

Diseases of muskmelon and winter squash

Mark Gleason
Iowa State University
(mgleason@iastate.edu)

Five diseases

- 1) Downy mildew
- 2) Powdery mildew
- 3) Phytophthora blight
- 4) Bacterial wilt
- 5) Gummy stem blight/black rot

1) Downy mildew

- Caused by *Pseudoperonospora cubensis*
 - A “water mold”
- Attacks many cucurbit crops
- Worst on cucumber and muskmelon
- Reduces yield, fruit quality
- **INCREASING PROBLEM** in the Midwest.

Early symptoms on leaf undersides



Angular, yellow to brown spots on upper sides of leaves



Ecology of downy mildew

- Most damaging in rainy, humid periods.
- Often appears in late summer.
- Spores come from southern U.S. and Mexico.
- Most cucurbits are highly susceptible.

Downy mildew management

- Drip irrigation; good air drainage
- Long list of fungicides
- Avoid over-using strobilurins
 - Cabrio, Flint, Quadris, Pristine, Reason
- Avoid over-using Ridomil.
- Alternate fungicide modes of action.
- Apply fungicides only if symptoms seen.
- No overwinter survival in our region.

2) Powdery mildew

Sphaerotheca fuliginea
(a fungus)



Turn over leaves to see early powdery mildew.





Top side

Underside

Powdery mildew ecology

- Spores can fly hundreds of miles.
- Greenhouse cucurbits, weed hosts
- High humidity, dense canopy, cloudy
- Favored by LOW-rainfall periods
 - OPPOSITE of most diseases



Powdery mildew management

- Partially resistant varieties (muskmelon)
- Fungicides
 - Scout leaf undersides for 1st symptoms
 - Start sprays promptly when pm appears.
 - Alternate fungicide modes of action.
 - Less resistance risk than downy mildew.
- Excellent canopy penetration is essential for effective fungicide sprays.

3) Phytophthora root rot and blight

- Caused by *Phytophthora capsici*
 - Another “water mold” like downy mildew
- Lives in the soil.
- Major problem in Michigan, Ohio, Illinois
- Sporadic problem in Iowa, Missouri

Damping off



Leaf spots



Vine blight



Wilting and collapse





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**Fruits develop
white growth
and
may collapse.**



Swimming spores

- **Zoospores**
- Develop inside **sporangia**
- Spread in water
- Zoospores and sporangia attack plants.

Sporangia

Zoospores



High risk of *Phytophthora*

- **Standing water**
- **Heavy rain**
- **Usually after mid-July**
 - **Prefers warm weather**
- **Poor drainage**
- **Excessive irrigation**

Tips for *Phytophthora* control

- Sporadic
- But plan for it every year.
- Avoid fields with *Phytophthora* history.
- Select well-drained fields.
- Level or trench high-risk fields.

More *Phytophthora* tips

- Pumpkins with **hard rinds** (Ex: Ironsides).
- Plant cover crop in wet spots.
- Use raised beds for bush-type squash.
- Subsoil between rows before vining.
- Fungicides - seeds, drip lines, sprays

Even more tips

- Don't irrigate from a pond that drains from an infested field.
- **Fungicides alone won't work.**
 - Seed treatments: Apron, Allegiance
 - Sprays: Acrobat + Cuprofix weekly
 - Some growers combine seed treatments and sprays.
- Scout fields for symptoms after heavy rains



