI: 4-hour. PHI: 0-day. FRAC P05. *OMRI-listed.*

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synthetic fungicide use. REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed.*

streptomycin products (Streptomycin sulfate) *Pepper, Tomato* | Use 17% products at 16 oz. per 100 gals of water, or 50% products at 5.3 oz. per 100 gals. of water to maintain a concentration of 200 ppm. Apply one or two times to seedlings, alternated with a fixed copper product compound beginning at the two-leaf stage. Not labeled for use after transplanting (greenhouse only). REI: 12-hour. FRAC 25.

Tanos (famoxadone, cymoxanil) *Pepper, Tomato* | Tomato: Early blight at 6-8 oz. per acre. Late blight and anthracnose at 8 oz per acre. For suppression of bacterial diseases of tomato, 8 oz. For late blight, tank-mix with a contact fungicide with a different mode of action. Pepper: Anthracnose at 8-10 fl. oz. REI: 12-hour. FRAC 11, FRAC 27.

Buckeye Rot of Tomatoes - Phytophthora Oomycete

These diseases are favored by heavy rains and waterlogged soils. Symptoms include discolored fruit and declining plants. Consider fungicide drench. Regular fungicide schedule may lessen impact of buckeye rot.

Non-Pesticide

Tomato | Rotate to non-cucurbit, non-legume, and non-solanaceous crops for 3 years. Use raised beds, staking, and mulch to improve drainage, air flow, and reduce splashing. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up. Anaerobic soil disinfestation (ASD) is an effective sterilization method for greenhouse and high tunnel soils that contain this pathogen.

Pesticide

azoxystrobin products (azoxystrobin) *Tomato* | Several formulations are labeled at various rates (Acadia LFC, AZteroid FC 3.3, Dexter SC, Heritage, Quadris, Satori). Use 34.3% formulations at 3.9-9.7 fl. oz. per acre. Use 22.9% formulations at 6.0-15.5 fl. oz. per acre. Use 18.4% formulations at 6.3-7.8 fl. oz. per acre. Use 50% formulations (Heritage) on greenhouse transplants only at 0.024-0.08 oz. per 1,000 sq. ft. REI: 4-hour. PHI: 0-day. FRAC 11.

copper products (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Tomato* | Several formulations of copper (Badge, Champ, Kocide) are labelled for use and may improve efficacy of fungicides against

Phytophthora blight when tank mixed at labeled rates. See label for directions. REI: 4 to 48-hour. PHI: 0-day. FRAC M01. *OMRI-listed.*

Gavel 75DF (zoxamide, mancozeb) *Tomato* | 1.5-2 lbs. per acre. REI: 48-hour. PHI: 5-day. FRAC 22, FRAC M03.

Orondis Opti (oxathiapiprolin, chlorothalonil) *Eggplant, Pepper, Tomato* | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day. FRAC 49, FRAC M05.

Orondis Ultra (oxathiapiprolin, mandipropamid) *Tomato* | 5.5-8.0 fl. oz. per acre. Alternate with fungicides that have a different mode of action. Use either soil applications or foliar applications of oxathiapiprolin products, but not both. REI: 4-hour. PHI: 1-day. FRAC 49, FRAC 40.

Quadris 2.08SC (azoxystrobin) *Pepper, Tomato* | 5-6.2 fl. oz. per acre. REI: 4-hour. PHI: 0-day. FRAC 11.

Quadris Opti (azoxystrobin, chlorothalonil) *Pepper, Tomato* | 1.6 pts. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC M05.

Ridomil Gold Copper (mefenoxam, copper hydroxide) *Tomato* | *For processing tomatoes:* apply 1 pack per 3.7 acres plus 0.8 lb. a.i. per acre of mancozeb. *For fresh market tomatoes:* apply 1 pack per 2.5 acres plus 0.8 lb. a.i. per acre of mancozeb. REI: 48-hour. PHI: 14-day. FRAC 04, FRAC M01.

Damping-Off Seed and Seedling Rots of Multiple Crops - Multiple Pathogens

Non-Pesticide

Eggplant, Pepper, Tomato | Practice good greenhouse sanitation of equipment, tools propagation trays/pots, and surfaces. Avoid excess moisture to the transplants in the greenhouse by monitoring irrigation frequency. Plant in warm field soils. The fungi responsible for damping-off in field soils cause more loss when the seedling is slow to emerge.

Pesticide

Aliette WDG (fosetyl-aluminum) *Tomato* | 2.5-5 lbs. per acre. For *Pythium* spp., apply 2.5-5 lbs. per acre at 2-4 leaf stage for direct seeded plants or immediately after transplanting. REI: 12-hour. PHI: 14-day. FRAC P07.

mefenoxam/metalaxyl products (mefenoxam) *Eggplant, Pepper, Tomato* | Several formulations (Apron, MetaStar, Ridomil Gold, Ultra Flourish, Subdue Maxx, and Xyler) are

labeled. Several formulations are labeled as pre-plant incorporated or surface broadcast and banded applications at various rates between 1 pt. and 8 pt. per acre. A 2.5% granular formulation can be used at 20 lb. per acre *in tomatoes only*. A 33.3% seed treatment formulation can be used at 0.32-0.64 fl. oz. per 100 lb. of seed. A 22% formulation can be used at 21.7 ml. per 1000 sq. ft. *for transplants grown for retail sale to consumers*. REI: 48-hour. PHI: 7-day. FRAC 04.

Orondis Gold (oxathiapiprolin, mefenoxam) *Eggplant, Pepper, Tomato* | 28-55 fl. oz. per acre. Use as an at-plant soil drench, banded spray in furrow, or through drip irrigation. Do not follow soil applications of Orondis Gold with foliar applications of Orondis Opti, or Orondis Ultra. REI: 4-hour. PHI: 7-day. FRAC 49, FRAC 04.

Previcur Flex (propamocarb) *Eggplant, Pepper, Tomato* | For *Pythium* spp., apply 1.2 pts. (eggplants or peppers) or 1.5 pts. per acre (tomato) per acre with nozzles directed at base of plants, or via drip irrigation, transplant water or sprinklers. For late blight, 0.7-1.5 pts. per acre. REI: 12-hour. PHI: 5-day. FRAC 28.

Regalia (Reynoutria sachalinensis extract) *Eggplant, Pepper, Tomato* | 1-4 qts. per acre. Use in a program with copper products. On greenhouse-produced seedlings, drench planting medium with 1-2 qts. per gal. water or dip seedlings in solution of 1-2 qts. per 100 gal. water immediately before transplanting. REI: 4-hour. PHI: 0-day. FRAC P05. *OMRI-listed.*

Ridomil Gold SL (mefenoxam) *Eggplant, Pepper, Tomato* | 1 pt. per acre. Soil treatment at 1 pt. per acre broadcast (use less for band applications) before transplanting. Subsequent directed sprays may be needed. *Phytophthora crown rot only*. Fungicides will not be effective if plants are planted in poorly drained fields with a history of the disease. Damping-off treatments for tomato are 1-2 pts. per acre. Other formulations include MetaStar, Subdue Maxx, Ultra Flourish, and Xyler. Rates vary by formulation. REI: 48-hour. PHI: 7-day. FRAC 04.

Serifel (Bacillus amyloliquifaciens strain MBI-600) *Eggplant, Pepper, Tomato* | 4-16 oz. per acre. Soil treatment in-furrow, drench, shanked in and chemigation applications at 4-16 oz. per acre for *Pythium* spp. damping-off and other root rots. REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed.*

SoilGard (Gliocladium virens strain GL-21) *Eggplant, Pepper, Tomato* | 0.5-2 lbs. per acre. Soil treatment in-furrow, drench, shanked in and chemigation applications at 0.5-2 lbs. per acre for *Pythium*, *Rhizoctonia*, *Fusarium* and other spp. causing damping-off and root rots. For greenhouse-grown

transplants, drench medium with 2-4 oz. per gal. water. REI: see label. PHI: 0-day. FRAC BM02. *OMRI-listed*.

Early Blight of Fruiting Vegetables - *Alternaria* Fungus

This pathogen can infect peppers and tomatoes, but is mainly a problem in tomatoes. This disease initially causes lesions on lower leaves of the tomato plant. After field planting, begin protective fungicide applications on a 7-14 day schedule. May be seedborne.

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.

Non-Pesticide

Eggplant, Pepper, Tomato | Use pathogen-free seed and disease-free transplants. Hot water seed treatment may reduce this seedborne disease. Use temperatures and times of 122 F for 25 minutes for tomato. Avoid fields with a history of Fusarium and Verticillium wilts. Rotate to non-Solanaceous crops for 3-4 years. Varieties with partial resistance are available, and varieties resistant to Fusarium and Verticillium wilt will hold up better against *Alternaria*. Use raised beds, staking, and mulch to improve drainage, air flow, and reduce splashing. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up.

Pesticide

Aprovia Top (difenoconazole, benzovindiflupyr) *Eggplant, Pepper, Tomato* | 10.5-13.5 fl. oz. per acre. Use of a spreader sticker is recommended. REI: 12-hour. PHI: 0-day. FRAC 03, FRAC 07.

azoxystrobin products (azoxystrobin) *Tomato* | Several formulations are labeled at various rates (Acadia LFC, AZteroid FC 3.3, Dexter SC, Heritage, Quadris, Satori). Use 34.3% formulations at 3.9-9.7 fl. oz. per acre. Use 22.9% formulations at 6.0-15.5 fl. oz. per acre. Use 18.4% formulations at 6.3-7.8 fl. oz. per acre. Use 50% formulations (Heritage) on greenhouse transplants only at 0.024-0.08 oz. per 1,000 sq. ft. REI: 4-hour. PHI: 0-day. FRAC 11.

Azterknot (azoxystrobin, *Reynoutria sachalinensis* extract) *Tomato* | 5.9-7.4 fl. oz. per acre. REI: 4-hour. PHI: 0-day. FRAC 11, FRAC P05.

Cabrio EG (pyraclostrobin) *Eggplant, Pepper, Tomato* | 8-12 oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 11.

Cevya (mefentrifluconazole) *Eggplant, Pepper, Tomato* | 3-5 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 03.

chlorothalonil products (chlorothalonil) *Tomato* | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 38.5% (Zn) formulations at 2.0-4.0 pt. per acre. Use 54% (720) formulations at 1.38-2.75 pt. per acre. Use 82.5% (WDG) formulations at 1.3-2.6 lb. per acre. Use 90% DF formulations at 1.1-2.5 lb. per acre. REI: 12-hour. PHI: 0-day. FRAC M05.

Cymbol Advance (chlorothalonil, cymoxanil) *Tomato* | 1.9-3 pts. per acre. Also available as Ariston. REI: 12-hour. PHI: 3-day. FRAC M05, FRAC 27.

Double Nickel 55 (*Bacillus amyloliquefaciens* strain D-747) *Eggplant, Pepper, Tomato* | 0.25-3 lbs. per acre. Suppression only; can be used in a rotational program with effective fungicides to reduce synthetic fungicide use. REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed*.

Endura (boscalid) *Tomato* | Rates as follows per acre: early blight rates are 2.5-3.5 oz.; Gray mold rates are 9-12.5 oz.; white mold rates 12.5 oz. Suppression only for while mold. REI: 12-hour. PHI: 0-day. FRAC 07.

Evito (fluoxastrobin) *Eggplant, Pepper, Tomato* | Rates depend on formulation. Other products include Aftershock, Tepera. REI: 12-hour. PHI: 3-day. FRAC 11.

Flint Extra (trifloxystrobin) *Eggplant, Pepper, Tomato* | 3.0-3.8 fl. oz. per acre. Use Gem 500 SC at same rate. Use Flint (50%) formulation at 3-4 fl. oz. per acre. REI: 12-hour. PHI: 3-day. FRAC 11.

Fontelis (penthiopyrad) *Eggplant, Pepper, Tomato* | 16-24 fl. oz per acre for all diseases listed here except anthracnose at 24 fl. oz. Suppression only for anthracnose. In the greenhouse use a rate of 0.75 fl. oz. per gallon per 1,360 sq. ft. REI: 12-hour. PHI: 0-day. FRAC 07.

Gavel 75DF (zoxamide, mancozeb) *Tomato* | 1.5-2 lbs. per acre. REI: 48-hour. PHI: 5-day. FRAC 22, FRAC M03.

Inspire Super (difenoconazole, cyprodinil) *Eggplant, 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. FRAC 03, FRAC 09.

LifeGard WG (Bacillus mycoides isolate J) Eggplant, Pepper, Tomato | 1-4.5 oz. per acre. 1-4.5 oz. per acre or 4.5 oz. per 100 gals. water. Suppression only; can be used in a rotational program with effective fungicides to reduce synthetic fungicide use REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed*.

Luna Sensation (fluopyram, trifloxystrobin) Eggplant, Pepper, Tomato | Rates are as follows per acre: early blight, powdery mildew, Septoria leaf spot at 5-7.6 fl. oz.; anthracnose, gray mold, white mold and southern blight at 7.6 fl. oz. Suppression only for anthracnose and white mold. REI: 12-hour. PHI: 3-day. FRAC 07, FRAC 11.

Luna Tranquility (fluopyram, pyrimethanil) Tomato | 11.2 fl. oz. per acre. Disease suppression of powdery mildew. Labeled for field use and in greenhouses with good fungicide resistance management programs REI: 12-hour. PHI: 1-day. FRAC 07, FRAC 09.

mancozeb products (mancozeb) Pepper, Tomato | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Use 37% formulations at 0.6-2.4 qt. per acre. Use 75% and 80% formulations at 0.75-3.0 lb. per acre. REI: 24-hour. PHI: 5-day. FRAC M03.

Mettle 125ME (tetraconazole) Eggplant, Pepper, Tomato | 6-8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 03.

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. FRAC 07, FRAC 12.

Mural (azoxystrobin, benzovindiflupyr) Tomato | 0.6 oz. per 1,000 sq. ft. *Tomato Transplants for Home Consumer Market*. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC 07.

Orondis Opti (oxathiapiprolin, chlorothalonil) Eggplant, Pepper, Tomato | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day. FRAC 49, FRAC M05.

