Bacterial Diseases of Tomato--
featuring bacterial canker

Daniel S. Egel, SW Purdue Ag Center,
812-886-0198, egel@purdue.edu
Bacterial diseases of tomato

- Bacterial speck
- Bacterial spot
- Bacterial canker
Bacterial diseases of tomato

• Bacterial speck
• Bacterial spot
• Bacterial canker

Management similar
Bacterial diseases of tomato

- **Bacterial speck** - causes lesions on leaves, stems and fruit. Prefers cool (64-75 F), wet weather
- Bacterial spot
- Bacterial canker
Bacterial speck of tomato
Bacterial speck of tomato
Bacterial diseases of tomato

- Bacterial speck
- **Bacterial spot** - causes lesions on all above ground parts. Optimum temperature of 75 to 86 F, spread with rain.
- Bacterial canker
Bacterial spot of Tomato
Bacterial spot of tomato
Bacterial spot of tomato
Bacterial spot of tomato
Xanthomonas perforans
Bacterial spot of tomato
Bacterial spot of tomato

- Strains of the bacterial spot microbe resistance to fixed copper in Indiana
- Copper resistance in tomato & pepper strains
- Both copper resistant & sensitive strains in any year
Bacterial spot strains according to species-2016-2017

Most likely to also go to pepper

Favored by cooler climate

Shot-hole symptom

X. euvesicatoria  X. gardneri  X. perforans
Proportion of bacterial spot strains resistant or sensitive to copper and streptomycin -2016-2017

- Copper resistant: 84%
- Copper sensitive: 16%
- Streptomycin resistant: 61%
- Streptomycin sensitive: 39%
Bacterial diseases of tomato

- Bacterial speck
- Bacterial spot
- **Bacterial canker**—may cause lesions on all above ground parts and/or systemic infections. Optimum temperatures: 24 to 90 F.
Bacterial Canker: Background

- First reported from Michigan in 1909
- Now occurs wherever tomatoes are grown.
- Other names include:
  - Grand Rapids Disease
  - Bacterial tomato wilt
  - Stem rot
  - Bird’s eye spot
Bacterial Canker: Biology

- Caused by a bacterium, *Clavibacter michiganensis subsp. michiganensis* (Cmm)
- Cmm can enter host by stomates (pores) and small wounds.
- After entering plant, Cmm can become systemic in xylem
- Cmm does not survive in soil, but in crop residue for long periods (especially if left on soil surface)
- Cmm can infect other solanaceous plants—pepper, eggplant, tobacco and several nightshade species.
Bacterial Canker: Biology

- Pathogenic bacteria often enter into plants passively.
  - Watersoaking or wounding required.
BACTERIAL CANKER: BIOLOGY

- Caused by a bacterium, *Clavibacter michiganensis subsp. michiganensis* (Cmm)
- Cmm can enter host by stomates (pores) and small wounds.
- After entering plant, Cmm can become systemic in xylem
- Cmm does not survive in soil, but in crop residue for long periods (especially if left on soil surface)
- Cmm can infect other solanaceous plants—pepper, eggplant, tobacco and several nightshade species.
Stomates on plant leaves may provide entry to pathogenic bacteria.
BACTERIAL CANKER: BIOLOGY

- Caused by a bacterium, *Clavibacter michiganensis subsp. michiganensis* (Cmm)
- Cmm can enter host by stomates (pores) and small wounds.
- After entering plant, Cmm can become systemic in xylem
- Cmm does not survive in soil, but in crop residue for long periods (especially if left on soil surface)
- Cmm can infect other solanaceous plants-pepper, eggplant, tobacco and several nightshade species.
Bacterial Canker: Biology

- Caused by a bacterium, *Clavibacter michiganensis subsp. michiganensis* (Cmm)
- Cmm can enter host by stomates (pores) and small wounds.
- After entering plant, Cmm can become systemic in xylem
- Cmm does not survive in soil, but in crop residue for long periods (especially if left on soil surface)
- Cmm can infect other solanaceous plants - pepper, eggplant, tobacco and several nightshade species.
Tomato crop residue might be a source of bacterial canker especially if left on the soil surface.
Bacterial Canker: Biology

- Caused by a bacterium, *Clavibacter michiganensis subsp. michiganensis* (Cmm)
- Cmm can enter host by stomates (pores) and small wounds.
- After entering plant, Cmm can become systemic in xylem
- Cmm does not survive in soil, but in crop residue for long periods (especially if left on soil surface)
- Cmm can infect other solanaceous plants - pepper, eggplant, tobacco and several nightshade species.
Bacterial Canker: Symptoms

- Transplants
- General symptoms
  - Wilt
  - Marginal chlorosis and necrosis of leaves
  - Vascular discoloration
  - Fruit lesions
Leaf symptoms of bacterial canker on transplants.

Photo-Mary Hausbeck
Leaf symptoms of bacterial canker on transplants.
bacterial canker
bacterial canker
Bacterial canker
Bacterial spot
Bacterial speck
The canker bacterium may become systemic in the tomato plant.
Wilt caused by bacterial canker.
Seeds harvested from a tomato with bacterial canker might transmit the disease to the seedlings.
Tomato leaves with bacterial canker

Harvest & pruning can spread canker
Greenhouse-bacterial canker on transplants
Greenhouse-bacterial canker on transplants
Pathogen survival

- Seed
- Crop residue
- Volunteers
- Weed hosts
- Stakes/tools
Bacterial Diseases of Tomato-field

- Fall tillage
- Crop rotation
- Choose tomato varieties…
  - Resistant to speck
  - Less susceptible to varieties to spot
  - Resistance to spot in pepper
- Avoid leaf wetness
- Fixed copper/mancozeb-5-10 day schedule
- Actigard (0.33 oz/A)…30-50 gal water/A
  - increase water volume with Actigard rate
  - 8 Actigard applications allowed per year.
Bacterial Diseases of tomato-greenhouse

- Purchase seed tested for disease
- Good sanitation
- Inspect seedlings
- Apply copper/mancozeb
- Apply streptomycin...e.g., Agri-mycin 17, Firewall, Harbour.
- Hydrogen dioxide (Oxidate)
- Serenade Opti
- Agriphage
- Seed treatments
Agriphage-Omnilytics

- Microbe that attacks pathogens of bacterial speck, spot & canker
- 1 to 2 pints per 100 gallons
- 0 hour REI; 0 Day PHI
- Do not use with a copper product
- NOP certified (Not OMRI)
- Contact Omnilytics to order Indiana cocktail
- Recommended for greenhouse & 3-4 applications in field.
Seed treatments for tomato

- Seed treatments may be separated into hot water and chlorine
- Seed without fungicide.
  - Hot water will kill most disease-causing organisms
  - 122 F for 25 minutes
  - Use 2 water baths
  - Demo at Illiana veg & small farm conference
- Chlorine will remove outside bacteria
  - 25 fl. oz of bleach, 100 fl. oz of water and a teaspoon of surfactant for 1 min.
- Both hot water & bleach can ruin germination!