

Managing Diseases in High Tunnels

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High tunnels...



...are low-cost, passive, solar greenhouses that use no fossil fuels for heating or venting.

Benefits of high tunnels...

- Season extension
- Protect crop from environment
- Protect crop from pests
- Well suited for heirloom vegetables
- Intensive crop production on small land area



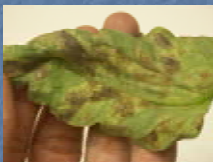
Rutgers cooperative extension

High Tunnel Disease Management vs. Disease Management in the Field

	High Tunnel	Field
Crop rotation	No difference...see pages 44-45 in ID-56	
Fungicide applications	Restricted	---
Windborne spores	Little or no difference	
Splash dispersed diseases	Some protection offered	---
Leaf wetness	Higher humidity, plus leaf wetness	---

Crop rotation is important for residue and soilborne diseases.

Residue borne-survives on crop debris (shorter rotations)



Leaf mold of tomato

Soil borne-survives in soil (longer rotations)

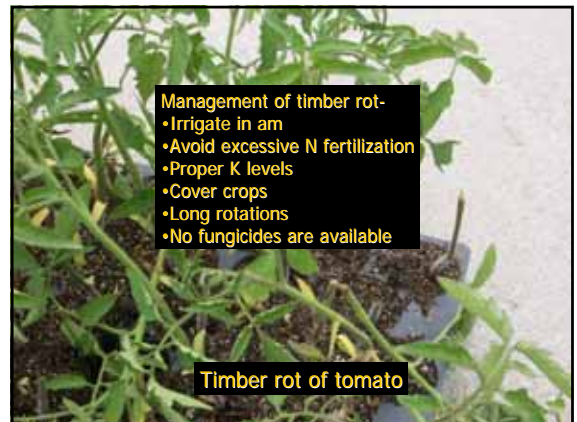


Timber rot of tomato





- Leaf mold management-
- Rotate at least two years
 - Control relative humidity by venting greenhouse pruning and spacing.
 - Fungicides include copper products, mancozeb



- Management of timber rot-
- Irrigate in am
 - Avoid excessive N fertilization
 - Proper K levels
 - Cover crops
 - Long rotations
 - No fungicides are available

Bacterial canker of tomato
(residue-borne)



Bacterial canker of tomato

Bacterial canker management-

- Reduce humidity
- Rotate 3-4 years or more
- Transplants-fixed copper & inspect
- Copper not effective for mature plants

Bacterial canker of tomato

Botrytis gray mold of tomatoes



APSnet

Gray mold of tomatoes



APSnet

Gray mold of tomatoes

Managing gray mold of tomato-

- Rotate 2 years
- Reduce humidity
- Lime soils & keep fertility up
- Copper products, Scala



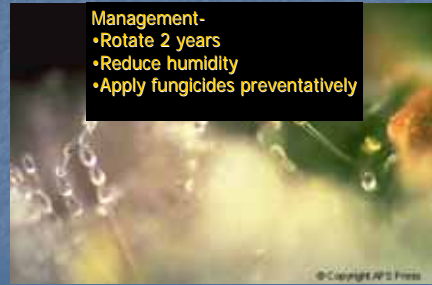
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Powdery mildew of tomato



Powdery mildew fungus

- Management-
- Rotate 2 years
 - Reduce humidity
 - Apply fungicides preventatively



Fusarium wilt of watermelon

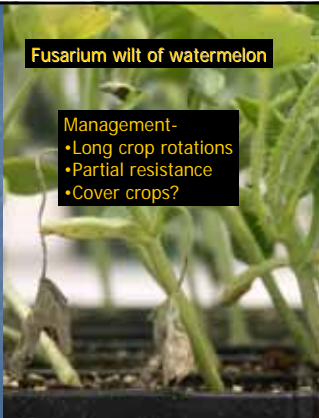


Fusarium wilt of watermelon



Fusarium wilt of watermelon

- Management-
- Long crop rotations
 - Partial resistance
 - Cover crops?



Fungicide applications in a high tunnel

Fungicide applications are restricted in a greenhouse....
....a high tunnel is legally a greenhouse.

- A greenhouse is an enclosed area large enough for a person to enter
 - Nonporous covering.
- 2005 WPS How to Comply Manual

Fungicide labels and the greenhouse

Fungicide labels may...

1. Have a section listing special rates and instructions for greenhouse
2. Mention that a fungicide can be used in greenhouse-no instructions
3. Have no mention of whether the fungicide can be used in greenhouse or not
4. Specifically prohibit greenhouse use.

Fungicide example

1. Label that has specific instructions for the greenhouse.

Copper hydroxide-e.g., Kocide 2000, Champ

Fungicide example

2. Label only mentions that greenhouse use is allowed.

Mancozeb-e.g., Dithane, Mancozeb, Penncozeb

Fungicide example

3. Label has no mention of greenhouse use at all.

Nova, Endura

Fungicide example

4. Label specifically prohibits greenhouse use.

Chlorothalonil-e.g., Bravo, Echo, Equus

Managing diseases in high tunnels-

- Learn to recognize disease symptoms
- Reduce humidity/leaf wetness
- Rotate crops
- Follow good sanitation
- Apply labeled fungicides preventatively

For more information....
High Tunnel Melon and Watermelon Production
Lewis Jeff
University of Missouri (now at U. of WV)
<http://extension.missouri.edu/explore/manuals/m00173.htm>
www.hightunnels.org

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