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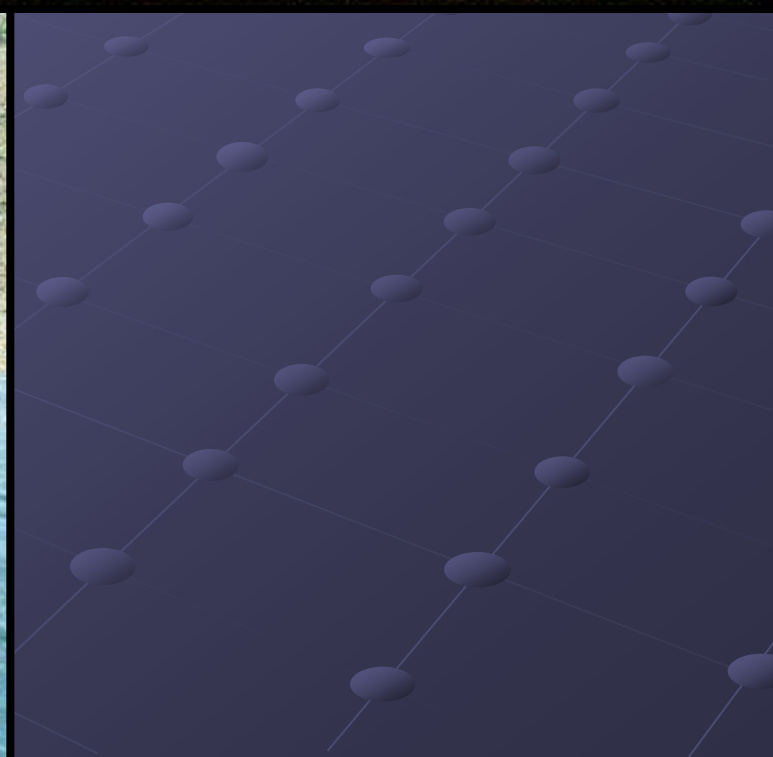
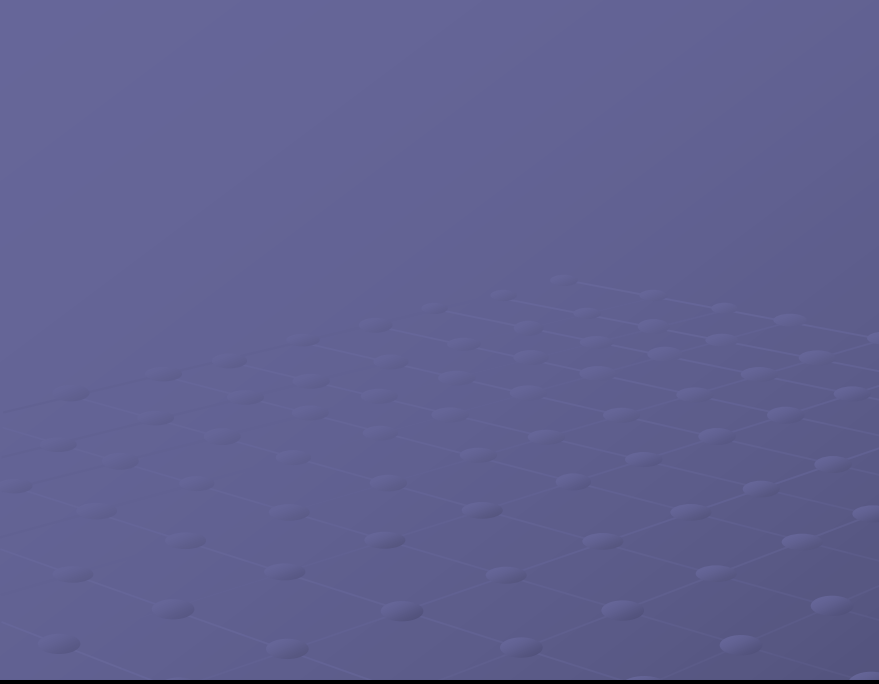


