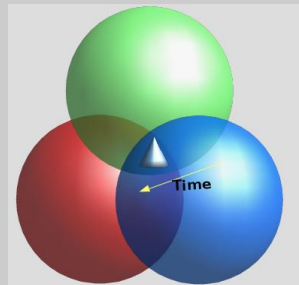


# Pumpkin: Disease Management



Alan Henn. Extension Plant Pathologist



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# Plant Diseases Are Caused By:

## Biotic factors

- **Pathogens: fungi, bacteria, viruses...**

## Abiotic factors

- **Nutrient Deficiencies: shortages or imbalances of minerals; soil pH can also have a major effect.**
- **Environmental plant needs that are not met (e.g. too much or too little sun, water, shade...).**
- **An imbalance of nutrients or environmental factors can incite pathogen infection and/or increase the disease – much due to stress.**



# Managing Abiotic Plant Diseases Caused By:

- **Nutrient Deficiencies:** shortages or imbalances of minerals; soil pH can also have a major effect.
  - Conduct a soil test and follow its recommendation
  - Lime is best applied in the year previous to the crop
- **Environmental plant needs that are not met (e.g. too much or too little sun, water, shade...).**
  - Make sure the plants are grown in a appropriate environment – e.g. tall hills if excess moisture...

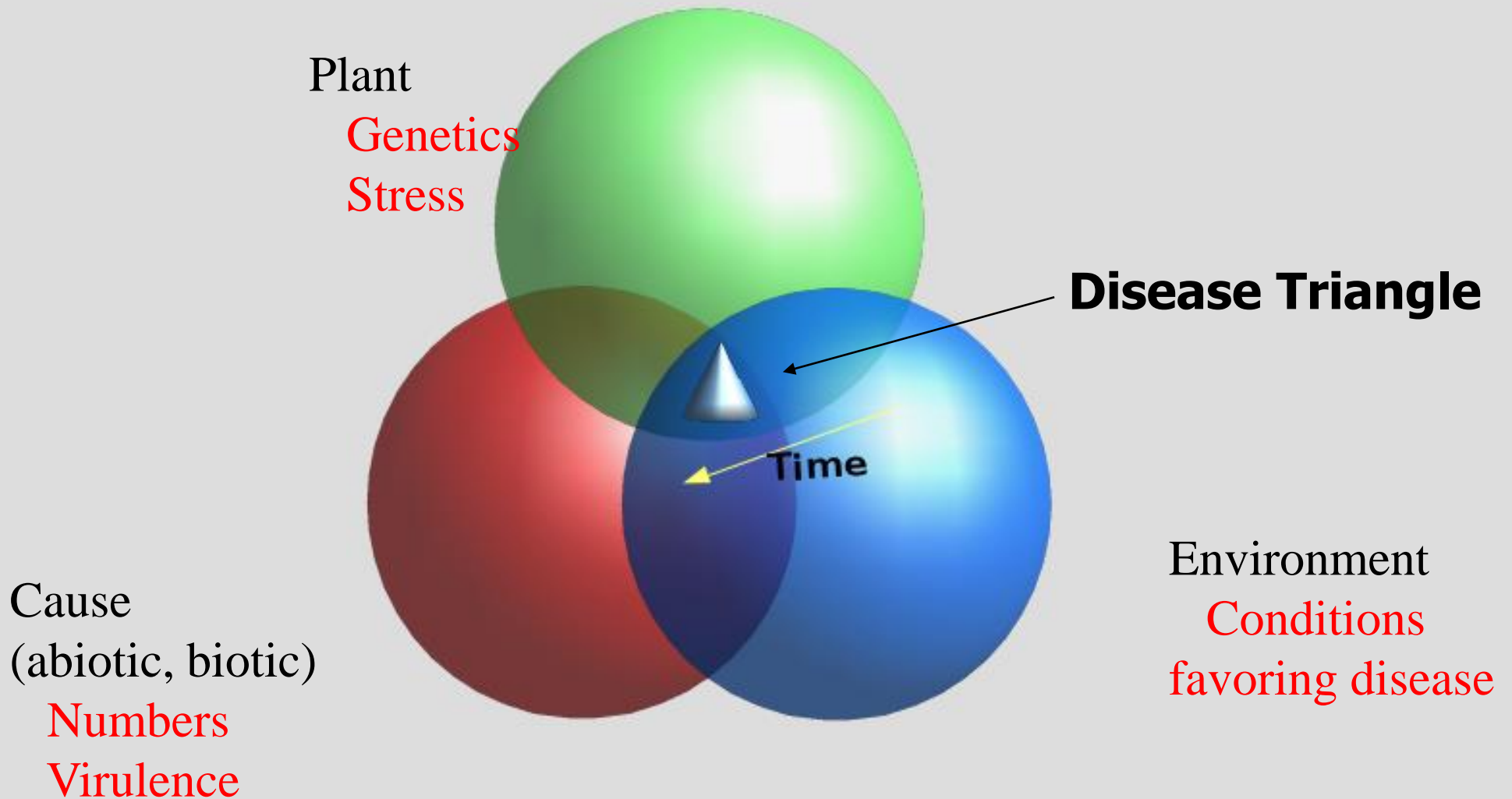


# Managing Plant Diseases Caused By Biotic Factors

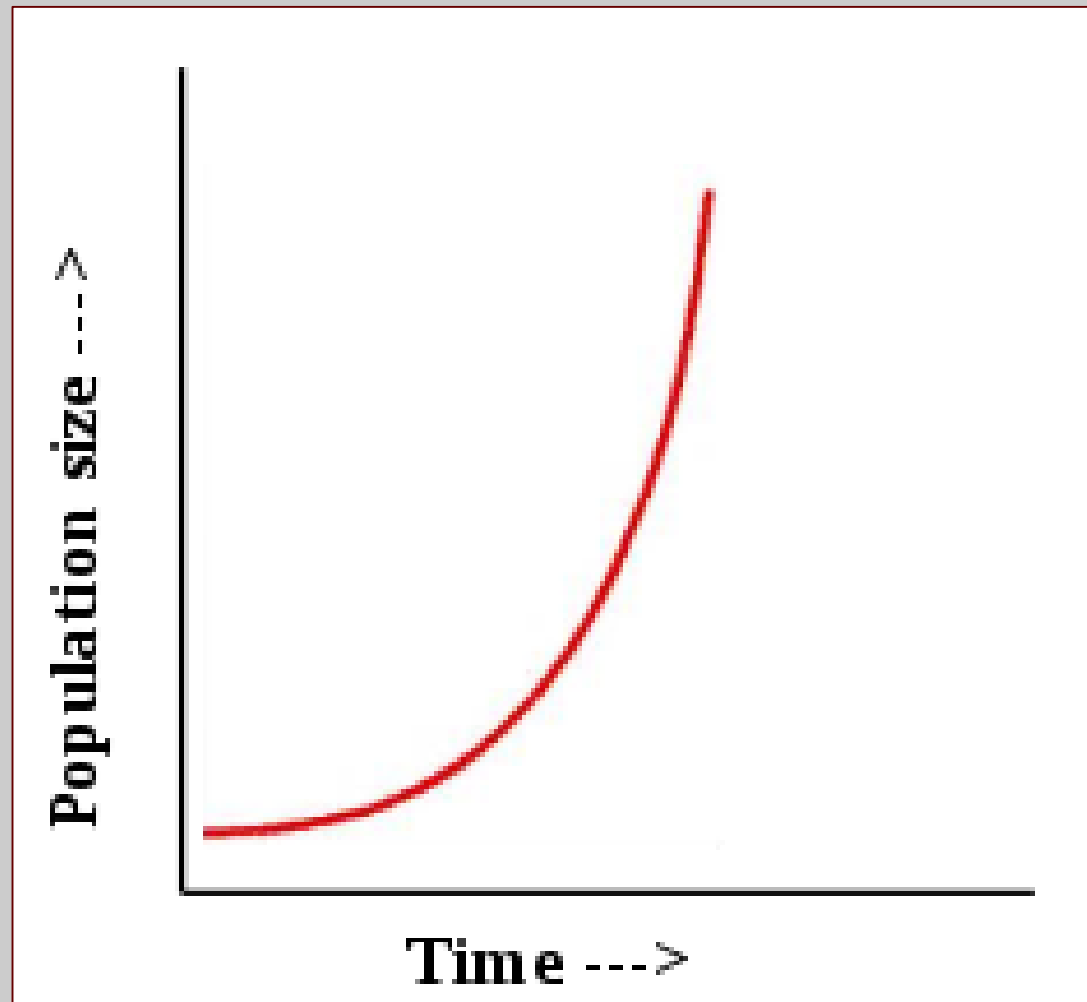
- **Pathogens: fungi, bacteria, viruses...**
- **Their infection into the plant and the rate of disease development depends on:**
  - **Their presence**
  - **The plant host (especially susceptibility/resistance)**
  - **Environment: e.g. temperature, free water, humidity...**