Pageant Intrinsic (boscalid, pyraclostrobin) Eggplant, Pepper, Tomato | Rates are as follow per acre: Powdery mildew at 9.7-18 oz.; gray mold at 23 oz. Do not apply on seedlings meant for transplanting in the field. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Pageant Intrinsic (boscalid, pyraclostrobin) Tomato | Rates are as follows per acre.: Gray mold, 23 oz.; anthracnose and early blight 12.25-23 oz. Labeled for greenhouse-/high tunnel-grown tomatoes. Do not apply on seedlings meant for transplanting in the field. For Pythium and Rhizoctonia spp. use 12-18 oz. per 100 gals. water. Do not apply on seedlings

meant for transplanting in the field. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Priaxor (fluxapyroxad, pyraclostrobin) Eggplant, Pepper, Tomato | 6-8 fl. oz. per acre. Late blight, 8 fl. oz. per acre. Gray mold and white mold suppression only. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Quadris 2.08SC (azoxystrobin) Pepper, Tomato | 5-6.2 fl. oz. per acre. REI: 4-hour. PHI: 0-day. FRAC 11.

Quadris Opti (azoxystrobin, chlorothalonil) Pepper, Tomato | 1.6 pts. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC M05.

Quadris Top (azoxystrobin, difenoconazole) Pepper, Tomato | 8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC 03.

Reason 500SC (fenamidone) Eggplant, Pepper, Tomato | 5.5-8.2 fl. oz. per acre. Septoria leaf spot disease suppression. REI: 12-hour. PHI: 14-day. FRAC 11.

Regalia (Reynoutria sachalinensis extract) Eggplant, Pepper, Tomato | 1-4 qts. per acre. Use in a program with copper products. On greenhouse-produced seedlings, drench planting medium with 1-2 qts. per gal. water or dip seedlings in solution of 1-2 qts. per 100 gal. water immediately before transplanting. REI: 4-hour. PHI: 0-day. FRAC P05. *OMRI-listed*.

Regev (tea tree oil, difenoconazole) Eggplant, Pepper, Tomato | 4-8.5 fl. oz. per acre. REI: 12-hour. PHI: 2-day. IRAC UNE, FRAC BM01, FRAC 03.

Revus Top (mandipropamid, difenoconazole) Tomato | 5.5-7.0 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day. FRAC 40, FRAC 03.

Rhyme (flutriafol) Tomato | 3.5-7 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 03.

Scala (pyrimethanil) Tomato | 7 fl. oz. per acre. Tank-mix with another fungicide. Allow greenhouse/high tunnel to ventilate for 2 hours. REI: 12-hour. PHI: 1-day. FRAC 09.

Spirato GHN (fludioxonil) Eggplant, Pepper, Tomato | 5.0-5.7 fl. oz. per acre. This is a foliar-applied formulation of fludioxonil, which is more typically a seed treatment ingredient. Only for greenhouse/high tunnel-produced eggplant, pepper, and tomato. REI: 12-hour. PHI: 0-day. FRAC 12.

Switch 62.5WG (cyprodinil, fludioxonil) *Eggplant, Pepper, Tomato* | 11-14 oz. per acre. Do not apply to small fruited varieties in the greenhouse. REI: 12-hour. PHI: 0-day. FRAC 09, FRAC 12.

Tanos (famoxadone, cymoxanil) *Pepper, Tomato* | Tomato: Early blight at 6-8 oz. per acre. Late blight and anthracnose at 8 oz per acre. For suppression of bacterial diseases of tomato, 8 oz. For late blight, tank-mix with a contact fungicide with a different mode of action. Pepper: Anthracnose at 8-10 fl. oz. REI: 12-hour. FRAC 11, FRAC 27.

tebuconazole products (tebuconazole) *Tomato* | 8 fl. oz. per acre. There are many 38.7% formulations (Monsoon, Onset, Toledo, Vibe) that use the same rate. REI: 12-hour to 18-day. PHI: 7-day. FRAC 03.

Topguard EQ (flutriafol, azoxystrobin) *Tomato* | 4-8 fl. oz. per acre. REI: 12-hour to 3-day. PHI: 0-day. FRAC 03, FRAC 11.

Zing! (zoxamide, chlorothalonil) *Eggplant, Pepper, Tomato* | Application rate: 34 fl. oz. per acre for pepper; 36 fl. oz for tomato. REI: 12-hour. PHI: 3-day. FRAC 22, FRAC M05.

Fusarium Wilt of Fruiting Vegetables - Fusarium Fungus

May be seedborne.

Non-Pesticide

Eggplant, Pepper, Tomato | Use pathogen-free seed and disease-free transplants. Hot water seed treatment may reduce this seedborne disease. Use temperatures and times of 122 F for 25 minutes for eggplants and tomato, and 125 for 30 minutes for pepper. Avoid fields with a history of the disease. Rotate to non-Solanaceous crops for >6 years. Varieties with resistance are available, and resistant rootstocks are available for grafting (<https://vegetablegrafting.org>). Use raised beds, staking, and mulch to improve drainage, air flow, and reduce splashing. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up. Anaerobic soil disinfestation (ASD) is an effective sterilization method for greenhouse and high tunnel soils that contain this pathogen.

Gray Mold of Multiple Crops - Botrytis Fungus

This disease often occurs in greenhouse, high tunnel or other protected production systems with high humidity.

Non-Pesticide

Eggplant, Pepper, Tomato | Use raised beds and adequate plant spacing to improve drainage, air flow. Monitor humidity in the structure and vent appropriately. Pruning the crop will help increase airflow as well. Prompt destruction of the finished crop with tillage to rapidly break down tissue is an important method to prevent disease build-up

Pesticide

Botran 75W (dichloro-nitroaniline) *Pepper, Tomato* | 1lb. 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: 12-hour. PHI: 0-day. FRAC 14.

BotryStop (Ulocladium oudemansii strain U3) *Eggplant, Pepper, Tomato* | 2-4 lbs. per acre. Suppression of Botrytis gray mold; use in a program with good cultural practices and effective fungicides. REI: 4-hour. PHI: 0-day. FRAC NC. *OMRI-listed.*

Cabrio EG (pyraclostrobin) *Eggplant, Pepper, Tomato* | 12-16 oz. per acre. Suppression only for Botrytis gray mold and white mold. REI: 12-hour. PHI: 0-day. FRAC 11.

chlorothalonil products (chlorothalonil) *Eggplant, Pepper* | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 54% (720) formulations at 1.5 pt. per acre. Use 82.5% (WDG) formulations at 1.4 lb. per acre. REI: 12-hour. PHI: 3-day. FRAC M05.

chlorothalonil products (chlorothalonil) *Tomato* | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 38.5% (Zn) formulations at 2.0-4.0 pt. per acre. Use 54% (720) formulations at 1.38-2.75 pt. per acre. Use 82.5% (WDG) formulations at 1.3-2.6 lb. per acre. Use 90% DF formulations at 1.1-2.5 lb. per acre. REI: 12-hour. PHI: 0-day. FRAC M05.

copper products (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Pepper, Tomato* | Several formulations of copper (Badge, Champ, Kocide) are labelled for use. See label for directions. Copper-resistant strains of the bacterial spot pathogen are common in the Midwest. Mancozeb products (e.g., Dithane, Manzate, Penncozeb) 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: 4 to 48-hour. PHI: 0-day. FRAC M01. *OMRI-listed.*

Cymbol Advance (chlorothalonil, cymoxanil) *Tomato* | 1.9-3 pts. per acre. Also available as Ariston. REI: 12-hour. PHI: 3-day. FRAC M05, FRAC 27.

Double Nickel 55 (Bacillus amyloliquefaciens strain D-747) *Eggplant, Pepper, Tomato* | 0.25-3 lbs. per acre. Suppression only; can be used in a rotational program with effective fungicides to reduce synthetic fungicide use. REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed*.

Endura (boscalid) *Tomato* | Rates as follows per acre: early blight rates are 2.5-3.5 oz.; Gray mold rates are 9-12.5 oz.; white mold rates 12.5 oz. Suppression only for white mold. REI: 12-hour. PHI: 0-day. FRAC 07.

Fontelis (penthiopyrad) *Eggplant, Pepper, Tomato* | 16-24 fl. oz per acre for all diseases listed here except anthracnose at 24 fl. oz. Suppression only for anthracnose. In the greenhouse use a rate of 0.75 fl. oz. per gallon per 1,360 sq. ft. REI: 12-hour. PHI: 0-day. FRAC 07.

Howler (Pseudomonas chlororaphis strain AFS009) *Eggplant, Pepper, Tomato* | 5-15 lb. per acre. See label for other field and greenhouse uses. Suppression of Botrytis gray mold; use in a program with good cultural practices and effective fungicides. REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed*.

Inspire Super (difenoconazole, cyprodinil) *Eggplant, 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. FRAC 03, FRAC 09.

Luna Sensation (fluopyram, trifloxystrobin) *Eggplant, Pepper, Tomato* | Rates are as follows per acre: early blight, powdery mildew, Septoria leaf spot at 5-7.6 fl. oz.; anthracnose, gray mold, white mold and southern blight at 7.6 fl. oz. Suppression only for anthracnose and white mold. REI: 12-hour. PHI: 3-day. FRAC 07, FRAC 11.

Luna Tranquility (fluopyram, pyrimethanil) *Tomato* | 11.2 fl. oz. per acre. Disease suppression of powdery mildew. Labeled for field use and in greenhouses with good fungicide resistance management programs REI: 12-hour. PHI: 1-day. FRAC 07, FRAC 09.

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. FRAC 07, FRAC 12.

Orondis Opti (oxathiapiprolin, chlorothalonil) *Eggplant, Pepper, Tomato* | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day. FRAC 49, FRAC M05.

OxiDate 2.0 (hydrogen dioxide, peroxyacetic acid) *Eggplant, Pepper, Tomato* | 1 qt. to 2.5 gals. per 100 gals. water Suppression of Botrytis gray mold. Use high rate in rescue situations and use preventive low rates in a program with good cultural practices and other effective fungicides. REI: 0 to 1-hour. PHI: 0-day. FRAC NC. *OMRI-listed*.

Pageant Intrinsic (boscalid, pyraclostrobin) *Eggplant, Pepper, Tomato* | Rates are as follow per acre: Powdery mildew at 9.7-18 oz.; gray mold at 23 oz. Do not apply on seedlings meant for transplanting in the field. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Pageant Intrinsic (boscalid, pyraclostrobin) *Tomato* | Rates are as follows per acre.: Gray mold, 23 oz.; anthracnose and early blight 12.25-23 oz. Labeled for greenhouse-/high tunnel-grown tomatoes. Do not apply on seedlings meant for transplanting in the field. For Pythium and Rhizoctonia spp. use 12-18 oz. per 100 gals. water. Do not apply on seedlings meant for transplanting in the field. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Priaxor (fluxapyroxad, pyraclostrobin) *Eggplant, Pepper, Tomato* | 6-8 fl. oz. per acre. Late blight, 8 fl. oz. per acre. Gray mold and white mold suppression only. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Scala (pyrimethanil) *Tomato* | 7 fl. oz. per acre. Tank-mix with another fungicide. Allow greenhouse/high tunnel to ventilate for 2 hours. REI: 12-hour. PHI: 1-day. FRAC 09.

Switch 62.5WG (cyprodinil, fludioxonil) *Eggplant, Pepper, Tomato* | 11-14 oz. per acre. Do not apply to small fruited varieties in the greenhouse. REI: 12-hour. PHI: 0-day. FRAC 09, FRAC 12.

Late Blight of Potatoes/Tomatoes - *Phytophthora Oomycete*

This destructive pathogen causes quick plant death and can be identified by large spreading brown to black stem lesions, velvety white growth on plant surfaces, and large brown leathery spots on green fruits. It is favored by prolonged cool and damp conditions.

The pathogen overwinters on plant residue, including volunteer potatoes and potato cull piles. The first step to manage this disease is monitoring and destroying cull and volunteer potato emergence in the spring. When it is reported in your region, begin weekly preventive sprays with chlorothalonil and mancozeb for as long as favorable conditions persist. Pay attention to which pathogen strain is identified. If infections start in a field, the strain US-23 is sensitive to mefenoxam (Ridomil).

Biofungicide products like Double Nickel, Regalia, Serifel, Serenade, Sonata, and Stargus can be included in a conventional spray program to reduce the number of synthetic fungicides or in an organic program with OMRI-listed copper products. See labels for instructions.

Non-Pesticide

Tomato | Avoid fields with a history the disease. Rotate to non-solanaceous crops (including potatoes) for 3-4 years. Use raised beds, staking, pruning, and mulch to improve drainage, air flow, and reduce splashing. Prompt destruction of the infected crop or finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up. In small plantings, remove infected plants from the field and dispose in a sealed trash container, or burn. Anaerobic soil disinfestation (ASD) is an effective biological treatment for greenhouse and high tunnel soils that contain this pathogen.

Pesticide

chlorothalonil products (chlorothalonil) *Tomato* | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 38.5% (Zn) formulations at 2.0-4.0 pt. per acre. Use 54% (720) formulations at 1.38-2.75 pt. per acre. Use 82.5% (WDG) formulations at 1.3-2.6 lb. per acre. Use 90% DF formulations at 1.1-2.5 lb. per acre. REI: 12-hour. PHI: 0-day. FRAC M05.

copper products (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Tomato* | Several formulations of copper (Badge, Champ, Kocide) are labelled for use and may improve efficacy of fungicides against Phytophthora blight when tank mixed at labeled rates. See label for directions. REI: 4 to 48-hour. PHI: 0-day. FRAC M01. *OMRI-listed.*

Forum (dimethomorph) *Eggplant, Pepper* | 6 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 40.

Gavel 75DF (zoxamide, mancozeb) *Tomato* | 1.5-2 lbs. per acre. REI: 48-hour. PHI: 5-day. FRAC 22, FRAC M03.

mancozeb products (mancozeb) *Pepper, Tomato* | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Use 37% formulations at 0.6-2.4 qt. per acre. Use 75% and 80% formulations at 0.75-3.0 lb. per acre. REI: 24-hour. PHI: 5-day. FRAC M03.

Orondis Opti (oxathiapiprolin, chlorothalonil) *Eggplant, Pepper, Tomato* | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day. FRAC 49, FRAC M05.