4) Bacterial Wilt

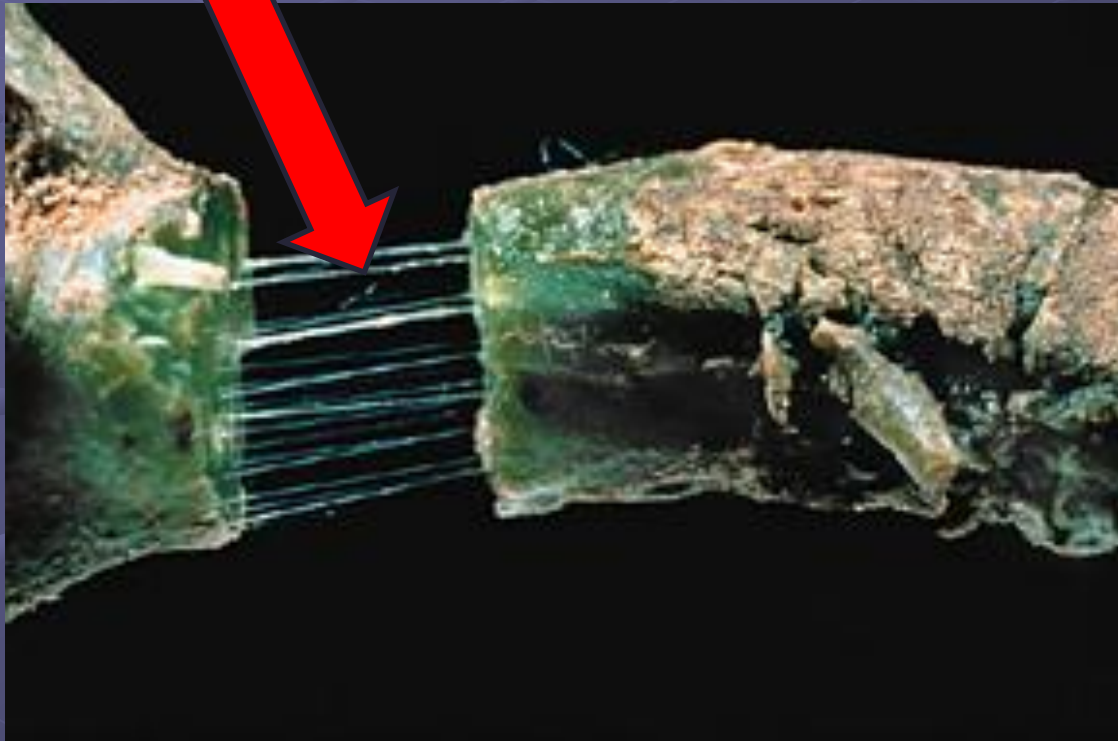
- *Erwinia tracheiphila*

- Most cucurbits

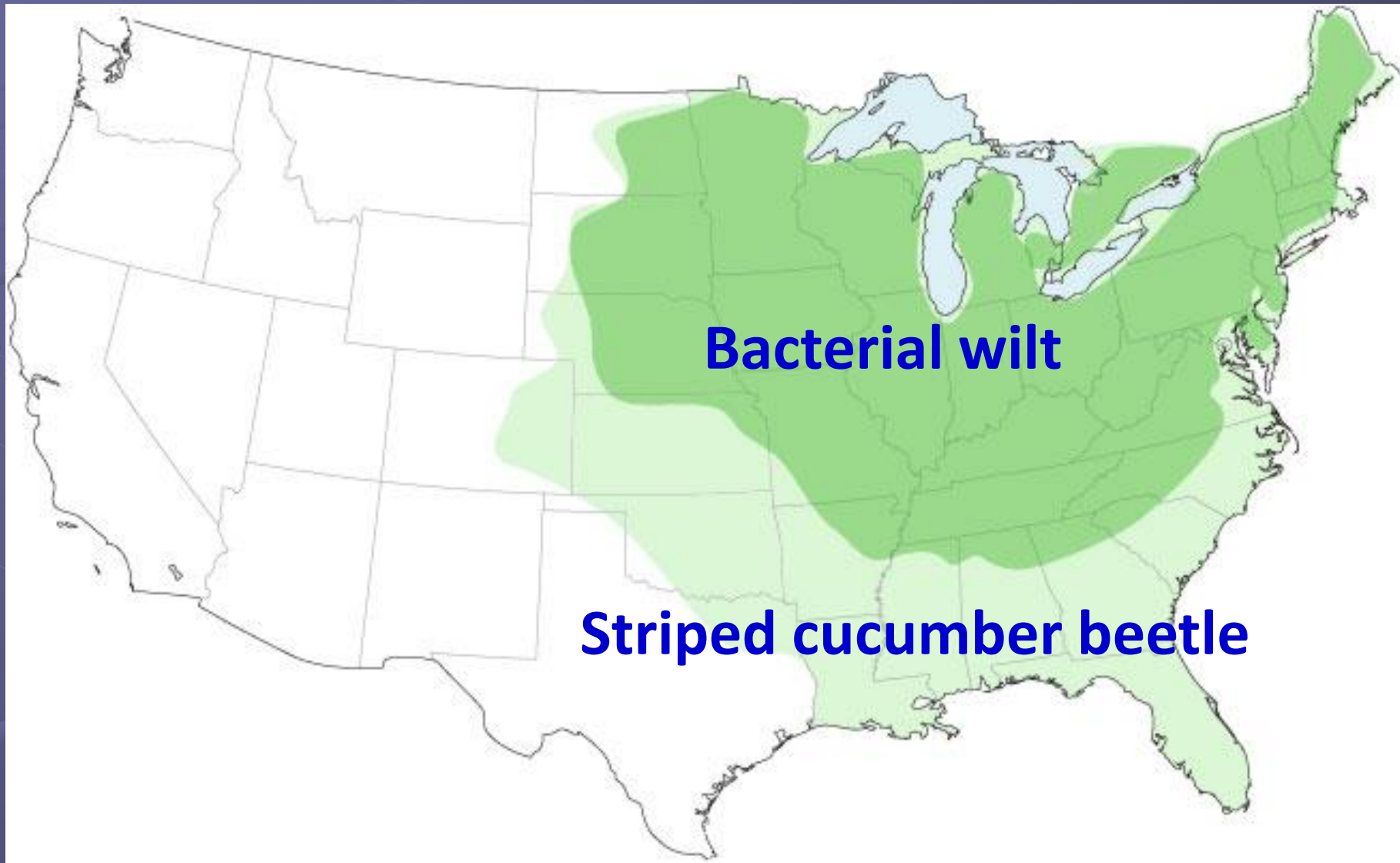




“String test”



Bacterial wilt “hot zone”



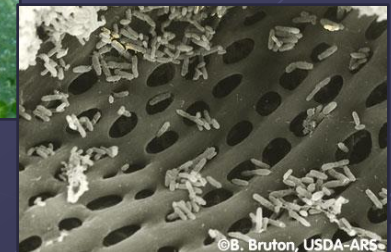
Overwintering adults



Cucurbit seedlings



Transmission



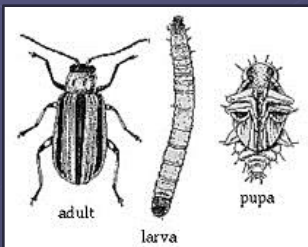
Symptoms



Beetles reproduce



Acquire bacteria



Management Options

- Insecticides
- Row covers
- Perimeter trap cropping



Rating the options

● Insecticides:

- Imidacloprid at transplant
 - May face new restrictions.
- Synthetic pyrethroids starting 2-3 weeks later

● Time sprays by scouting

- Ex: 1 beetle per plant per week
- High populations: spray every 5 days!