# Disease Triangle

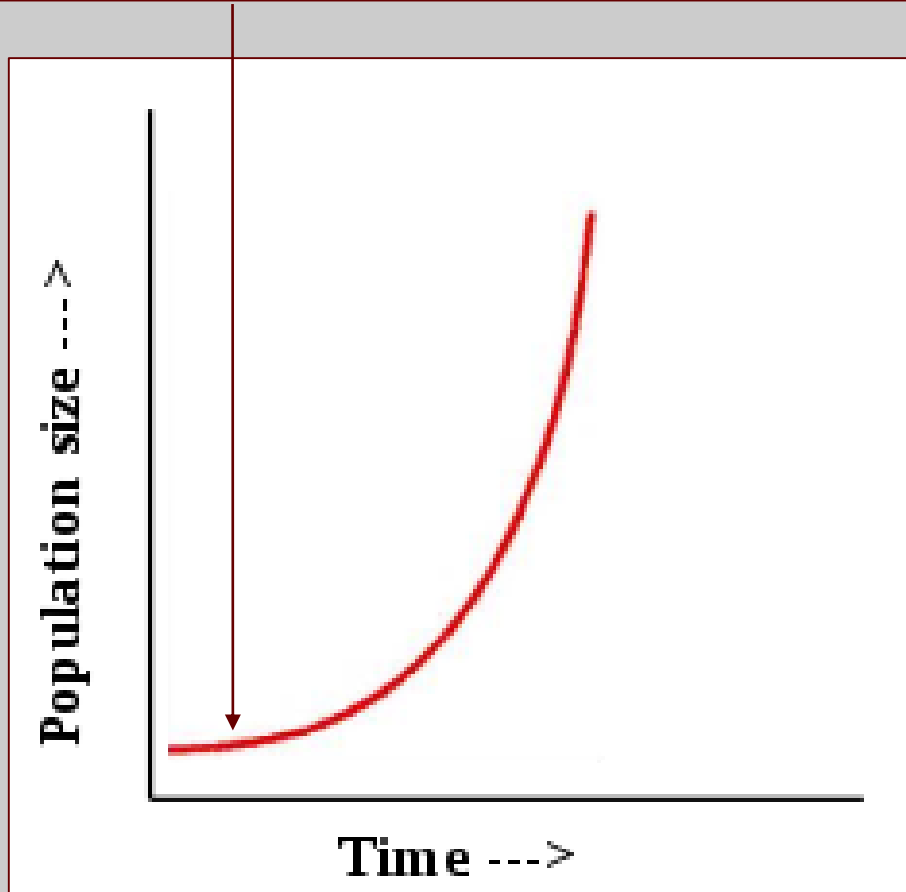


# In A Conducive Environment, Pathogens Increase Rapidly



# In A Conducive Environment, Pathogens Increase Rapidly

**Must act quickly to be successful. Problem: If you do sanitation right, you will never know how much trouble and money you have saved. There will be no “back pats.”**



# Need To Be Proactive

## SANITATION

**Disease is a numbers game. Do things to reduce numbers:**

- **Quarantine to keep it from entering.**
- **Remove infected plant parts and plants (rogue).**
- **Rotate crops to reduce accumulation of pathogens.**
- **Reduce pathogens by employing cultural techniques.**
- **At the end of the production season, remove the plants.**
- **Do not over winter plants from the previous year in your greenhouse. Associated pathogens can “explode”.**
- **Clean plant residue, surfaces, tools...**