Orondis Ultra (oxathiapiprolin, mandipropamid) *Tomato* | 5.5-8.0 fl. oz. per acre. Alternate with fungicides that have a different mode of action. Use either soil applications or foilar applications of oxathiapiprolin products, but not both. REI: 4-hour. PHI: 1-day. FRAC 49, FRAC 40.

Presidio (fluopicolide) *Eggplant, Pepper, 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. FRAC 43.

Previcur Flex (propamocarb) *Eggplant, Pepper, Tomato* | For *Pythium* spp., apply 1.2 pts. (eggplants or peppers) or 1.5 pts. per acre (tomato) per acre with nozzles directed at base of plants, or via drip irrigation, transplant water or sprinklers. For late blight, 0.7-1.5 pts. per acre. REI: 12-hour. PHI: 5-day. FRAC 28.

Priaxor (fluxapyroxad, pyraclostrobin) *Eggplant, Pepper, Tomato* | 6-8 fl. oz. per acre. Late blight, 8 fl. oz. per acre. Gray mold and white mold suppression only. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Quadris Opti (azoxystrobin, chlorothalonil) *Pepper, Tomato* | 1.6 pts. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC M05.

Ranman 400SC (cyazofamid) *Eggplant, Pepper, Tomato* | 2.1-2.75 fl. oz. per acre. For Buckeye rot and *Phytophthora* blight, apply to base of plant or in transplant water. Another formulation is Segway O. REI: 12-hour. PHI: 0-day. FRAC 21.

Reason 500SC (fenamidone) *Eggplant, Pepper, Tomato* | 5.5-8.2 fl. oz. per acre. Septoria leaf spot disease suppression. REI: 12-hour. PHI: 14-day. FRAC 11.

Revus (mandipropamid) *Eggplant, Pepper* | 8 fl. oz. per acre. *Phytophthora* blight suppression only. REI: 4-hour. PHI: 1-day. FRAC 40.

Revus Top (mandipropamid, difenoconazole) *Tomato* | 5.5-7.0 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day. FRAC 40, FRAC 03.

Ridomil Gold Bravo SC (mefenoxam, chlorothalonil) *Tomato* | 2.5 pts. per acre. REI: 48-hour. PHI: 5-day. FRAC 04, FRAC M05.

Ridomil Gold MZ WG (mefenoxam, mancozeb) *Tomato* | 2.5 pts. per acre. REI: 48-hour. PHI: 5-day. FRAC 04, FRAC M03.

Tanos (famoxadone, cymoxanil) Pepper, Tomato | Tomato: Early blight at 6-8 oz. per acre. Late blight and anthracnose at 8 oz per acre. For suppression of bacterial diseases of tomato, 8 oz. For late blight, tank-mix with a contact fungicide with a different mode of action. Pepper: Anthracnose at 8-10 fl. oz. REI: 12-hour. FRAC 11, FRAC 27.

Zampro (ametoctradin, dimethomorph) Eggplant, Pepper, Tomato | 14 fl. oz. per acre. REI: 12-hour. PHI: 4-day. FRAC 45, FRAC 40.

Zing! (zoxamide, chlorothalonil) Eggplant, Pepper, Tomato | Application rate: 34 fl. oz. per acre for pepper; 36 fl. oz for tomato. REI: 12-hour. PHI: 3-day. FRAC 22, FRAC M05.

Leaf Blight of Fruiting Vegetables - Septoria Fungus

This pathogen can infect eggplants, peppers, and tomatoes, but is mainly a problem in tomatoes. This disease initially causes lesions on lower leaves of the tomato plant. After field planting, begin protective fungicide applications on a 7-14 day schedule.

Non-Pesticide

Eggplant, Pepper, Tomato | Avoid fields with a history of Fusarium and Verticillium wilts. Rotate to non-solanaceous crops for 2-3 years. Varieties resistant to Fusarium and Verticillium wilt will hold up better against Septoria. Use raised beds, staking, and mulch to improve drainage, air flow, and reduce splashing. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up.

Pesticide

Aprovia Top (difenoconazole, benzovindiflupyr) Eggplant, Pepper, Tomato | 10.5-13.5 fl. oz. per acre. Use of a spreader sticker is recommended. REI: 12-hour. PHI: 0-day. FRAC 03, FRAC 07.

azoxystrobin products (azoxystrobin) Tomato | Several formulations are labeled at various rates (Acadia LFC, AZteroid FC 3.3, Dexter SC, Heritage, Quadris, Satori). Use 34.3% formulations at 3.9-9.7 fl. oz. per acre. Use 22.9% formulations at 6.0-15.5 fl. oz. per acre. Use 18.4% formulations at 6.3-7.8 fl. oz. per acre. Use 50% formulations (Heritage) on greenhouse transplants only at 0.024-0.08 oz. per 1,000 sq. ft. REI: 4-hour. PHI: 0-day. FRAC 11.

Cabrio EG (pyraclostrobin) Eggplant, Pepper, Tomato | 8-12 oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 11.

chlorothalonil products (chlorothalonil) Tomato | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 38.5% (Zn) formulations at 2.0-4.0 pt. per acre. Use 54% (720) formulations at 1.38-2.75 pt. per acre. Use 82.5% (WDG) formulations at 1.3-2.6 lb. per acre. Use 90% DF formulations at 1.1-2.5 lb. per acre. REI: 12-hour. PHI: 0-day. FRAC M05.

Flint Extra (trifloxystrobin) Eggplant, Pepper, Tomato | 3.0-3.8 fl. oz. per acre. Use Gem 500 SC at same rate. Use Flint (50%) formulation at 3-4 fl. oz. per acre. REI: 12-hour. PHI: 3-day. FRAC 11.

Fontelis (penthiopyrad) Eggplant, Pepper, Tomato | 16-24 fl. oz per acre for all diseases listed here except anthracnose at 24 fl. oz. Suppression only for anthracnose. In the greenhouse use a rate of 0.75 fl. oz. per gallon per 1,360 sq. ft. REI: 12-hour. PHI: 0-day. FRAC 07.

Gavel 75DF (zoxamide, mancozeb) Tomato | 1.5-2 lbs. per acre. REI: 48-hour. PHI: 5-day. FRAC 22, FRAC M03.

Inspire Super (difenoconazole, cyprodinil) Eggplant, 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. FRAC 03, FRAC 09.

Luna Sensation (fluopyram, trifloxystrobin) Eggplant, Pepper, Tomato | Rates are as follows per acre: early blight, powdery mildew, Septoria leaf spot at 5-7.6 fl. oz.; anthracnose, gray mold, white mold and southern blight at 7.6 fl. oz. Suppression only for anthracnose and white mold. REI: 12-hour. PHI: 3-day. FRAC 07, FRAC 11.

Luna Tranquility (fluopyram, pyrimethanil) Tomato | 11.2 fl. oz. per acre. Disease suppression of powdery mildew. Labeled for field use and in greenhouses with good fungicide resistance management programs REI: 12-hour. PHI: 1-day. FRAC 07, FRAC 09.

mancozeb products (mancozeb) Pepper, Tomato | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Use 37% formulations at 0.6-2.4 qt. per acre. Use 75% and 80% formulations at 0.75-3.0 lb. per acre. REI: 24-hour. PHI: 5-day. FRAC M03.

Mettle 125ME (tetraconazole) Eggplant, Pepper, Tomato | 6-8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 03.

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. FRAC 07, FRAC 12.

Orondis Opti (oxathiapiprolin, chlorothalonil) *Eggplant, Pepper, Tomato* | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day. FRAC 49, FRAC M05.

Priaxor (fluxapyroxad, pyraclostrobin) *Eggplant, Pepper, Tomato* | 6-8 fl. oz. per acre. Late blight, 8 fl. oz. per acre. Gray mold and white mold suppression only. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Quadris 2.08SC (azoxystrobin) *Pepper, Tomato* | 5-6.2 fl. oz. per acre. REI: 4-hour. PHI: 0-day. FRAC 11.

Quadris Opti (azoxystrobin, chlorothalonil) *Pepper, Tomato* | 1.6 pts. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC M05.

Quadris Top (azoxystrobin, difenoconazole) *Pepper, Tomato* | 8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC 03.

Reason 500SC (fenamidone) *Eggplant, Pepper, Tomato* | 5.5-8.2 fl. oz. per acre. Septoria leaf spot disease suppression. REI: 12-hour. PHI: 14-day. FRAC 11.

Revus Top (mandipropamid, difenoconazole) *Tomato* | 5.5-7.0 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day. FRAC 40, FRAC 03.

Topguard EQ (flutriafol, azoxystrobin) *Tomato* | 4-8 fl. oz. per acre. REI: 12-hour to 3-day. PHI: 0-day. FRAC 03, FRAC 11.

Zing! (zoxamide, chlorothalonil) *Eggplant, Pepper, Tomato* | Application rate: 34 fl. oz. per acre for pepper; 36 fl. oz. for tomato. REI: 12-hour. PHI: 3-day. FRAC 22, FRAC M05.

Leaf Mold of Fruiting Vegetables - *Passalora* Fungus

This pathogen can infect eggplants, peppers and tomatoes, but is mainly a problem in tomatoes. This disease causes yellow lesions on the upper side of the tomato leaf. It is common in greenhouse and high tunnel tomatoes.

Non-Pesticide

Eggplant, Pepper, Tomato | Use pathogen-free seed and disease-free transplants. Hot water seed treatment may reduce this seedborne disease. Use temperatures and times of 122 F for 25 minutes for tomato. Rotate to non-Solanaceous crops for 2 years. Resistant varieties are available. Use raised beds, staking, and mulch to improve drainage, air flow, and reduce splashing. Monitor humidity in the hoop house and vent appropriately. Pruning the crop can help increase airflow as

well. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up.

Pesticide

Aprovia Top (difenoconazole, benzovindiflupyr) *Eggplant, Pepper, Tomato* | 10.5-13.5 fl. oz. per acre. Use of a spreader sticker is recommended. REI: 12-hour. PHI: 0-day. FRAC 03, FRAC 07.

chlorothalonil products (chlorothalonil) *Tomato* | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 38.5% (Zn) formulations at 2.0-4.0 pt. per acre. Use 54% (720) formulations at 1.38-2.75 pt. per acre. Use 82.5% (WDG) formulations at 1.3-2.6 lb. per acre. Use 90% DF formulations at 1.1-2.5 lb. per acre. REI: 12-hour. PHI: 0-day. FRAC M05.

Gavel 75DF (zoxamide, mancozeb) *Tomato* | 1.5-2 lbs. per acre. REI: 48-hour. PHI: 5-day. FRAC 22, FRAC M03.

Inspire Super (difenoconazole, cyprodinil) *Eggplant, 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. FRAC 03, FRAC 09.

mancozeb products (mancozeb) *Pepper, Tomato* | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Use 37% formulations at 0.6-2.4 qt. per acre. Use 75% and 80% formulations at 0.75-3.0 lb. per acre. REI: 24-hour. PHI: 5-day. FRAC M03.

Mettle 125ME (tetraconazole) *Eggplant, Pepper, Tomato* | 6-8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 03.

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. FRAC 07, FRAC 12.

Orondis Opti (oxathiapiprolin, chlorothalonil) *Eggplant, Pepper, Tomato* | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day. FRAC 49, FRAC M05.

Quadris Top (azoxystrobin, difenoconazole) *Pepper, Tomato* | 8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC 03.

Revus Top (mandipropamid, difenoconazole) *Tomato* | 5.5-7.0 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day. FRAC 40, FRAC 03.

Tanos (famoxadone, cymoxanil) *Pepper, Tomato* | Tomato: Early blight at 6-8 oz. per acre. Late blight and anthracnose at 8 oz per acre. For suppression of bacterial diseases of tomato, 8 oz. For late blight, tank-mix with a contact fungicide with a different mode of action. Pepper: Anthracnose at 8-10 fl. oz. REI: 12-hour. FRAC 11, FRAC 27.

Nematodes

Non-Pesticide

Tomato | Collect soil samples for nematodes in the fall and avoid fields with high numbers. Rotate to a non-broadleaf crop, such as grass grains or sweet corn for >3 years. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue and displace nematodes is an important method to prevent nematode build-up. Anaerobic soil disinfestation (ASD) is an effective sterilization method for greenhouse and high tunnel soils that contain nematodes.

Pesticide

K-PAM HL (metam potassium) *Eggplant, Pepper, Tomato* | 30-62 gals. per acre. Use high rates on muck, and lower rates on sands. In the fall, when soil at 6 inches is above 50 F and moist, place K-PAM HL or Sectagon K54 about 8 inches beneath the surface through shank-injectors, or broadcast sprayers directly in front of tillage tools to bury it. Seal with soil packing or irrigation. Or, in the spring, it can be applied through drip irrigation under unperforated plastic beds. Before planting, allow product to dissipate for 1 week for every 10 gals. per acre plus 1 more week. REI: 5-day. IRAC 08F, HRAC NC, FRAC NC. *RUP.*

Nimitz (fluensulfone) *Eggplant, Pepper, Tomato* | 3.5-7 pts. per acre. Do not use on direct-seeded plants. May be broadcast, banded, or drip-applied in the spring up to 7 days before planting at a depth of 8 inches. Effectiveness is reduced on muck and clay soils. REI: 12-hour. IRAC UN.

