

Eggplant, Pepper, and Tomato

Early Blight

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Identification and Life Cycle

Early blight is a disease of tomato, pepper and eggplant caused by the fungus *Alternaria solani*, but tends to be most damaging to tomato. Early blight occurs on tomatoes wherever they are grown, but is most damaging in humid climates or semiarid environments where dews are frequent or irrigation is provided by overhead sprinklers. *A. solani* survives between susceptible hosts in and on infected crop debris in the soil and on seed. The pathogen can also survive on several weeds and other crops, including black nightshade, horsenettle, and potato. Disease occurs when spores (conidia) land on leaves and germinate in free moisture when temperatures are cool to warm. High temperatures (82-86°F) and alternating cycles of night time leaf wetness and daytime drying favor prolific sporulation and severe epidemics. Conidia are easily disseminated by wind and splashing water. Older leaves on plants are most susceptible to early blight, and young tissues become infected later in the season as they age.

Plant Response and Damage

Early blight can be very devastating if not managed carefully. Small lesions first appear on older leaflets as small brown to black lesions surrounded by a yellow halo. Lesions enlarge rapidly and form concentric rings as they age. Lesions become more numerous as plants age, coalesce, and can cause severe defoliation. Stem lesions are small, dark, and slightly sunken. Stem lesions enlarge and often develop concentric rings with light centers. Large stem lesions can form near the soil line, girdling the stem and killing the plant (often called collar rot). Fruit can become infected when green or ripe, forming large lesions with concentric rings. The entire fruit can become covered with lesions. Diseased areas appear leathery and may be covered by a velvety mass of black spores.

Management Approaches

Biological Control

No effective biological control strategies have been developed for early blight.

Cultural Control

Plant only high quality seed or transplants free from the early blight pathogen. Plant resistant or tolerant varieties where available. Practice a three-year or longer crop rotation between susceptible crops; avoid potato and other solanaceous crops in rotations. Practice strict sanitation between solanaceous crops by destroying crop debris, weeds, and volunteers. Provide adequate but not excessive nitrogen fertilization and irrigation to promote vigorous growth. Time irrigations to avoid prolonged periods of leaf wetness; do not use overhead irrigation if possible. Promote rapid drying of foliage between irrigation by planting on wide row spacing parallel to the prevailing wind direction.

Chemical Control

Fungicides are often necessary for effective early blight management in tomato, but rarely in pepper or eggplant. Fungicides are most effective when used in combination with cultural control strategies.

Product List for Early Blight Eggplant:

Pesticide	Product per acre	Application Frequency (days)	Remarks
Boscalid			
Endura	2.5-3.5 oz	7-14 days	Maximum of 21 oz or 6 applications per season; do not make more than 2 consecutive Endura applications before rotating to a fungicide with a different mode of action; 0 day PHI
Copper Fungicides			
Champ Dry Prill	1.33 lb	5-7 days	
Champ Formula	1.33 pt	5-7 days	

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Copper-Count-N	4-6 pt	7 days	Mid-harvest.
Cuprofix MZ Disperss	1.75-4.75 lb	7-10 days	Maximum of 21 lbs product/A/season
Kocide 101	1.5-3 lbs	5-7 days	May cause injury
Kocide DF	1.5-3 lbs	5-7 days	May cause injury
Kocide 4.5LF	1-2 pts	5-7 days	May cause injury
Nordox	1.5-2.0 lb	7-10 days	
Tri Basic Copper	2-4 pt	7-10 days	1 day PHI
EBDC/ mixtures			
Maneb 75 DF	1.5-2.0 lb	7-10 days	Maximum of 17.1 pounds per season; 5 day PHI
Manex 80W	1.5-2.0 lb	7-10 days	Maximum of 16.0 pounds per season; 5 day PHI
Manex	2.4-3.2 pt	7-10 days	Maximum of 25 pints per season; 5 day PHI
Strobilurin			
Cabrio	8-16 oz	7-14 days	Maximum of 4 applications or 64 oz per season; Alternate fungicides with different modes of action; 0 day PHI
Flint	2-3 oz	7-10 days	Maximum of 4 applications or 16 ounces per season; Rotate with fungicides with a different mode of action such as Maneb, Endura, or copper-containing products; 3 day PHI
Quadris	11.0-15.4 fl oz	5-14 days	Maximum of 4 applications or 2.88 quarts per season; Alternate Quadris with fungicides with different modes of action; 1 day PHI

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Product List for Early Blight Pepper:

Pesticide	Rate/Acre	Application Frequency (days)	Remarks
Boscalid			
Endura	2.5-3.5 oz	7-14 days	Maximum of 21 oz or 6 applications per season; do not make more than 2 consecutive Endura applications before rotating to a fungicide with a different mode of action; 0 day PHI
Captan			
Captan 50	2 lb	3-7 days	4 day REI
Copper Fungicides			
Champ Dry Prill	2 lb	7-10 days	
Champ Formula 2	2 pt	7-10 days	
Copper-Count-N	4 pt	7-10 days	
Cuprofix Disperss	2.5-6 lb	7-10 days	
Kocide 101	1.5-3 lbs	5-7 days	
Kocide DF	1.5-3 lbs	5-7 days	
Kocide 4.5LF	1-2 pts	5-7 days	
Nordox	2-4 lb	7-10 days	
Top Cop + S	4 pt	7-10 days	1 day PHI
Tri-Basic Copper	3 lb	7-10 days	1 day PHI
EBDC			
Maneb 75DF	1.5-2 lb	7-10 days	Maximum of 12.8 lbs; 5 day PHI
Maneb 80W	1.5-2 lb	7-10 days	Maximum of 12 lbs; 5 day PHI
Strobilurin and Strobilurin Mixtures			
Cabrio	8-12 oz	7-14 days	Maximum of 6 applications or 96 oz per season; Do not make more than 2 applications before alternating with a fungicide with a different mode of action; 0 day PHI