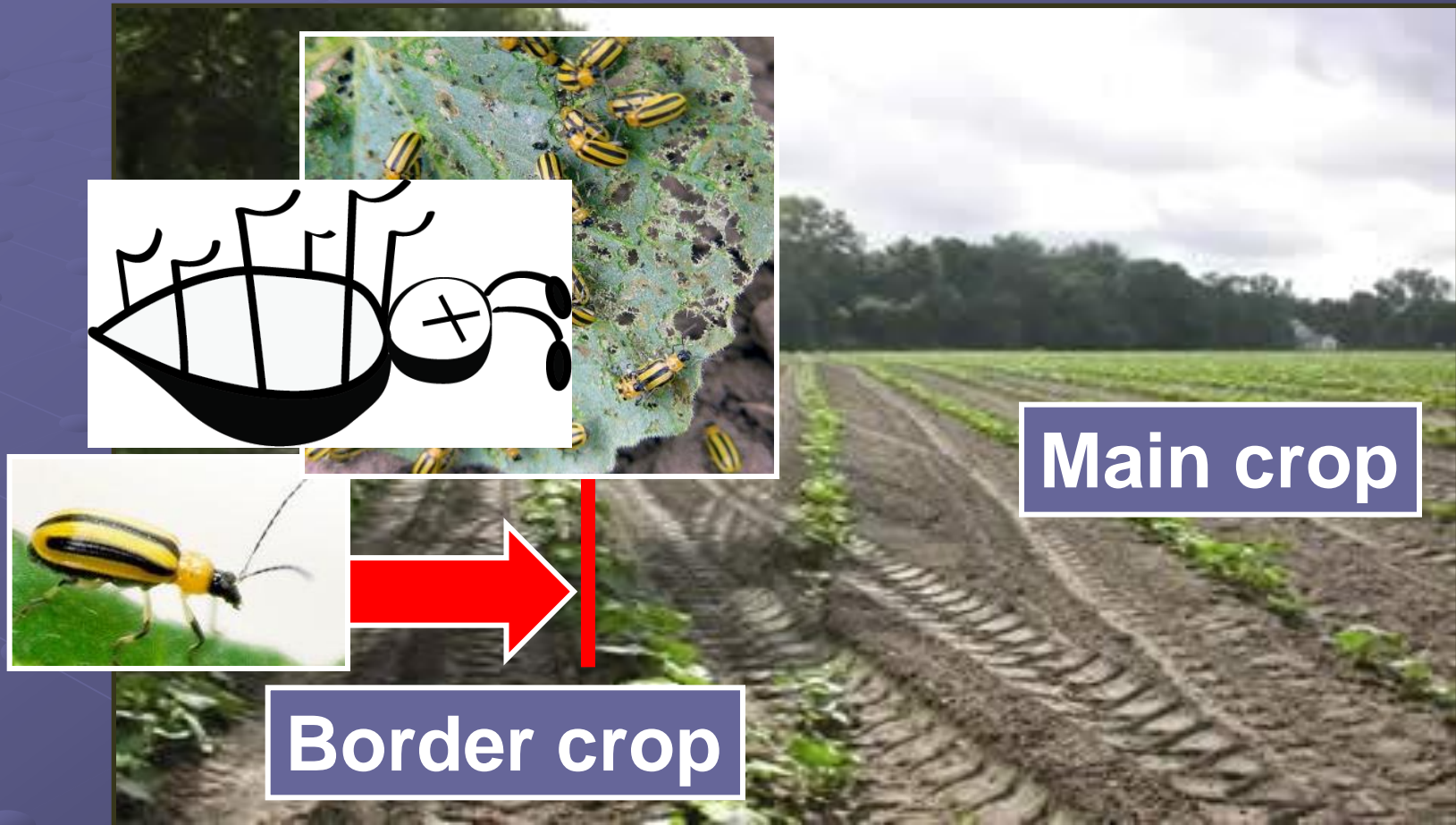
Row covers

- Spunbond polypropylene or nylon mesh
- From transplanting until bloom starts
- Advantages:
 - Earliness
 - Better plant stand
- ISU/UKY research: row covers can reduce bacterial wilt and save sprays.
- **New project: Full-season row covers**
 - Using nylon mesh fabric
 - Triple rows under fabric

