

# Eggplant, Pepper, and Tomato

## Bacterial Spot

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### Identification and Life Cycle

Bacterial spot is caused by two species of bacteria, *Xanthomonas axonopodis* pv. *vesicatoria* and *X. vesicatoria*. Bacterial spot can be damaging to both pepper and tomato in the High Plains during warm (75 to 86°F), humid, rainy weather. Bacterial spot does not affect eggplant. Bacteria are introduced onto plants by planting contaminated seed and transplants, splashing rain or irrigation water, aerosols, or on contaminated equipment. The bacteria multiply on leaves to form large populations before penetrating through natural openings or wounds created by wind-blown sand, insect feeding, or mechanical injury. The bacterial spot pathogens survive between susceptible crops in and on weed, volunteer plants, infested crop debris, culls, and contaminated seed and transplants.

### Plant Response and Damage

The bacterial spot pathogens can infect all aboveground plant parts. Disease symptoms begin as small, brown, water-soaked lesions, which turn brown with necrotic centers. Leaf lesions are generally sunken on the upper surface, but are raised on lower surfaces. Lesions are rarely larger than 0.12 inch, but when conditions are favorable for disease, lesions coalesce and form large blighted areas. Infected leaves turn yellow and drop prematurely. Fruit lesions begin as small (0.04 inch) circular green spots, but turn brown and become cracked and roughened with age. Bacterial spot reduces both yield and fruit quality. Infected fruit is generally unmarketable.

## Management Approaches

### Biological Control

Bacteriophage, viruses that attacked bacteria, control bacterial spot but must be applied at dusk at least twice weekly to be effective. Nonpathogenic *Xanthomonas* spp. provide some control of bacterial spot.

### Cultural Control

Plant only high quality seed and transplants free from the bacterial spot pathogens. Hot water treatments can reduce seed contamination, but may reduce germination. Practice a three-year or longer crop rotation between susceptible crops; do not plant tomato and pepper consecutively in a field. Eliminate weeds, volunteers, crop debris, and cull piles that can serve as inoculum sources. Avoid reuse of irrigation tail water and overhead irrigation if possible. Resistant varieties are available, but should be chosen carefully to match the most prevalent pathogenic races of the pathogen present. Eleven pathogenic races are known to occur; no single resistance gene will provide resistance to all pathogenic races.

### Chemical Control

Resistance to copper bactericides and streptomycin are widespread in the bacterial spot pathogens. Tank-mixing copper bactericides with EBDC fungicides such as maneb can provide some suppression of copper-tolerant strains of *X. axonopodis* pv. *vesicatoria*. The plant activator Actigard can provide effective control of both copper sensitive and tolerant strains of the pathogen, but can reduce yields in the absence of disease. Chemical controls are most effective when combined with as many cultural and biological controls as possible.

#### *Product List for Bacterial Spot:*

<b>Pesticide</b>	<b>Product per acre</b>	<b>Application Frequency (days)</b>	<b>Remarks</b>
<b>Acibenzolar</b>			
Actigard 50 WG	0.33-0.75 oz	7-14 days	Do not apply to stressed plants; Start applications at a

			low rate and slowly increase; Maximum of 4 ounces per season; 14 day PHI
<b>Copper Fungicides</b>			
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	
Cuprofix MZ Disperss	1.75-4.75 lb	7-10 days	
Kocide 101	1.5-3 lbs	5-7 days	
Kocide DF	1.5-3 lb	5-7 days	
Kocide 4.5LF	1-2 pts	5-7 days	
Kocide 3000	0.75-1.75 lb	5-10 days	Maximum of 21 lb product/A
Nordox	1.5-2.0 lb	7-10 days	
Tri Basic Copper	2-4 pt	7-10 days	1 day PHI
<b>Copper/EBDC/Zoxamide Mixtures</b>			
Cuprofix Disperss MZ	1.75-4.75 lb	3-10 days	Maximum of 21 pounds per season; 5 day PHI
Gavel	1.5-2.0 lb	7-10 days	Maximum of 4 (west of Rockies) to 8 (east of Rockies) applications, 5 day PHI
ManKocide	2.5-5.0 lb	3-10 days	Maximum of 42.7 pounds per season; 5 day PHI
<b>Famoxadone/Cymoxanil</b>			
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
<b>Streptomycin</b>			
Agri-Strep	1 lb/100 gal	4-5 days	Registered for tomato only; Apply once after transplanting

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Categories: Eggplant, Pepper, Tomato, Disease, Bacterial Spot

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