# Summary

## **Exclude It, Clean It, Prune It, Remove It, Clean it. The Unappreciated Role of Sanitation**

### **Unappreciated because:**

- You will never know what problems you have prevented
- No one will give you a “pat on the back” and say “well done”



# Pumpkin Diseases in Mississippi

**Growing pumpkins in central/south Mississippi is more difficult than north of the Greenville/Columbus line**

- Different weather
- Must stay on a regular spray program

**North of the line:**

- Downy Mildew starts erratically at different times
- Powdery mildew is less aggressive

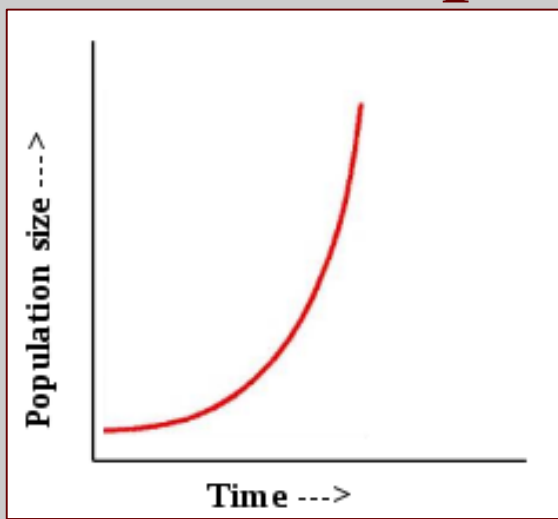
**Upshot, you may be growing in a micro-climate in which disease pressure is less or more than surrounding areas**



# Pathogens Come From Somewhere

- **Some will over winter in plant debris in your fields**
- **Some may blow into the field from a long distance**

Your job is to reduce the starting inoculum, and keep it low enough to produce a crop.



**Suggest that for your first year you have relatively intense scouting contact with experienced scout or Extension personnel**



# Major Tool: Sprayer



# Droplet distribution is KEY!



Droplet size controlled by pressure  
and nozzle size



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# Powdery Mildew



# **Pathogen: Powdery Mildew**

## **Two species:**

**May over winter on crop/weed residue**

**May blow in from warmer areas**

## **Forms a white powder on the leaf,**

**Starts on leaves, sucks out water, leaves wither, die**

**Pumpkins are reduced in size and quality**

**Exposes pumpkins to sun, may cause early burn**

**Thrives in high humidity, but not in direct rain/irrigation water; may start just prior to vine run, when bushy plant, so is a good time to scout/spray**



# Management: Powdery Mildew

## Variety selection

- **Resistant varieties – this is the best and least expensive method to control the disease**

## Remove over wintering plant debris

- **Rake and destroy**
- **Deep plowing**
- **Improve air circulation to reduce humidity**
  - **Good plant spacing**
  - **Weed control**





# Cucurbit Downy Mildew

- **Can be very destructive**
- **Affects cucumber, squash, pumpkin, cantaloupe and watermelon of all ages**
- **Requires a living host to survive and does not overwinter in areas where freezing temperatures prevent cucurbit production**
- **Spores travel on air currents**
- **Favors high humidity and cooler temperatures**
- **Caused by an oomycete (water mold) – fungicides are expensive and must be constantly rotated among FRAC groups to avoid resistance**



# **Management: Downy Mildew**

**Variety selection: Some tolerance available (delay the disease, disease is less severe, produces fewer spores)**

**Plant as early as possible – before severe diseases hit**

**Improve air circulation to reduce humidity**

- **Good plant spacing**
- **Weed control**

**Disease forecasting/scouting**

- **If chemical sprays are not initiated in a timely manner, downy mildew is difficult to manage**



# Management: Downy Mildew

## Disease forecasting/scouting

- If chemical sprays are not initiated in a timely manner, downy mildew is difficult to manage
- <http://cdm.ipmpipe.org>  
Lets you know where the disease is to begin spray coverage