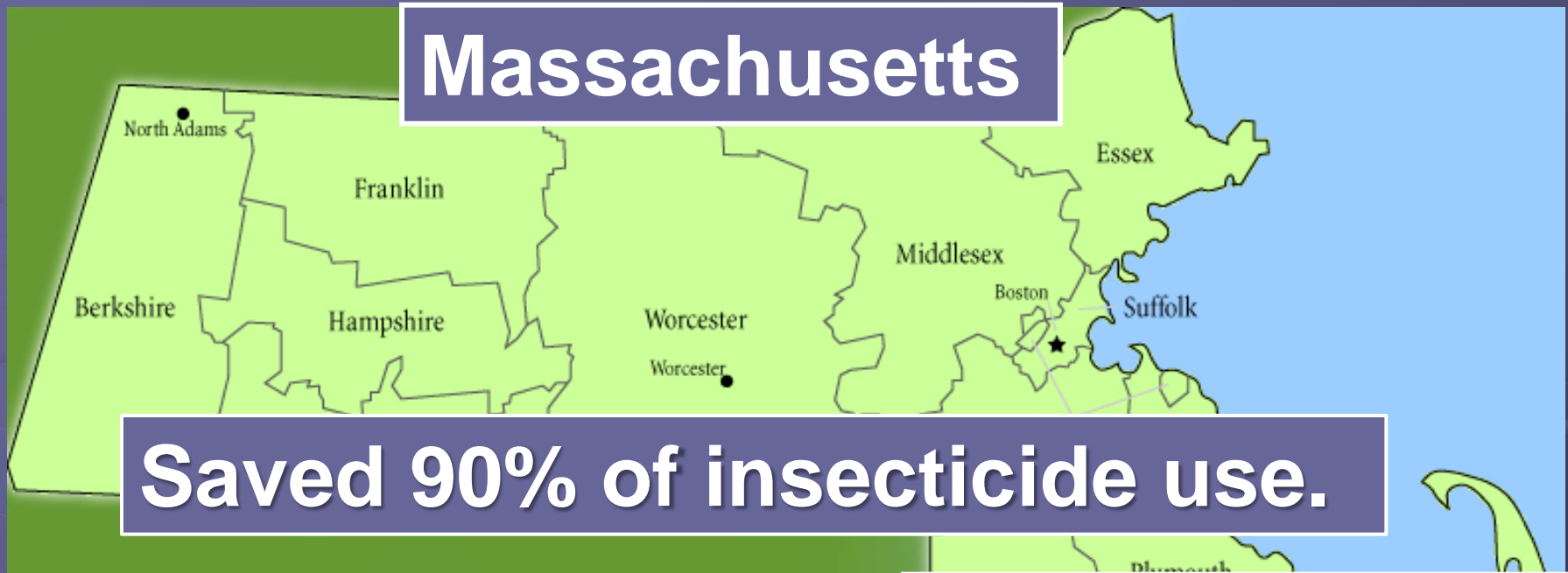


Perimeter trap cropping

How does PTC work?



Massachusetts



Saved 90% of insecticide use.

Main crop



Trap crop



NCR-SARE projects (2011-2015)



Plant the trap crop first



Field trials



Results



- Cucumber beetle pressure varied.
- Most beetles stayed in trap crop.
- Less insecticide use
- Same yield as control plots
- PTC sometimes worked well, but...
- Ineffective if the trap crop struggled.
- Muskmelon may be too beetle-attractive.



Challenges

● Managing two crops

- Can you market both crops?
- Need to manage different pests
- Squash bug, squash vine borer

Bottom line for bacterial wilt

- Insecticides are still the mainstay.
- Row covers mainly an organic option.
 - Labor to install and remove is a negative.
- Perimeter trap crop: Maybe NOT...
- Can scout and use thresholds
 - Purdue University scouting guide:
<http://extension.entm.purdue.edu/publications/E-101.pdf>

5) Gummy stem blight/ Black rot

Didymella bryoniae
(a fungus)