Telone C-17 (1,3-dichloropropene, chloropicrin) *Eggplant, Pepper, Tomato* | *Muck soils:* Use C-17 formulation at 27.4-30 gals. per acre, and C-35 formulation at 33-36 gals. per acre. *Mineral soils:* Use C-17 formulation at 10.8-17.1 gals. per acre, and C-35 formulation at 13-20.5 gals per acre. In the fall, when soil at 6 inches is above 50 F and moist, place Telone C-17 or C-35 about 8 inches beneath the surface through shank-injectors, or broadcast sprayers directly in front of tillage tools to bury it. Seal with soil packing, irrigation, or plastic. Or, in the spring, InLine may be applied through drip irrigation under unperforated plastic beds at 13-20.5 gals. per acre, on mineral soils only. Before planting, allow product to dissipate for 1 week for every 10 gals. per acre plus 1 more week. REI: 3-5-day. IRAC 8A, FRAC NC, IRAC 08B. *RUP.*

Telone II (1,3-dichloropropene) *Eggplant, Pepper, Tomato* | *Muck soils:* Use at 25 gals. per acre. *Mineral soils:* Use at 9-12 gals. per acre. In the spring or fall, when soil at 6 inches is above 50 F and moist, place Telone II about 8 inches beneath the surface through shank-injectors, or broadcast sprayers directly in front of tillage tools to bury it. Seal with soil packing or irrigation. Or, in the spring, Telone EC may be applied through drip irrigation under unperforated plastic beds at 9-18 gals. per acre on mineral soils only. Before planting, allow product to dissipate for 1 week for every 10 gals. per acre plus 1 more week. REI: 5-day. IRAC 8A, FRAC NC. *RUP.*

VAPAM HL (metam sodium) *Eggplant, Pepper, Tomato* | 37.5-75 gals. per acre. Use high rates on muck, and lower rates on sands. In the fall, when soil at 6 inches is above 50 F and moist, place VAPAM HL or Sectagon K42 about 8 inches beneath the surface through shank-injectors, or broadcast sprayers directly in front of tillage tools to bury it. Seal with soil packing or irrigation. Or, in the spring, it can be applied through drip irrigation under unperforated plastic beds. Before planting, allow product to dissipate for 1 week for every 10 gals. per acre plus 1 more week. REI: 5-day. IRAC 08F, HRAC NC, FRAC NC. *RUP.*

Velum Prime (fluopyram) *Eggplant, Pepper, Tomato* | 5.0-6.84 fl. oz. per acre. Apply through drip irrigation. Do not exceed 13.7 fl. oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 0-day. FRAC 07.

Vydate L (oxamyl) *Eggplant* | 2-4 pts. per acre. Apply as a transplant water drench (peppers and tomatoes only), banded directed post-plant soil treatment with at least 20 gals. water per acre incorporated 2-4 inches deep by water or mechanical means, or drip chemigate after transplanting with at least 40 gals. water per acre. Allow 14 days between applications. *For eggplants,* do not exceed 16 pts. per acre per season. *For peppers,* do not exceed 24 pts. per acre per season. *For tomatoes,* do not exceed 32 pts. per acre per season. *In Kansas,* only drip treatment allowed for eggplant, only low rate allowed for peppers, and up to 8 pts. allowed for tomato drip applications. *In Missouri,* up to 8 pts. per acre allowed for tomato drip applications. REI: 48-hour. PHI: 7-day for eggplants and peppers, 3-day for tomatoes. IRAC 01A. *RUP.*

Phytophthora Blight of Multiple Crops - Phytophthora Oomycete

Phytophthora may cause damping-off, stem infection, and fruit rot in tomatoes and peppers. It is mainly a pepper disease and often associated with heavy rains and fields with poor drainage. The first symptoms are usually observed in low areas. It has a wide host range of crops and weeds, including

vine crops, beans, nightshades and velvetleaf. Ponds and streams with run-off water from infested soil may be contaminated with *Phytophthora*.

At planting, use a transplant drench to help prevent *Phytophthora* infection of young plants. *At fruit set*, apply contact or systemic fungicides at first sign of the disease to prevent fruit rots. Systemic fungicides are available.

Non-Pesticide

Eggplant, Pepper, Tomato | Rotate to non-cucurbit, non-legume, and non-solanaceous crops for ≥ 3 years. Avoid fields with a history of the disease and poor drainage. Use raised beds, staking, and mulch to improve drainage, air flow, and reduce splashing. Do not irrigate with surface water. Pepper varieties with moderate to good resistance to the crown and root rot phase of *Phytophthora* blight include the *Bell-types*, Paladin, Aristotle, Archimedes, Revolution, Declaration, Intruder, and Vanguard; *Jalapeno-types*, Hechicero; and *Ancho-type*, Sequoia. These varieties are susceptible to the foliar and fruit rot phases of *Phytophthora* blight. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up. Anaerobic soil disinfestation (ASD) is an effective sterilization method for greenhouse and high tunnel soils that contain this pathogen.

Pesticide

Elumin (ethaboxam) *Eggplant, Pepper* | 8 fl. oz. per acre. REI: 12-hour. PHI: 2-day. FRAC 22.

mefenoxam/metalaxyl products (mefenoxam) *Eggplant, Pepper, Tomato* | Start soil treatments before transplanting. Subsequent directed sprays may be needed. Fungicides will not be effective if plants are planted in poorly drained fields with a history of the disease. Several formulations (Apron, MetaStar, Ridomil Gold, Ultra Flourish, Subdue Maxx, and Xylar) are labeled. Several formulations are labeled as pre-plant incorporated or surface broadcast and banded applications at various rates between 1 pt. and 8 pt. per acre. A 2.5% granular formulation can be used at 20 lb. per acre *in tomatoes only*. A 33.3% seed treatment formulation can be used at 0.32-0.64 fl. oz. per 100 lb. of seed. A 22% formulation can be used at 21.7 ml. per 1000 sq. ft. *for transplants grown for retail sale to consumers*. REI: 48-hour. PHI: 7-day. FRAC 04.

Omega 500F (fluazinam) *Eggplant, Pepper* | 16-24 fl. oz. per acre. Apply 24 fl. oz. per acre as a soil drench at transplanting. Then, begin foliar applications using low rates under low disease pressure, and high rates under high disease pressure. REI: 12-hour. PHI: 30-day. FRAC 29.

Orondis Gold (oxathiapiprolin, mefenoxam) *Eggplant, Pepper, Tomato* | 28-55 fl. oz. per acre. Use as an at-plant soil drench, banded spray in furrow, or through drip irrigation. Do not follow soil applications of Orondis Gold with foliar applications of Orondis Opti, or Orondis Ultra. REI: 4-hour. PHI: 7-day. FRAC 49, FRAC 04.

Orondis Ultra (oxathiapiprolin, mandipropamid) *Tomato* | 5.5-8.0 fl. oz. per acre. Alternate with fungicides that have a different mode of action. Use either soil applications or foliar applications of oxathiapiprolin products, but not both. REI: 4-hour. PHI: 1-day. FRAC 49, FRAC 40.

phosphite and phosphorous acid products (phosphorous acid, potassium phosphite, mono-dipotassium salts of phosphorous acid, mono- and dibasic sodium, potassium, and ammonium phosphites, fosetyl-aluminum) *Pepper, Tomato* | Several phosphite or phosphorous acid products (Aliette, Phostrol, ProPhyt, Rampart) are labeled at various rates. Label includes different crops, PHIs, resistance instructions, and other important information. Some manufacturers recommend tank-mixing. These products may be used in a preventative program until the disease is observed. REI: 4 to 12-hour. PHI: see label. FRAC P07.

Presidio (fluopicolide) *Eggplant, Pepper, 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. FRAC 43.

Ranman 400SC (cyazofamid) *Eggplant, Pepper, Tomato* | 2.1-2.75 fl. oz. per acre. For Buckeye rot and *Phytophthora* blight, apply to base of plant or in transplant water. Another formulation is Segway O. REI: 12-hour. PHI: 0-day. FRAC 21.

Revus (mandipropamid) *Eggplant, Pepper* | 8 fl. oz. per acre. *Phytophthora* blight suppression only. REI: 4-hour. PHI: 1-day. FRAC 40.

Ridomil Gold SL (mefenoxam) *Eggplant, Pepper, Tomato* | 1 pt. per acre. Soil treatment at 1 pt. per acre broadcast (use less for band applications) before transplanting. Subsequent directed sprays may be needed. *Phytophthora crown rot only*. Fungicides will not be effective if plants are planted in poorly drained fields with a history of the disease. Damping-off treatments for tomato are 1-2 pts. per acre. Other formulations include MetaStar, Subdue Maxx, Ultra Flourish, and Xylar. Rates vary by formulation. REI: 48-hour. PHI: 7-day. FRAC 04.

Zampro (ametoctradin, dimethomorph) *Eggplant, Pepper, Tomato* | 14 fl. oz. per acre. REI: 12-hour. PHI: 4-day. FRAC 45, FRAC 40.

Powdery Mildew of Fruiting Vegetables - *Leveillula Fungus*

This pathogen can infect eggplants, peppers and tomatoes, but is mainly a problem in tomatoes.

Non-Pesticide

Eggplant, Pepper, Tomato | Avoid fields with a history of the disease. Rotate to non-solanaceous crops for 2 years. Use raised beds, staking, and mulch to improve drainage, air flow, and reduce splashing. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up.

Pesticide

Aprovia Top (difenoconazole, benzovindiflupyr) *Eggplant, Pepper, Tomato* | 10.5-13.5 fl. oz. per acre. Use of a spreader sticker is recommended. REI: 12-hour. PHI: 0-day. FRAC 03, FRAC 07.

azoxystrobin products (azoxystrobin) *Tomato* | Several formulations are labeled at various rates (Acadia LFC, AZteroid FC 3.3, Dexter SC, Heritage, Quadris, Satori). Use 34.3% formulations at 3.9-9.7 fl. oz. per acre. Use 22.9% formulations at 6.0-15.5 fl. oz. per acre. Use 18.4% formulations at 6.3-7.8 fl. oz. per acre. Use 50% formulations (Heritage) on greenhouse transplants only at 0.024-0.08 oz. per 1,000 sq. ft. REI: 4-hour. PHI: 0-day. FRAC 11.

Cabrio EG (pyraclostrobin) *Eggplant, Pepper, Tomato* | 8-16 oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 11.

chlorothalonil products (chlorothalonil) *Eggplant, Pepper* | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 54% (720) formulations at 1.5 pt. per acre. Use 82.5% (WDG) formulations at 1.4 lb. per acre. REI: 12-hour. PHI: 3-day. FRAC M05.

Flint Extra (trifloxystrobin) *Pepper* | 2.5 fl. oz. per acre. Use Gem 500SC at 2.0 fl. oz. per acre. Use Flint (50%) formulation at 1.5-2.0 fl. oz. per acre. REI: 12-hour. PHI: 3-day. FRAC 11.

Flint Extra (trifloxystrobin) *Tomato* | 3.0-3.8 fl. oz. per acre. Use Gem 500SC at the same rate. Use Flint (50%) formulation at 3.0-4.0 fl. oz. per acre REI: 12-hour. PHI: 3-day. FRAC 11.

Fontelis (penthiopyrad) *Eggplant, Pepper, Tomato* | 16-24 fl. oz per acre for all diseases listed here except anthracnose at 24 fl. oz. Suppression only for anthracnose. In the greenhouse

use a rate of 0.75 fl. oz. per gallon per 1,360 sq. ft. REI: 12-hour. PHI: 0-day. FRAC 07.

Inspire Super (difenoconazole, cyprodinil) *Eggplant, 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. FRAC 03, FRAC 09.

Luna Sensation (fluopyram, trifloxystrobin) *Eggplant, Pepper, Tomato* | Rates are as follows per acre: early blight, powdery mildew, Septoria leaf spot at 5-7.6 fl. oz.; anthracnose, gray mold, white mold and southern blight at 7.6 fl. oz. Suppression only for anthracnose and white mold. REI: 12-hour. PHI: 3-day. FRAC 07, FRAC 11.

Luna Tranquility (fluopyram, pyrimethanil) *Tomato* | 11.2 fl. oz. per acre. Disease suppression of powdery mildew. Labeled for field use and in greenhouses with good fungicide resistance management programs REI: 12-hour. PHI: 1-day. FRAC 07, FRAC 09.

Mettle 125ME (tetraconazole) *Eggplant, Pepper, Tomato* | 6-8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 03.

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. FRAC 07, FRAC 12.

Orondis Opti (oxathiapiprolin, chlorothalonil) *Eggplant, Pepper, Tomato* | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 3-day. FRAC 49, FRAC M05.

Pageant Intrinsic (boscalid, pyraclostrobin) *Eggplant, Pepper, Tomato* | Rates are as follow per acre: Powdery mildew at 9.7-18 oz.; gray mold at 23 oz. Do not apply on seedlings meant for transplanting in the field. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Priaxor (fluxapyroxad, pyraclostrobin) *Eggplant, Pepper, Tomato* | 6-8 fl. oz. per acre. Late blight, 8 fl. oz. per acre. Gray mold and white mold suppression only. REI: 12-hour. PHI: 0-day. FRAC 07, FRAC 11.

Quadris 2.08SC (azoxystrobin) *Pepper, Tomato* | 5-6.2 fl. oz. per acre. REI: 4-hour. PHI: 0-day. FRAC 11.

Quadris Opti (azoxystrobin, chlorothalonil) *Pepper, Tomato* | 1.6 pts. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC M05.

Quadris Top (azoxystrobin, difenoconazole) *Pepper, Tomato* | 8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC 03.

Revus Top (mandipropamid, difenoconazole) *Tomato* | 5.5-7.0 fl. oz. per acre. Do not use on small-fruited varieties. REI: 12-hour. PHI: 1-day. FRAC 40, FRAC 03.

Switch 62.5WG (cyprodinil, fludioxonil) *Eggplant, Pepper, Tomato* | 11-14 oz. per acre. Do not apply to small fruited varieties in the greenhouse. REI: 12-hour. PHI: 0-day. FRAC 09, FRAC 12.

Velum Prime (fluopyram) *Eggplant, Pepper, Tomato* | 5.0-6.84 fl. oz. per acre. Apply through drip irrigation. Do not exceed 13.7 fl. oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 0-day. FRAC 07.

Southern Blight of Fruiting Vegetables - Sclerotium Fungus

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

Non-Pesticide

Eggplant, Pepper, Tomato | Rotate to a non-broadleaf crop, such as grass grains, sweet corn, or onions for >6 years. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up. Anaerobic soil disinfestation (ASD) is an effective sterilization method for greenhouse and high tunnel soils that contain this pathogen.

Pesticide

Aprovia Top (difenoconazole, benzovindiflupyr) *Eggplant, Pepper, Tomato* | 10.5-13.5 fl. oz. per acre. Use of a spreader sticker is recommended. REI: 12-hour. PHI: 0-day. FRAC 03, FRAC 07.

Cabrio EG (pyraclostrobin) *Eggplant, Pepper, Tomato* | 12-16 oz. per acre. Suppression only for Botrytis gray mold and white mold. REI: 12-hour. PHI: 0-day. FRAC 11.

Fontelis (penthiopyrad) *Eggplant, Pepper, Tomato* | 16-24 fl. oz per acre for all diseases listed here except anthracnose at 24 fl. oz. Suppression only for anthracnose. In the greenhouse use a rate of 0.75 fl. oz. per gallon per 1,360 sq. ft. REI: 12-hour. PHI: 0-day. FRAC 07.