Flint	2-3 oz	7-10 days	Maximum of 4 applications or 16 ounces per season; Rotate with fungicides with a different mode of action such as Maneb, Endura, or copper-containing products; 3 day PHI
Quadris FL	6.2-15.4 oz	7-21 days	Do not make more than 1 Quadris application before rotating with a fungicide with a different mode of action; Maximum 1.92 qt/acre/season; 0 day PHI
Tanos	8 oz	5-7 days	Rotate and rotato with fungicides with a different mode of action such as chlorothalonil or mancozeb; Maximum of 72 ounces per season; 3 day PHI

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Product List for Early Blight Tomato:

Pesticide	Product per acre	Application Frequency (days)	Remarks
Boscalid			
Endura	2.5-3.5 oz	7-14 days	Maximum of 21 oz or 6 applications per season; do not make more than 2 consecutive Endura applications before rotating to a fungicide with a different mode of action; 0 day PHI
Captan			
Captan 4F	4 pt	5-7 days	4 day REI
Captan 50	2 lb	5-7 days	4 day REI
Copper Fungicides			
Champ Dry Prill	1.33 lb	5-7 days	
Champ Formula 2	1.33 pt	5-7 days	
Copper-Count-N	4-6 pt	7 days	
Kocide 101	1.5-3 lbs	5-7 days	
Kocide DF	1.5-3 lbs	5-7 days	
Kocide 4.5LF	1-2 pts	5-7 days	
Kocide 3000	0.75-1.75 lb	5-10 days	

Nordox	1.5-2.0 lb	7-10 days	
Tri Basic Copper	2-4 pt	7-10 days	1 day PHI
Chlorothalonil and Chlorothalonil Mixtures			
Bravo 720, Echo 720	1.5-3 pt	7-14 days	Do not graze or feed debris to livestock; 7 day PHI
Bravo Ultrex, Echo 90DF	1.7-2.2 lb	7-10 days	Maximum of 18.3 pounds per season; 0 day PHI
Bravo Weather Stik	1.5-3.0 pt	7-10 days	Maximum of 20 pints per season; 0 day PHI
Echo Zn	2-4 pt	7-10 days	Maximum of 3.6 gallons per season; 0 day PHI
Ridomi Goldl/Bravo	2 lb	14 days	Maximum of three applications; 14 day PHI
EBDC, Copper/EBDC, and EBDC/Zoxamide			
Cuprofix Disperss MZ	1.75-4.75 lb	3-10 days	Maximum of 21 pounds per season; 5 day PHI
Dithane	1.5-2.0 lb	7-10 days	Maximum of 8.5 pounds per season; 5 day PHI; use a non-ionic surfactant to improve performance
Gavel	1.5-2 lb	7-10 days	Maximum of 4 (west of Rockies) to 8 (east of Rockies) applications; 5 days PHI
Maneb 75 DF	1.5-2.0 lb	7-10 days	Maximum of 8.5 pounds per season; 5 day PHI
Manex	1.2-1.6 qt	7-10 days	Maximum of 6.4 quarts per season; 5 day PHI
ManKocide	2.5-5.0 lb	7-10 days	Maximum of 42.6 pounds per season; 5 day PHI
Manzate Fl	1.2-1.6 qt	7-10 days	Maximum of 6.4 qts per season; 5 day PHI
Penncozeb 80W	0.75-2.0 lb	7-10 days	Maximum of 8.0 pounds per season; 5 day PHI.
Penncozeb 75DF	0.75-2.0 lb	7-10 days	Maximum of 8.5 pounds per season; 5 day PHI.
Pyrimethanil			
Scala	7.0 fl oz	7-14 days	Maximum of 35 fl oz; 1 day PHI
Strobilurin and Strobilurin Mixtures			
Cabrio	8-12 oz	7-14 days	Maximum of 6 applications or 96 oz per season; Do not make more than 2 applications before alternating with a fungicide with a different mode of action; 0 day PHI
Flint	4 oz	7-10 days	Maximum of 5 applications or

			16 ounces per season; Rotate with fungicides with a different mode of action such as Maneb, Endura, or copper-containing products; 3 day PHI
Quadris	6 oz	5-7 days	Maximum of 0.60 lb a.i. per season; Alternate Quadris with fungicides with different modes of action; 0 day PHI
Tanos	8 oz	5-7 days	Rotate and rotate with fungicides with a different mode of action such as chlorothalonil or mancozeb; Maximum of 72 ounces per season; 3 day PHI

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