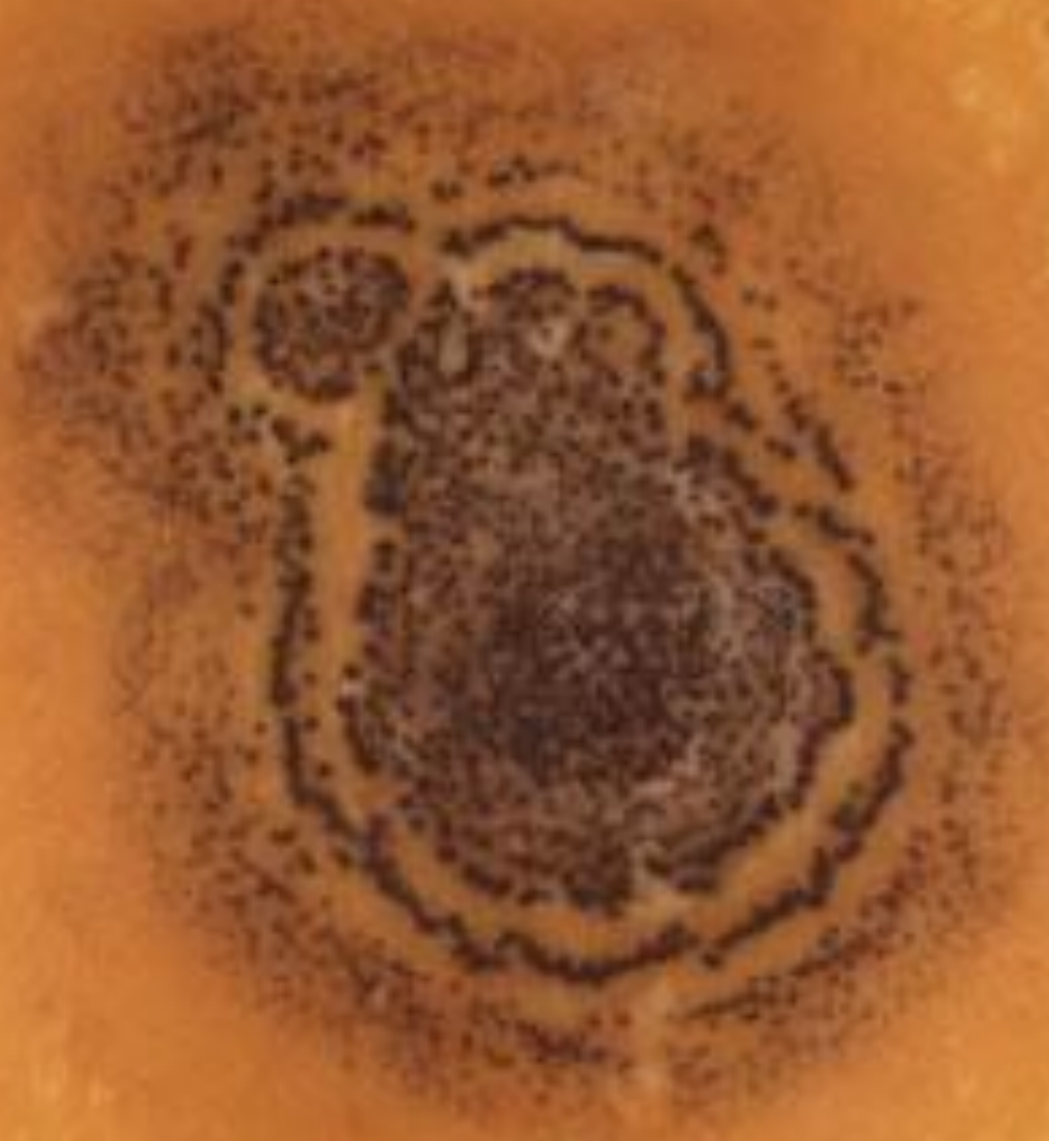




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GSB/black rot ecology

- Survives winter on plant debris.
- Can be seedborne
- Rain, dew favor disease
- Rind injuries favor black rot.

GSB/black rot management

- Use treated seed
- Rotate 3-4 years out of cucurbits.
- Fungicides
 - Strobilurins and boscalids: alternate and/or tank mix with other modes of action.
- Avoid wounding fruit at harvest.
- Allow fruit to cure after harvest.

Questions?