Luna Sensation (fluopyram, trifloxystrobin) *Eggplant, Pepper, Tomato* | Rates are as follows per acre: early blight, powdery mildew, Septoria leaf spot at 5-7.6 fl. oz.; anthracnose, gray mold, white mold and southern blight at 7.6

fl. oz. Suppression only for anthracnose and white mold. REI: 12-hour. PHI: 3-day. FRAC 07, FRAC 11.

Quadris Opti (azoxystrobin, chlorothalonil) *Pepper, Tomato* | 1.6 pts. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC M05.

Viruses of Multiple Crops - Multiple Pathogens

There are three main virus diseases in tomatoes: Impatiens Necrotic Spot Virus (INSV), Tomato Spotted Wilt Virus (TSWV), and Tobacco Mosaic Virus (TMV).

INSV and TSWV is carried by thrips and can cause major loss to tomatoes if they infect young plants. It is more common in greenhouse and high tunnel situations, especially where tomatoes and ornamental flowers share space.

TMV is more of a problem in fresh market tomatoes than processing tomatoes due to extensive handling. Disease can spread through smoking tobacco and tobacco residue.

Non-Pesticide

Tomato | For **INSV and TSWV**: maintain transplant greenhouse sanitation and good weed control is important. Avoid shared space with hanging basket flowers, and Solanaceous weeds like nightshades and horse nettle. Use a monitoring program to time the release of natural enemies of thrips (see insect section). Remove infected transplants and do not plant them out into fields. For **TMV**: establish and enforce break area and handwashing rules and procedures to avoid tobacco residue on tomato plants. Remove infected transplants and do not plant them out into fields.

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

This soil pathogen is long-lived in the soil and has a wide host range on broadleaved crops and weeds, including beans, vine crops, lettuce, tomatoes, peppers, and cole crops. It goes by other names in other crops, such as Drop, White Mold, Stem Rot, and Timber Rot.

It is more commonly found in greenhouses and high tunnels where humidity is high. The fungus often infects flowers, which then drop off and infect the stems that they land on. The stems take on a woody appearance and can split open, revealing small black pellets that are the overwintering body of the pathogen.

Non-Pesticide

Eggplant, Pepper, Tomato | Avoid fields with a history of the problem. Rotate to a non-broadleaf crop, such as grass grains or sweet corn for >6 years. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up. Anaerobic soil disinfestation (ASD) is an effective biological treatment for greenhouse and high tunnel soils that contain this pathogen.

Pesticide

Cabrio EG (pyraclostrobin) *Eggplant, Pepper, Tomato* | 12-16 oz. per acre. Suppression only for Botrytis gray mold and white mold. REI: 12-hour. PHI: 0-day. FRAC 11.

Contans WG (Coniothyrium minitans strain CON/M/91-08) *Eggplant, Pepper* | 1-4 lbs per acre. 1-4 lbs. per acre in the field; 0.75-1.5 oz. per 1,000 sq. ft. for greenhouse/high tunnel applications. REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed.*

Endura (boscalid) *Tomato* | Rates as follows per acre: early blight rates are 2.5-3.5 oz.; Gray mold rates are 9-12.5 oz.; white mold rates 12.5 oz. Suppression only for white mold. REI: 12-hour. PHI: 0-day. FRAC 07.

Howler (Pseudomonas chlororaphis strain AFS009) *Eggplant, Pepper, Tomato* | 5-15 lb. per acre. See label for other field and greenhouse uses. Suppression of Botrytis gray mold; use in a program with good cultural practices and effective fungicides. REI: 4-hour. PHI: 0-day. FRAC BM02. *OMRI-listed.*

Quadris Opti (azoxystrobin, chlorothalonil) *Pepper, Tomato* | 1.6 pts. per acre. REI: 12-hour. PHI: 0-day. FRAC 11, FRAC M05.

Wilt of Multiple Crops - Verticillium Fungus

This is a soil pathogen. Eggplants are more sensitive to it than other Solanaceous crops.

Non-Pesticide

Eggplant, Tomato | Avoid fields with a history of the disease. Rotate to non-cucurbit, non-legume, and non-solanaceous crops for >6 years. Many tomato varieties with resistance are

available, and resistant tomato rootstocks are available for grafting under eggplant. Use raised beds, staking, and mulch to improve drainage, air flow, and reduce splashing. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up. Anaerobic soil disinfestation (ASD) is an effective sterilization method for greenhouse and high tunnel soils that contain this pathogen.

Pesticide

K-PAM HL (metam potassium) *Eggplant, Pepper, Tomato* | 30-62 gals. per acre. Use high rates on muck, and lower rates on sands. In the fall, when soil at 6 inches is above 50 F and moist, place K-PAM HL or Sectagon K54 about 8 inches beneath the surface through shank-injectors, or broadcast sprayers directly in front of tillage tools to bury it. Seal with soil packing or irrigation. Or, in the spring, it can be applied through drip irrigation under unperforated plastic beds. Before planting, allow product to dissipate for 1 week for every 10 gals. per acre plus 1 more week. REI: 5-day. IRAC 08F, HRAC NC, FRAC NC. *RUP.*

Telone C-17 (1,3-dichloropropene, chloropicrin) *Eggplant, Pepper, Tomato* | *Muck soils:* Use C-17 formulation at 27.4-30 gals. per acre, and C-35 formulation at 33-36 gals. per acre. *Mineral soils:* Use C-17 formulation at 10.8-17.1 gals. per acre, and C-35 formulation at 13-20.5 gals per acre. In the fall, when soil at 6 inches is above 50 F and moist, place Telone C-17 or C-35 about 8 inches beneath the surface through shank-injectors, or broadcast sprayers directly in front of tillage tools to bury it. Seal with soil packing, irrigation, or plastic. Or, in the spring, InLine may be applied through drip irrigation under unperforated plastic beds at 13-20.5 gals. per acre, on mineral soils only. Before planting, allow product to dissipate for 1 week for every 10 gals. per acre plus 1 more week. REI: 3-5-day. IRAC 8A, FRAC NC, IRAC 08B. *RUP.*

VAPAM HL (metam sodium) *Eggplant, Pepper, Tomato* | 37.5-75 gals. per acre. Use high rates on muck, and lower rates on sands. In the fall, when soil at 6 inches is above 50 F and moist, place VAPAM HL or Sectagon K42 about 8 inches beneath the surface through shank-injectors, or broadcast sprayers directly in front of tillage tools to bury it. Seal with soil packing or irrigation. Or, in the spring, it can be applied through drip irrigation under unperforated plastic beds. Before planting, allow product to dissipate for 1 week for every 10 gals. per acre plus 1 more week. REI: 5-day. IRAC 08F, HRAC NC, FRAC NC. *RUP.*

Fruiting Vegetables - Insects

Reviewed by Laura Ingwell, Marissa Schuh, Ashley Leach,
Dan Fillius – Apr 2025

Aphids

Aphid populations tend to spike during periods of hot weather and when plants have excess nitrogen. Aphids transmit viral diseases. Treatment will not reverse the symptoms of viruses, but will limit further spread. Scout the upper and lower surface of leaves and look for shed skins or honey dew. Selective chemistries (e.g. flonicamid, pymetrozine) that target piercing-sucking insects help to preserve natural enemies.

Non-Pesticide

Eggplant, Pepper, Tomato | Preserve and encourage natural enemies. Aphid mummies indicate the presence of parasitoids. Predatory fly larvae, lady beetles, minute pirate bugs, and lacewings are common predators. For greenhouses, consider purchasing and releasing the predatory midge *Aphidoletes aphidimyza*, lady beetles *Adalia bipunctata* and *Hippodamia convergens*, and lacewings *Chrysopa carnea* and *Chrysoperla rufilabris*. Also depending on the aphid species, consider co-releasing a parasitoid wasp like *Aphelinus abdominalis*, *Aphidius colemani*, *Aphidius ervi*, or *Aphidius matricariae*. Avoid insecticides when deploying natural enemies.

Pesticide

Actara (thiamethoxam) *Eggplant, Pepper, Tomato* | 2-3 oz. per acre. REI: 12-hour. PHI: 0-day. IRAC 04A.

Admire Pro (imidacloprid) *Eggplant, Pepper, Tomato* | Use 1.3-2.2 fl. oz. per acre for foliar application on eggplant, pepper, and tomato. Use 7.0-10.5 fl. oz. per acre for soil application on eggplant and tomato, up to 14 fl. oz. per acre for pepper. REI: 12-hour. PHI: 0-day for foliar application, or 21-day for soil application. IRAC 04A.

Assail 30SG (acetamiprid) *Eggplant, Pepper, Tomato* | Use 30SG formulations at 2.0-4.0 oz. per acre. Use 70WP formulations at 0.8-1.7 oz. per acre. REI: 12-hour. PHI: 7-day. IRAC 04A.

Beleaf (flonicamid) *Eggplant, Pepper, Tomato* | 2.0-4.28 fl. oz. per acre. REI: 12-hour. PHI: 0-day. IRAC 29.

Dimethoate 4EC (dimethoate) *Pepper, Tomato* | Use 2.67EC formulations at 0.75-1.0 pt. per acre on peppers, or 0.75-1.5

pts. per acre on tomatoes. Use 4EC, LV-4, and 400EC formulations at 0.5-0.6 pt. per acre on peppers, or 0.5-1.0 pt. per acre on tomatoes. REI: 48-hour. PHI: 0-day for pepper, 7-day for tomato. IRAC 01B.

Fulfill (pymetrozine) *Eggplant, Pepper, Tomato* | 2.75 oz. per acre. REI: 12-hour. PHI: 0-day. IRAC 09B.

Lannate LV (methomyl) *Eggplant, Pepper, Tomato* | 0.75-3.0 pts. per acre. REI: 48-hour. PHI: 1-day for tomato, 3-day for pepper, 5-day for eggplant. IRAC 01A. *RUP*.

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. IRAC UN, FRAC NC. *OMRI-listed*.

Malathion 5EC (malathion) *Eggplant, Pepper, Tomato* | Use 5EC formulations at 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. Use 57EC formulations at 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. REI: 12-hour. PHI: 1-day for tomato, 3-day for eggplant and pepper. IRAC 01B.

Movento (spirotetramat) *Eggplant, Pepper, Tomato* | 4-5 fl. oz. per acre. REI: 24-hour. PHI: 1-day. IRAC 23.

Orthene 97 (acephate) *Pepper* | For Bell Pepper, use 0.5-1 lb. per acre. For all other peppers, use 0.5 lb. per acre. REI: 24-hour. PHI: 7-day. IRAC 01B.

Platinum 2SC (thiamethoxam) *Eggplant, Pepper, Tomato* | Use 2SC formulations as a soil treatment at 5-11 fl. oz. per acre. Use 75SG formulations as a soil treatment at 1.66-3.67 oz. per acre. REI: 12-hour. PHI: 30-day. IRAC 04A.

Pyganic EC 5.0 II (pyrethrins) *Eggplant, Pepper, Tomato* | *Foliar applications*: 4.5-15.6 fl. oz. per acre. *Soil drench applications* (in greenhouses): 0.375 fl. oz. per 1,000 sq. ft. of growing media/soil. REI: 12-hour. PHI: 0-day. IRAC 03A. *OMRI-listed*.

Sivanto 200 (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. IRAC 04D.

Vydate L (oxamyl) *Eggplant, Pepper, Tomato* | 2-4 pts. per acre. Apply as a foliar spray. Drip application allowed in peppers. *In Kansas*, only low rate allowed for peppers. REI: 48-hour. PHI: 1-day for eggplant, 3-day for tomato, 7-day for pepper. IRAC 01A. *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.

Pesticide

Asana XL (esfenvalerate) *Eggplant, Pepper, Tomato* | 2.9-9.6 fl. oz. per acre. For armyworms, corn borers, cutworms, fruitworms, hornworms, loopers, and pinworms in tomatoes. For corn borers, fruitworms, and loopers in eggplants. For armyworms, corn borers, fruitworms, and loopers in peppers. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP*.

Avaunt (indoxacarb) *Eggplant, Pepper, Tomato* | 2.5-3.5 fl. oz. per acre. For armyworms, fruitworms, hornworms, and loopers in tomatoes, peppers and eggplants. For corn borers in bell peppers. REI: 12-hour. PHI: 3-day. IRAC 22A.

Baythroid XL (beta-cyfluthrin) *Eggplant, Pepper, Tomato* | 1.6-2.8 fl. oz. per acre. For armyworms, corn borers, cutworms, fruitworms, hornworms, loopers, and pinworms. REI: 12-hour. PHI: 0-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP*.

Brigade 2EC (bifenthrin) *Eggplant, Pepper, Tomato* | For armyworms, corn borers, cutworms, fruitworms, and loopers in tomatoes, peppers, and eggplants. For hornworms, and pinworms in peppers and eggplants only. Use 2EC formulations at 2.1-6.4 fl. oz. per acre. Use 10DF, 10WP, or 10WSB formulations at 5.3-12.8 oz. per acre. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP*.

Bt (*Bacillus thuringiensis*) products for caterpillars (*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* | For armyworms, corn borers, cutworms, fruitworms, hornworms, loopers, and pinworms. Various Bt products (Agree, Biobit, Dipel, Javelin, etc.) are available for control of young caterpillars however, different Bt products can vary in the effectiveness against caterpillars. REI: 4-hour. PHI: 0-day. IRAC 11A. *OMRI-listed*.

Coragen (chlorantraniliprole) *Eggplant, Pepper, Tomato* | 2.0-7.5 fl. oz. per acre. For armyworms, corn borers, fruitworms, hornworms, loopers, and pinworms. Can be

applied as either a foliar application or via drip chemigation. Chemigation will provide up to 30 days of control. REI: 4-hour. PHI: 1-day. IRAC 28.

Danitol 2.4EC (fenpropathrin) *Eggplant, Pepper, Tomato* | 10.67 fl. oz. per acre. For armyworms, cutworms, fruitworms, hornworms, and loopers. REI: 24-hour. PHI: 3-day. IRAC 03A. *RUP*.

Diazinon AG500 (diazinon) *Tomato* | For cutworms. Use 50W formulations at 4-8 lbs. per acre as a pre-plant incorporation. Use AG500 formulations at 64-128 fl. oz. per acre as a pre-plant incorporation. Use AG600 formulations at 51-102 fl. oz. per acre as a pre-plant incorporation. REI: 2 to 4-day. IRAC 01B. *RUP*.

Entrust SC (spinosad) *Eggplant, Pepper, Tomato* | For armyworms, fruitworms, hornworms, loopers, and pinworms. Use 2SC formulations at 4.0-8.0 fl. oz. per acre. Use 80WP formulations at 1.25-2.5 oz. per acre. REI: 4-hour. PHI: 1-day. IRAC 05. *OMRI-listed*.

Exirel (cyantraniliprole) *Eggplant, Pepper, Tomato* | 7.0-13.5 fl. oz. per acre. For armyworms, corn borers, fruitworms, hornworms, loopers, and pinworms. REI: 12-hour. PHI: 1-day. IRAC 28.

Harvanta (cyclaniliprole) *Eggplant, Pepper, Tomato* | 10.9-16.4 fl. oz. per acre. For armyworms, corn borers, fruitworms, hornworms, loopers, and pinworms. Use with adjuvant. REI: 4-hour. PHI: 1-day. IRAC 28.

Intrepid 2F (methoxyfenozide) *Eggplant, Pepper, Tomato* | 4-16 oz. per acre. For armyworms, corn borers, hornworms, and loopers. REI: 4-hour. PHI: 1-day. IRAC 18.

Lannate LV (methomyl) *Eggplant, Pepper, Tomato* | 1.5-3.0 pts. per acre. For armyworms, fruitworms, and pinworms in eggplant. For armyworms, cutworms, fruitworms, hornworms, loopers, and pinworms in tomatoes. For armyworms, cutworms, corn borers, and loopers in peppers. REI: 48-hour. PHI: 1-day for tomato, 3-day for pepper, 5-day for eggplant. IRAC 01A. *RUP*.

Mustang Maxx (zeta-cypermethrin) *Eggplant, Pepper, Tomato* | 2.24-4.0 fl. oz. per acre. For armyworms, corn borers, cutworms, fruitworms, hornworms, loopers, and pinworms. REI: 12-hour. PHI: 1-day. IRAC 03A. *RUP*.

Orthene 97 (acephate) *Pepper* | 0.75-1.0 lb. per acre. For corn borers, hornworms, and loopers in bell pepper. REI: 24-hour. PHI: 7-day. IRAC 01B.

Perm-Up 25DF (permethrin) *Eggplant, Pepper, Tomato* | For armyworms, fruitworms, hornworms, loopers, and pinworms. Use 25W, 25WP or 25DF formulations at 3.2-12.8 fl. oz. per acre for tomato, 9.6 fl. oz. per acre for eggplant, or 6.4-12.8 fl. oz. per acre for pepper. Use 3.2EC formulations at 2-8 fl. oz. per acre for tomato, 6 fl. oz. per acre for eggplant, or 4-8 fl. oz. per acre for pepper. REI: 12-hour. PHI: 0-day for tomato, 3-day for eggplant and pepper. IRAC 03A. *RUP*.

Pyganic EC 5.0 II (pyrethrins) *Eggplant, Pepper, Tomato* | For armyworms, fruitworms, hornworms, loopers and pinworms. *Foliar applications*: 4.5-15.6 fl. oz. per acre. *Soil drench applications* (in greenhouses): 0.375 fl. oz. per 1,000 sq. ft. of growing media/soil. REI: 12-hour. PHI: 0-day. IRAC 03A. *OMRI-listed*.

Radiant 1SC (spinetoram) *Eggplant, Pepper, Tomato* | 5-10 fl. oz. per acre. For armyworms, corn borers, fruitworms, hornworms, loopers and pinworms. REI: 4-hour. PHI: 1-day. IRAC 05.

Rimon 0.83EC (novaluron) *Eggplant, Pepper, Tomato* | 9-12 fl. oz. per acre. For armyworms, corn borers, cutworms, fruitworms, hornworms, loopers, and pinworms. REI: 12-hour. PHI: 1-day. IRAC 15.

Sevin XLR Plus (carbaryl) *Eggplant, Pepper, Tomato* | 1-2 qts. per acre. For armyworms, corn borers, cutworms, fruitworms, hornworms, and pinworms. REI: 12-hour. PHI: 3-day. IRAC 01A.

Verimark (cyantraniliprole) *Eggplant, Pepper, Tomato* | 5-10 fl. oz. per acre. For armyworms, corn borers, fruitworms, hornworms, loopers, and pinworms. Can be applied as either a foliar application or via drip chemigation. REI: 4-hour. PHI: 1-day. IRAC 28.

Warrior II (lambda-cyhalothrin) *Eggplant, Pepper, Tomato* | 0.96-1.92 fl. oz. per acre. For armyworms, corn borers, cutworms, fruitworms, hornworms, loopers, and pinworms. REI: 24-hour. PHI: 5-day. IRAC 03A. *RUP*.

Colorado Potato Beetle

Colorado potato beetles spend the winter as adults near where they were feeding the previous year. Emerging overwintering adults walk to fields to feed, and can't travel very far. Management of the migrating spring adults can reduce later populations. Treatment of small larvae is more effective than treatment of large larvae; they are easier to control, and will be controlled before they do a majority of their feeding.

Thresholds vary by crop and plant growth stage.

For tomatoes, treat if plants have an average of one egg mass, larva, or adult Colorado beetle.

For peppers or eggplants under 6 inches

Treat if plants have an average of more than 2 small larvae, 1 large larvae, or 1 adult per plant

For peppers or eggplants over 6 inches

Treat if plants have an average of 4 small larvae, 2 large larvae, or 2 adults per plant.

Colorado potato beetle has cases of documented insecticide resistance. Rotate modes of action. Don't repeat insecticide classes across Colorado potato beetle generations.

Non-Pesticide

Eggplant, Pepper, Tomato | Rotating more than 0.25-0.5 miles in distance prevents overwintering adults from easily reaching this year's planting. Row covers early in the season can help plants escape early season feeding. Plastic-lined trenches can prevent the first generation from walking into fields. Straw mulch can make it more difficult for beetles to complete its lifecycle. Hand removal or flaming can be effective for small plantings.

Pesticide

Actara (thiamethoxam) *Eggplant, Pepper, Tomato* | 2-3 oz. per acre. REI: 12-hour. PHI: 0-day. IRAC 04A.

Admire Pro (imidacloprid) *Eggplant, Pepper, Tomato* | Use 1.3-2.2 fl. oz. per acre for foliar application on eggplant, pepper, and tomato. Use 7.0-10.5 fl. oz. per acre for soil application on eggplant and tomato, up to 14 fl. oz. per acre for pepper. REI: 12-hour. PHI: 0-day for foliar application, or 21-day for soil application. IRAC 04A.

Agri-Mek SC (abamectin) *Eggplant, Pepper, Tomato* | Use 0.7SC formulations at 1.75-3.5 fl. oz. per acre. Use 0.15SC formulations at 8-16 fl. oz. per acre. Greenhouse use for commercial production tomatoes only, not for transplants. REI: 12-hour. PHI: 7-day for field-grown crops, 1-day for greenhouse tomatoes. IRAC 06. *RUP*.

Asana XL (esfenvalerate) *Eggplant, Tomato* | 5.8-9.6 fl. oz. per acre. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant. IRAC 03A. *RUP*.

Assail 30SG (acetamiprid) *Eggplant, Pepper, Tomato* | Use 30SG formulations at 1.5-2.5 oz. per acre. Use 70WP

formulations at 0.6-1.1 oz. per acre. REI: 12-hour. PHI: 7-day. IRAC 04A.

Baythroid XL (beta-cyfluthrin) *Eggplant, Pepper, Tomato* | 1.6-2.8 fl. oz. per acre. REI: 12-hour. PHI: 0-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP*.

Brigade 2EC (bifenthrin) *Eggplant, Pepper, Tomato* | For armyworms, corn borers, cutworms, fruitworms, and loopers in tomatoes, peppers, and eggplants. For hornworms, and pinworms in peppers and eggplants only. Use 2EC formulations at 2.1-6.4 fl. oz. per acre. Use 10DF, 10WP, or 10WSB formulations at 5.3-12.8 oz. per acre. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP*.

Coragen (chlorantraniliprole) *Eggplant, Pepper, Tomato* | 3.5-5 fl. oz. per acre. REI: 4-hour. PHI: 1-day. IRAC 28.

Entrust SC (spinosad) *Eggplant, Pepper, Tomato* | Use 2SC formulations at 3.0-6.0 fl. oz. per acre. Use 80WP formulations at 1.0-2.0 oz. per acre. REI: 4-hour. PHI: 1-day. IRAC 05. *OMRI-listed*.

Exirel (cyantraniliprole) *Eggplant, Pepper, Tomato* | 7.0-13.5 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 28.

Gladiator (zeta-cypermethrin, abamectin) *Eggplant, Pepper, Tomato* | 19 fl. oz. per acre. REI: 12-hour. PHI: 7-day. IRAC 03A, IRAC 06. *RUP*.

Harvanta (cyclaniliprole) *Eggplant, Pepper, Tomato* | 10.9-16.4 fl. oz. per acre. REI: 4-hour. PHI: 1-day. IRAC 28.

Mustang Maxx (zeta-cypermethrin) *Eggplant, Pepper, Tomato* | 2.24-4.0 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 03A. *RUP*.

Perm-Up 25DF (permethrin) *Eggplant, Tomato* | Use 25W, 25WP or 25DF formulations at 3.2-12.8 fl. oz. per acre for tomato or 9.6 fl. oz. per acre for eggplant. Use 3.2EC formulations at 2-8 fl. oz. per acre for tomato, or 6 fl. oz. per acre for eggplant. REI: 12-hour. PHI: 0-day for tomato, 3-day for eggplant. IRAC 03A. *RUP*.

Platinum 2SC (thiamethoxam) *Eggplant, Pepper, Tomato* | Use 2SC formulations as a soil treatment at 5-11 fl. oz. per acre. Use 75SG formulations as a soil treatment at 1.66-3.67 oz. per acre. REI: 12-hour. PHI: 30-day. IRAC 04A.

Pyganic EC 5.0 II (pyrethrins) *Eggplant, Pepper, Tomato* | *Foliar applications*: 4.5-15.6 fl. oz. per acre. *Soil drench applications* (in greenhouses): 0.375 fl. oz. per 1,000 sq. ft. of

growing media/soil. REI: 12-hour. PHI: 0-day. IRAC 03A. *OMRI-listed*.

Radiant 1SC (spinetoram) *Eggplant, Pepper, Tomato* | 5-10 fl. oz. per acre. REI: 4-hour. PHI: 1-day. IRAC 05.

Rimon 0.83EC (novaluron) *Eggplant, Pepper, Tomato* | 9-12 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 15.

Scorpion 35SL (dinotefuran) *Eggplant, Pepper, Tomato* | *Soil application*: Use Scorpion 35SL at 9.0-13.0 fl. oz. per acre, or Venom 70SG at 5.0-7.5 oz. per acre. *Foliar application*: Use Scorpion 35SL at 2.0-7.0 fl. oz. per acre, or Venom 70SG at 1-4 oz. per acre. See pollination precautions. REI: 12-hour. PHI: 21-day as soil applications, 7-day as foliar applications. IRAC 04A.

Sivanto 200 (flupyradifurone) *Eggplant, Pepper, Tomato* | 10.5-14 fl. oz. per acre. REI: 4-hour. PHI: 1-day. IRAC 04D.

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. IRAC 11A. *OMRI-listed*.

Verimark (cyantraniliprole) *Eggplant, Pepper, Tomato* | 5-10 fl. oz. per acre. REI: 4-hour. PHI: 1-day. IRAC 28.

Vydate L (oxamyl) *Eggplant, Tomato* | 2-4 pts. per acre. REI: 48-hour. PHI: 1-day for eggplant, 3-day for tomato. IRAC 01A. *RUP*.

Warrior II (lambda-cyhalothrin) *Eggplant, Pepper, Tomato* | 1.28-1.92 fl. oz. per acre. REI: 24-hour. PHI: 5-day. IRAC 03A. *RUP*.

Flea Beetles

Flea beetles that feed on solanaceous crops include potato flea beetle.

Non-Pesticide

Eggplant, Pepper, Tomato | Rotating and immediately covering transplants with row cover can exclude flea beetles from young plants.

Pesticide

Actara (thiamethoxam) *Eggplant, Pepper, Tomato* | 2-3 oz. per acre. REI: 12-hour. PHI: 0-day. IRAC 04A.

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. REI: 12-hour. PHI: 21-day. IRAC 04A.

Asana XL (esfenvalerate) *Eggplant, Pepper, Tomato* | 5.8-9.6 fl. oz. per acre. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP.*

Baythroid XL (beta-cyfluthrin) *Eggplant, Pepper, Tomato* | 2.8 fl. oz. per acre. REI: 12-hour. PHI: 0-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP.*

Brigade 2EC (bifenthrin) *Eggplant, Pepper, Tomato* | For armyworms, corn borers, cutworms, fruitworms, and loopers in tomatoes, peppers, and eggplants. For hornworms, and pinworms in peppers and eggplants only. Use 2EC formulations at 2.1-6.4 fl. oz. per acre. Use 10DF, 10WP, or 10WSB formulations at 5.3-12.8 oz. per acre. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP.*

Mustang Maxx (zeta-cypermethrin) *Eggplant, Pepper, Tomato* | 2.24-4.0 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 03A. *RUP.*

Perm-Up 25DF (permethrin) *Eggplant, Pepper* | Use 25W, 25WP or 25DF formulations at 9.6 fl. oz. per acre for eggplant, or 6.4-12.8 fl. oz. per acre for pepper. Use 3.2EC formulations at 6 fl. oz. per acre for eggplant, or 4-8 fl. oz. per acre for pepper. REI: 12-hour. PHI: 3-day. IRAC 03A. *RUP.*

Platinum 2SC (thiamethoxam) *Eggplant, Pepper, Tomato* | Use 2SC formulations as a soil treatment at 5-11 fl. oz. per acre. Use 75SG formulations as a soil treatment at 1.66-3.67 oz. per acre. REI: 12-hour. PHI: 30-day. IRAC 04A.

Pyganic EC 5.0 II (pyrethrins) *Eggplant, Pepper, Tomato* | *Foliar applications:* 4.5-15.6 fl. oz. per acre. *Soil drench applications* (in greenhouses): 0.375 fl. oz. per 1,000 sq. ft. of growing media/soil. REI: 12-hour. PHI: 0-day. IRAC 03A. *OMRI-listed.*

Sevin XLR Plus (carbaryl) *Eggplant, Pepper, Tomato* | 0.5-1 qt. per acre. REI: 12-hour. PHI: 3-day. IRAC 01A.

Warrior II (lambda-cyhalothrin) *Eggplant, Pepper, Tomato* | 1.28-1.92 fl. oz. per acre. REI: 24-hour. PHI: 5-day. IRAC 03A. *RUP.*

Fruit Flies

Pesticide

EverGreen Pro 60-6 (piperonyl butoxide, pyrethrins) *Tomato* | 1 tsp. per 12.5 pts. water. 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, and move hampers to processing plant as soon as possible. REI: 12-hour. PHI: 0-day. IRAC UN, IRAC 03A.

Malathion 5EC (malathion) *Eggplant, Pepper, Tomato* | Use 5EC formulations at 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. Use 57EC formulations at 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. REI: 12-hour. PHI: 1-day for tomato, 3-day for eggplant and pepper. IRAC 01B.

Pyganic EC 5.0 II (pyrethrins) *Eggplant, Pepper, Tomato* | *Foliar applications:* 4.5-15.6 fl. oz. per acre. *Soil drench applications* (in greenhouses): 0.375 fl. oz. per 1,000 sq. ft. of growing media/soil. REI: 12-hour. PHI: 0-day. IRAC 03A. *OMRI-listed.*

Mites

Two-spotted spider mites and broad mites are the primary pest mites in our region. Mite populations spike in hot dry weather. Damage appears as white flecks on leaves, accompanied by webbing. Selective chemistries (e.g. abamectin, bifenazate, etoxazole, cyflumetofen, fenpyroximate, hexythiazox, spiromesifen) that target mites help to preserve natural enemies.

Non-Pesticide

Eggplant, Pepper, Tomato | Preserve and encourage natural enemies. For greenhouses, consider purchasing and releasing the predatory mites *Amblyseius andersonii*, *Amblyseius californicus*, *Amblyseius fallacis*, *Galendromus occidentalis* and *Phytoseiulus persimilis*. Also consider co-releasing a flying predator such as the predatory midge *Feltiella acarisuga*, and lady beetle *Stethorus punctillum*. Avoid insecticides when deploying natural enemies.

Pesticide

Acramite 50WS (bifenazate) *Eggplant, Pepper, Tomato* | 0.75-1 lb. per acre. *Two-spotted spider mites only.* REI: 12-hour. PHI: 3-day. IRAC 20D.

Agri-Mek SC (abamectin) *Eggplant, Pepper, Tomato* | Use 0.7SC formulations at 1.75-3.5 fl. oz. per acre. Use 0.15SC formulations at 8-16 fl. oz. per acre. Greenhouse use for commercial production tomatoes only, not for transplants. REI: 12-hour. PHI: 7-day for field-grown crops, 1-day for greenhouse tomatoes. IRAC 06. *RUP.*

Gladiator (zeta-cypermethrin, abamectin) *Eggplant, Pepper, Tomato* | 19 fl. oz. per acre. REI: 12-hour. PHI: 7-day. IRAC 03A, IRAC 06. *RUP.*

Kanemite 15SC (acequinocyl) *Eggplant, Pepper, Tomato* | 31 fl. oz. per acre. *Spider mites only.* REI: 12-hour. PHI: 1-day. IRAC 20B.

Movento (spirotetramat) *Eggplant, Pepper, Tomato* | 4-5 fl. oz. per acre. *Russet mites and broad mites only.* REI: 24-hour. PHI: 1-day. IRAC 23.

Nealta (cyflumetofen) *Tomato* | 13.7 fl. oz. per acre. *Spider mites only.* REI: 12-hour. PHI: 3-day. IRAC 25A.

Oberon 2SC (spiromesifen) *Eggplant, Pepper, Tomato* | 7-8.5 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 23.

Portal (fenpyroximate) *Eggplant, Pepper, Tomato* | 2 pt. per acre. REI: 12-hour. PHI: 1-day. IRAC 21A.

Pyganic EC 5.0 II (pyrethrins) *Eggplant, Pepper, Tomato* | *Foliar applications:* 4.5-15.6 fl. oz. per acre. *Soil drench applications* (in greenhouses): 0.375 fl. oz. per 1,000 sq. ft. of growing media/soil. REI: 12-hour. PHI: 0-day. IRAC 03A. *OMRI-listed.*

Vydate L (oxamyl) *Eggplant* | 2-4 pts. per acre. REI: 48-hour. PHI: 1-day. IRAC 01A. *RUP.*

Wettable Sulfur (sulfur) *Tomato* | *Russet mites only.* Rates vary by product. Use 80% sulfur products at 10-20 lb. per acre (Sulfur Dry Flowable, Sulfur 80 WDG, Thiolux), or 5-20 lb. per acre (Microthiol Disperss). Use 90% sulfur at 2-8 lb. per acre (Sulfur 90W), or 15-30 lb. per acre (Golden Micronized Sulfur). Thorough coverage is required. Do not apply when temperatures are above 95F or during a heavy dew. REI: 24-hour. PHI: 0-day. IRAC M02, IRAC UN. *OMRI-listed.*

Zeal (etoxazole) *Eggplant, Pepper* | 2-3 oz. per acre. *Spider mites only.* REI: 12-hour. PHI: 7-day. IRAC 10B.

Slugs and Snails

Slugs and snails may occasionally damage seedlings, low growing leafy vegetables, and/or ripening fruit. Slug and snail feeding causes hollowed out areas, which can be found on fruit, but the damage is usually on the stem. Slugs and snails produce a silvery trail on the surface of leaves and fruit. Slugs and snails are active at night and they inhabit moist soil and organic mulch. Slugs and snails overwinter as eggs in moist soil.

Bait products can be placed on the soil surface around the perimeter of the planting area. Bait products can also be placed on the soil surface in a band between rows. Apply bait products in the evening after a rain or irrigation. Avoid contacting edible crops with bait products.

Non-Pesticide

Eggplant, Pepper, Tomato | Slug and snail hiding places, such as, boards, stones, weedy areas, and mulch should be eliminated. Raised beds will dry out faster than flat beds, which will reduce problems with slugs and snails. Black plastic mulch can be used to reduce problems with slugs and snails.

Pesticide

Deadline M-Ps (metaldehyde) *Tomato* | 25 lbs. per acre. REI: 12-hour. PHI: 0-day. IRAC UN.

Sluggo 1B (iron phosphate) *Eggplant, Pepper, Tomato* | 20-44 lbs. per acre, or at 05.-1 lb. per square ft. REI: 0-hour. PHI: 0-day. IRAC UN. *OMRI-listed.*

Stink Bugs

Pesticide

Actara (thiamethoxam) *Eggplant, Pepper, Tomato* | 3.0-5.5 oz. per acre. REI: 12-hour. PHI: 0-day. IRAC 04A.

Azera (azadirachtin, pyrethrins) *Eggplant, Pepper, Tomato* | 1-3.5 pts. per acre. REI: 12-hour. PHI: 0-day. IRAC UN, IRAC 03A. *OMRI-listed.*

Baythroid XL (beta-cyfluthrin) *Eggplant, Pepper, Tomato* | 1.6-2.8 fl. oz. per acre. REI: 12-hour. PHI: 0-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP.*

Brigade 2EC (bifenthrin) *Eggplant, Pepper, Tomato* | For armyworms, corn borers, cutworms, fruitworms, and loopers in tomatoes, peppers, and eggplants. For hornworms, and pinworms in peppers and eggplants only. Use 2EC formulations at 2.1-6.4 fl. oz. per acre. Use 10DF, 10WP, or 10WSB formulations at 5.3-12.8 oz. per acre. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP.*

Danitol 2.4EC (fenpropathrin) *Eggplant, Pepper, Tomato* | 10.67 fl. oz. per acre. REI: 24-hour. PHI: 3-day. IRAC 03A. *RUP.*

Lannate LV (methomyl) *Pepper, Tomato* | 1.5-3.0 pts. per acre. *Brown Marmorated Stink Bugs only*. REI: 48-hour. PHI: 1-day for tomato, 3-day for pepper. IRAC 01A. *RUP*.

Mustang Maxx (zeta-cypermethrin) *Eggplant, Pepper, Tomato* | 3.2-4.0 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 03A. *RUP*.

Pyganic EC 5.0 II (pyrethrins) *Eggplant, Pepper, Tomato* | *Foliar applications*: 4.5-15.6 fl. oz. per acre. *Soil drench applications* (in greenhouses): 0.375 fl. oz. per 1,000 sq. ft. of growing media/soil. REI: 12-hour. PHI: 0-day. IRAC 03A. *OMRI-listed*.

Scorpion 35SL (dinotefuran) *Eggplant, Pepper, Tomato* | *Soil application*: Use Scorpion 35SL at 9.0-13.0 fl. oz. per acre, or Venom 70SG at 5.0-7.5 oz. per acre. *Foliar application*: Use Scorpion 35SL at 2.0-7.0 fl. oz. per acre, or Venom 70SG at 1-4 oz. per acre. See pollination precautions. REI: 12-hour. PHI: 21-day as soil applications, 7-day as foliar applications. IRAC 04A.

Warrior II (lambda-cyhalothrin) *Eggplant, Pepper, Tomato* | 1.28-1.92 fl. oz. per acre. REI: 24-hour. PHI: 5-day. IRAC 03A. *RUP*.

Thrips

Thrips populations spike in hot dry weather, and when neighboring small grains or alfalfa is harvested. Damage appears as white flecks on leaves. Thrips transmit viral diseases. Treatment will not reverse the symptoms of viruses, but will limit further spread. Selective chemistries (e.g. abamectin, spinetoram, spirotetramat, and spinosad) that target thrips help to preserve natural enemies.

Non-Pesticide

Eggplant, Pepper, Tomato | A heavy rain or overhead irrigation washes thrips out of plants. Avoid planting near early harvested grain or alfalfa fields. Preserve and encourage natural enemies. Minute pirate bugs, and lacewings are common predators. For greenhouses, consider purchasing and releasing the predatory mites *Amblyseius swirskii*, *Neoseiulus cucumeris* and *Stratiolaelaps scimitus*, minute pirate bug *Orius spp.* and beneficial nematode *Steinernema feltiae* to achieve pest suppression. *A. swirskii*, *N. cucumeris* and minute pirate bugs prey on life stages residing on the upper portion of the plant, *S. scimitus* and the beneficial nematodes attack the prepupae and pupae of thrips located in the soil or growing media.

Pesticide

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. REI: 12-hour. PHI: 21-day. IRAC 04A.

Agri-Mek SC (abamectin) *Eggplant, Pepper, Tomato* | Use 0.75SC formulations at 1.75-3.5 fl. oz. per acre. Use 0.15SC formulations at 8-16 fl. oz. per acre. Greenhouse use for commercial production tomatoes only, not for transplants. REI: 12-hour. PHI: 7-day for field-grown crops, 1-day for greenhouse tomatoes. IRAC 06. *RUP*.

Assail 30SG (acetamiprid) *Eggplant, Pepper, Tomato* | Use 30SG formulations at 4.0 oz. per acre. Use 70WP formulations at 1.7 oz. per acre. REI: 12-hour. PHI: 7-day. IRAC 04A.

Azera (azadirachtin, pyrethrins) *Eggplant, Pepper, Tomato* | 2-3.5 pts. per acre. REI: 12-hour. PHI: 0-day. IRAC UN, IRAC 03A. *OMRI-listed*.

Baythroid XL (beta-cyfluthrin) *Eggplant, Pepper, Tomato* | 2.1-2.8 fl. oz. per acre. REI: 12-hour. PHI: 0-day. IRAC 03A. *RUP*.

Brigade 2EC (bifenthrin) *Eggplant, Pepper, Tomato* | For armyworms, corn borers, cutworms, fruitworms, and loopers in tomatoes, peppers, and eggplants. For hornworms, and pinworms in peppers and eggplants only. Use 2EC formulations at 2.1-6.4 fl. oz. per acre. Use 10DF, 10WP, or 10WSB formulations at 5.3-12.8 oz. per acre. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP*.

Entrust SC (spinosad) *Eggplant, Pepper, Tomato* | Use 2SC formulations at 4.0-8.0 fl. oz. per acre. Use 80WP formulations at 1.25-2.5 oz. per acre. REI: 4-hour. PHI: 1-day. IRAC 05. *OMRI-listed*.

Exirel (cyantraniliprole) *Eggplant, Pepper, Tomato* | 13.5-20.5 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 28.

Gladiator (zeta-cypermethrin, abamectin) *Eggplant, Pepper, Tomato* | 19 fl. oz. per acre. REI: 12-hour. PHI: 7-day. IRAC 03A, IRAC 06. *RUP*.

Grandevo (Chromobacterium subtsugae strain PRAA4-1) *Eggplant, Pepper, Tomato* | 2-3 lb. per acre. REI: 4-hour. PHI: 0-day. IRAC UNB. *OMRI-listed*.

Minecto Pro (cyantraniliprole, abamectin) *Eggplant, Pepper, Tomato* | 10.0 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 28, IRAC 06. *RUP*.

Movento (spirotetramat) *Eggplant, Pepper, Tomato* | 4-5 fl. oz. per acre. REI: 24-hour. PHI: 1-day. IRAC 23.

Mustang Maxx (zeta-cypermethrin) *Eggplant, Pepper, Tomato* | 3.2-4.0 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 03A. *RUP*.

Neemix (azadirachtin) *Eggplant, Pepper, Tomato* | 4-16 fl. oz. per acre. REI: 4-hour. PHI: 0-day. IRAC UN. *OMRI-listed*.

Platinum 2SC (thiamethoxam) *Eggplant, Pepper, Tomato* | 5-11 fl. oz. per acre. REI: 12-hour. PHI: 30-day. IRAC 04A.

Pyganic EC 5.0 II (pyrethrins) *Eggplant, Pepper, Tomato* | *Foliar applications:* 4.5-15.6 fl. oz. per acre. *Soil drench applications* (in greenhouses): 0.375 fl. oz. per 1,000 sq. ft. of growing media/soil. REI: 12-hour. PHI: 0-day. IRAC 03A. *OMRI-listed*.

Radiant 1SC (spinetoram) *Eggplant, Pepper, Tomato* | 6-10 fl. oz per acre. REI: 4-hour. PHI: 1-day. IRAC 05.

Rimon 0.83EC (novaluron) *Eggplant, Pepper, Tomato* | 12 oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 15.

Torac (tolfenpyrad) *Eggplant, Pepper, Tomato* | 21 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 21A, FRAC 39.

Transform WG (sulfoxaflor) *Eggplant, Pepper, Tomato* | Use Transform WG at 2.0-2.25 oz. per acre. Use Sequoia at 4.25-4.5 fl. oz. per acre. REI: 24-hour. PHI: 1-day. IRAC 04C.

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

Warrior II (lambda-cyhalothrin) *Eggplant, Pepper, Tomato* | 1.28-1.92 fl. oz. per acre. Not for use against *western flower thrips*. REI: 24-hour. PHI: 5-day. IRAC 03A. *RUP*.

Whiteflies

Non-Pesticide

Eggplant, Pepper, Tomato | For greenhouses, consider purchasing and releasing the predatory mite *Amblyseius swirskii*, lady beetle *Delphastus catalinae*, and mirid bug *Dicyphus hesperus*. Also consider co-releasing a parasitoid

wasp like *Encarsia formosa*, or *Eretmocerus eremicus*. Avoid insecticides when deploying natural enemies.

Pesticide

Actara (thiamethoxam) *Eggplant, Pepper, Tomato* | 3.0-5.5 oz. per acre. REI: 12-hour. PHI: 0-day. IRAC 04A.

Admire Pro (imidacloprid) *Eggplant, Pepper, Tomato* | Use 1.3-2.2 fl. oz. per acre for foliar application on eggplant, pepper, and tomato. Use 7.0-10.5 fl. oz. per acre for soil application on eggplant and tomato, up to 14 fl. oz. per acre for pepper. REI: 12-hour. PHI: 0-day for foliar application, or 21-day for soil application. IRAC 04A.

Asana XL (esfenvalerate) *Tomato* | 5.8-9.6 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 03A. *RUP*.

Assail 30SG (acetamiprid) *Eggplant, Pepper, Tomato* | Use 30SG formulations at 2.5-4.0 oz. per acre. Use 70WP formulations at 1.1-1.7 oz. per acre. REI: 12-hour. PHI: 7-day. IRAC 04A.

Brigade 2EC (bifenthrin) *Eggplant, Pepper, Tomato* | For armyworms, corn borers, cutworms, fruitworms, and loopers in tomatoes, peppers, and eggplants. For hornworms, and pinworms in peppers and eggplants only. Use 2EC formulations at 2.1-6.4 fl. oz. per acre. Use 10DF, 10WP, or 10WSB formulations at 5.3-12.8 oz. per acre. REI: 12-hour. PHI: 1-day for tomato, 7-day for eggplant and pepper. IRAC 03A. *RUP*.

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. REI: 4-hour. PHI: 1-day. IRAC 28.

Exirel (cyantraniliprole) *Eggplant, Pepper, Tomato* | 13.5-20.5 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 28.

Knack (pyriproxyfen) *Eggplant, Pepper, Tomato* | 8-10 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 07C.

Movento (spirotetramat) *Eggplant, Pepper, Tomato* | 4-5 fl. oz. per acre. REI: 24-hour. PHI: 1-day. IRAC 23.

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

Oberon 2SC (spiromesifen) *Eggplant, Pepper, Tomato* | 7-8.5 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 23.

Platinum 2SC (thiamethoxam) *Eggplant, Pepper, Tomato* | Use 2SC formulations as a soil treatment at 5-11 fl. oz. per acre. Use 75SG formulations as a soil treatment at 1.66-3.67 oz. per acre. REI: 12-hour. PHI: 30-day. IRAC 04A.

Portal (fenpyroximate) *Eggplant, Pepper, Tomato* | 2 pt. per acre. REI: 12-hour. PHI: 1-day. IRAC 21A.

Pyganic EC 5.0 II (pyrethrins) *Eggplant, Pepper, Tomato* | *Foliar applications:* 4.5-15.6 fl. oz. per acre. *Soil drench applications* (in greenhouses): 0.375 fl. oz. per 1,000 sq. ft. of growing media/soil. REI: 12-hour. PHI: 0-day. IRAC 03A. *OMRI-listed.*

Sivanto 200 (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. IRAC 04D.

Transform WG (sulfoxaflor) *Eggplant, Pepper, Tomato* | Use Transform WG at 2.0-2.25 oz. per acre. Use Sequoia at 4.25-4.5 fl. oz. per acre. REI: 24-hour. PHI: 1-day. IRAC 04C.

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. IRAC 28.

Fruiting Vegetables - Weeds

Reviewed by Stephen Meyers, Ram Yadav, Chris Galbraith – Feb 2025

All Weeds

The fruiting vegetables are warm-season crops nearly always started as transplants. When growers transplant crops into plastic mulch, they sometimes use herbicides underneath the mulch. There are several herbicides labeled for the control of weeds preemergence, applied before crops are transplanted, or directed between the rows only after transplanting.

For specific weeds controlled by each herbicide, check the Relative Effectiveness of Herbicides for Vegetable Crops table.

Rates provided in the recommendations below are given for overall coverage. For a banded treatment, reduce amounts according to the portion of acre treated.

Non-Pesticide

Eggplant, Pepper, Tomato | A stale seedbed can be prepared prior to transplanting with flame weeding or very shallow cultivation to control emerged weeds, instead of herbicides. These crops can benefit from the soil warming properties of plastic mulch in addition to the in-row weed control it provides. Materials include landscape cloth/fabric, plastic, and biodegradable plastic. Straw mulch can delay early season growth by suppressing soil temperatures. Weeds between beds and along the edges of beds can be controlled with a combination of cultivation, mowing, or hand hoeing/pulling. Weeds along the edge of the mulches can be a particular challenge to avoid ripping the mulch. Some fresh market plantings are often small enough to accommodate hand-hoeing or pulling. For larger plantings it may make more sense to mechanically cultivate with tow-able tools between plastic rows or between bare-soil rows.

Pesticide

Aim EC (carfentrazone) POST  *Eggplant, Pepper,*

Tomato | 0.5-2 fl. oz. per acre. Apply a minimum of 1 day prior to transplanting, or apply between crop rows with hooded sprayer. Do not allow spray to contact crop. Add COC (1% v/v) or NIS (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. HRAC 14.

clethodim products (clethodim) POST  *Eggplant,*

Pepper, Tomato | Use 2EC formulations at 6-8 fl. oz. per acre with COC (1% v/v). For tomatoes, use up to 16 fl. oz per acre. Do not exceed 32 fl. oz. per acre per season. Use Select Max at 9-16 fl. oz. per acre with COC (1% v/v) or NIS (0.25% v/v). For tomatoes, use up to 32 fl. oz. per acre. 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. HRAC 01.

Command 3ME (clomazone) PRE   *Pepper* | 10.7-

42.7 fl. oz. per acre. For **bell and non-bell peppers** (*special 24c label required banana peppers*), make a single application before transplanting. Use a lower rate on coarse soils and a higher rate on fine soils. Ensure transplant roots are placed below the herbicide barrier. May cause temporary bleaching of crop leaves. Do not apply more than 42.7 fl. oz. per acre per year. Do not apply to soils that will be covered with plastic mulch. REI: 12-hour. HRAC 13.

Devrinol DF-XT (napropamide) PRE   *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. HRAC NC.

Dual Magnum (s-metolachlor) PRE   *Eggplant,*

Pepper, Tomato | For **tomatoes in all states**: Apply 1-2 pts. per acre. For **peppers with special 24c label**: apply 0.5-1.0 pt. per acre. For **eggplants with special 24c label**: 0.5-1.33 pts. per acre. Apply to soil before transplanting or within 48 hours after transplanting. Do not incorporate. Reduce risk of crop injury by applying after transplanting and by using a directed spray rather than spraying over the top of transplants. Crop injury may occur under unfavorable growing conditions. See label for additional precautions. Do not exceed 1 application per crop. REI: 24-hour. PHI: 30-day for tomatoes at rates less than 1.33 pts. per acre; 60-day for eggplants, and peppers; 90-day for tomatoes at rates greater than 1.33 pts. per acre. HRAC 15.

glyphosate products (glyphosate) POST  

Eggplant, Pepper, Tomato | 0.375-3.75 lbs. acid equivalent (ae) per acre. Divide lb. acid equivalent (ae) per acre target

rate by lb. ae per gal and then multiply by 4. For example, for RoundUp ULTRA at the high rate, (3.75 lb. ae per acre / 3 lb. ae per gal) * 4 = 5 qt. per acre of actual product. 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. Remove herbicide residue from plastic mulch prior to transplanting. Do not use row-middle applications for tomatoes grown on sandy soils because crop injury may occur. REI: 4-hour to 12-hour. PHI: 14-day. HRAC 9.

League (imazosulfuron) POST PRE  Pepper,

Tomato | 4.0-6.4 oz. per acre. For **peppers**: apply to row middles after peppers are well-established and at least 10 inches tall. Avoid contact with crop and 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. For **tomatoes**: Apply to prepared bed at least 1 day before transplanting just prior to laying plastic, if applicable. Or apply over the top or directed to row middles of transplanted tomatoes from 3-5 days after transplanting through early bloom stage. If small, emerged weeds are present include a manufacturer-approved surfactant. REI: 12-hour. PHI: 21-day. HRAC 02.

Matrix SG (rimsulfuron) POST PRE  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 gals. 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. HRAC 02.

metribuzin products (metribuzin) POST PRE  

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. HRAC 05.

paraquat products (paraquat) POST   Eggplant,

Pepper, Tomato | Use 2-4 pt. per acre of 2SL formulation or 1.3-2.7 pt. per acre of 3SL formulation. Add COC (1% v/v) or NIS (0.25% v/v) and apply to weeds less than 6 in. tall. Apply prior to transplanting. 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: 12 to 24-hour. PHI: 30-day for tomato HRAC 22. RUP.

pendimethalin products (pendimethalin) PRE  

Eggplant, Pepper, Tomato | 1 to 3 pts. per acre. Use 3.8 formulations. 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 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. HRAC 03.

Poast (sethoxydim) POST  Eggplant, Pepper, Tomato |

1.0-1.5 pt. per acre. Add COC (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. HRAC 01.

Prefar 4E (bensulide) PRE   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. HRAC NC.

Reflex (fomesafen) PRE  Pepper, Tomato | 1 pt. per

acre. *Special 24c label only*. Apply before transplanting. Do not incorporate. 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. HRAC 14.

Rely 280 (glufosinate) POST   Pepper, Tomato |

For preplant burndown applications: apply 29-43 fl. oz. per acre to bare ground or preformed beds covered with plastic mulch. For bare ground plantings, allow at least 14 days between application and transplanting if precipitation is at

least 0.5 inches. If rainfall is less than 0.5 inch, do not transplant within 21 days of application. Allow 3 days and at least 0.5 inch of precipitation or overhead irrigation to remove herbicide from the plastic mulch before transplanting. If rainfall or overhead irrigation are less than 0.5 inches, do not transplant into plastic mulch within 27 days of application. Do not transplant within 6 inches of holes in the plastic mulch that exist at the time of application. **For hooded postemergence row middle applications:** use 29-62 fl. oz. per acre applied with a hooded sprayer and directed to row middles without contacting the crop. If the crop is grown on flat beds, do not spray within 6 inches of the crop. Do not exceed three applications or 87 fl. oz. per acre for bare ground burndown applications, two applications or 64 fl. oz. per acre for plasticulture burndown applications, or two applications or 62 fl. oz. per acre for hooded row middle applications. When using both burndown and hooded row middle applications, do not exceed three applications or 87 fl. oz. per acre total. Allow at least 14 days between applications. REI: 12-hour. PHI: 30-day. HRAC 10.

Sandea (halosulfuron) POST PRE  *Eggplant,*

Pepper, Tomato | 0.5-1.0 oz. per acre. For **tomato:** apply 0.5-1.0 oz. per acre to the soil surface after final soil preparation or bed shaping and just before applying plastic mulch. Wait at least 7 days before transplanting. Or apply a minimum of 14 days after transplanting over the top or as a directed/shielded spray, avoiding contact with crop and plastic mulch, if present. For **eggplant and pepper:** apply 0.5-1.0 oz per acre to row middles, avoiding contact with 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. HRAC 02.

Spartan 4F (sulfentrazone) PRE  *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. HRAC 14.

Sulfen 4SC (sulfentrazone) PRE   *Eggplant,*

Pepper, Tomato | 3-12 fl. oz. per acre. For **eggplant and pepper:** Apply prior to transplanting at 3-12 fl. oz. per acre. Do not apply more than 12 fl. oz. per acre, and do apply more than 12 fl. oz. per acre per year. For **tomato:** Apply prior to transplanting at 6-8 fl. oz. per acre. Do not apply more than 8 fl. oz. per acre, and do apply more than 8 fl. oz. per acre per year. Do not apply to sand or soils with less than 1% organic matter. REI: 12-hour. HRAC 14.

trifluralin products (trifluralin) PRE   *Pepper,*

Tomato | Use 4EC formulations at 1-2 pts. per acre and do not exceed 4 pts. per acre per season on fine soils. Use 10G formulations at 5-10 lbs. per acre and do not exceed 20 lbs. per acre per season on fine soils. For **peppers:** broadcast and incorporate before transplanting. For **tomatoes:** apply as in peppers 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 higher rates on heavier soils. 4-6 weeks of residual activity. Not effective on muck or high organic matter soils. REI: 12-hour. HRAC 03.

Tripzin ZC (pendimethalin, metribuzin) POST PRE

  *Tomato* | 1.75-2.6 pt. per acre. *With special 24c label only.* Apply with banded application between rows of transplanted tomatoes when weeds are less than 1 inch tall. Tomatoes must be at least 4 inches tall or 5 to 6 leaf stage at the time of application. Avoid contact with tomato leaves. Do not exceed 3.6 pts per acre per season. REI: 24-hour. PHI: 21-day. HRAC 03, HRAC 05.