# Cucurbit Downy Mildew – Pumpkin



Photos: S. Miller, The Ohio State University, Bugwood.org



# CDM ipmPIPE

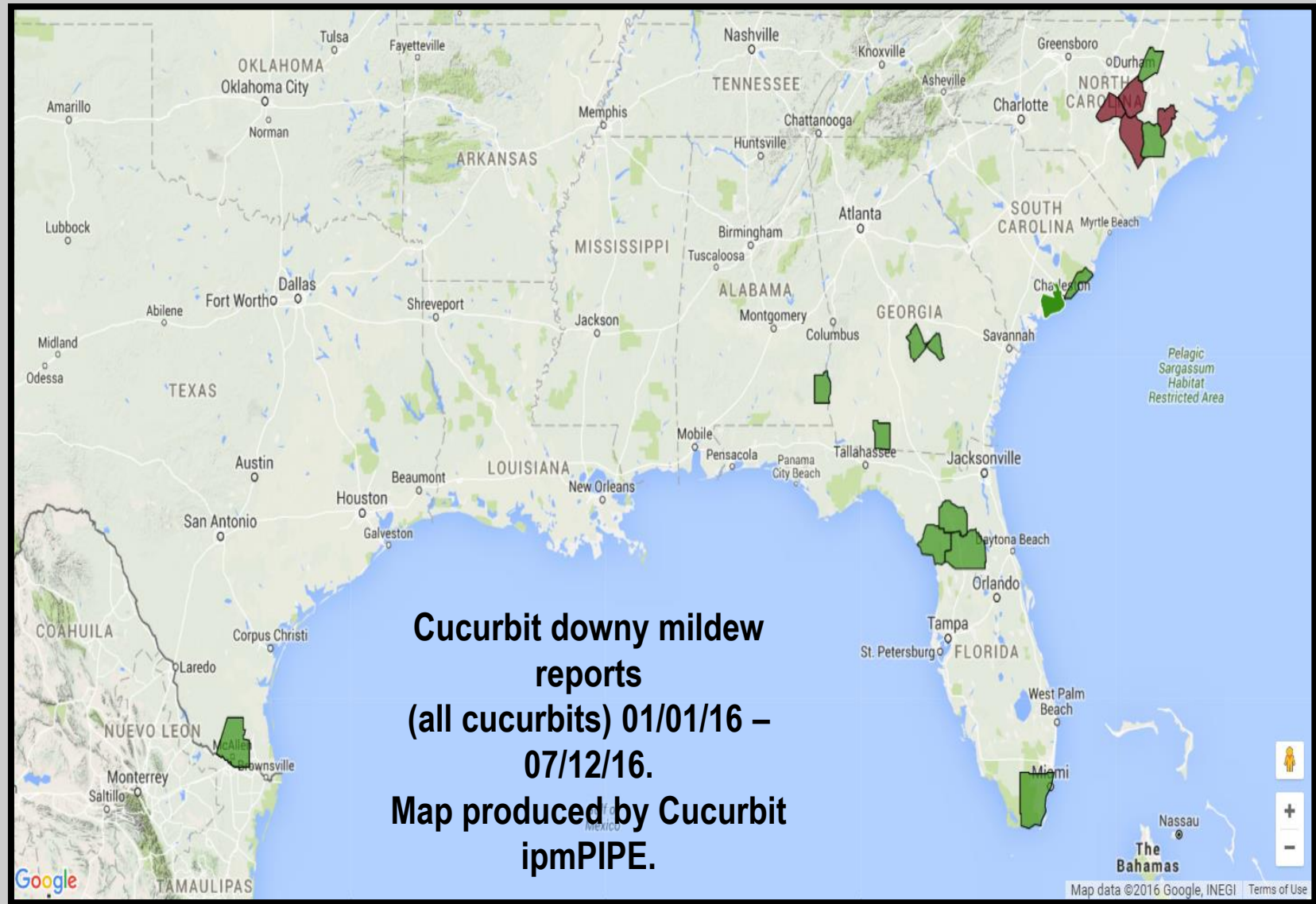
- **Threat** – refers to disease development factors at or near the source and is related to weather conditions, disease level, and source area
- **Risk** – refers to the potential spread and development at the source and along the forecast trajectory and to the danger of disease development to growing areas along this course

Source Threat	Associated Risk
Serious	HIGH
	Strongly Moderate
Moderate	Moderate
	Weakly Moderate
Low	Low

**“Low risk DOES NOT mean zero risk; high risk is not necessarily a guarantee of infection.”**



# Nearest Reports of Cucurbit Downy Mildew (07/12/16)



# Sentinel Plots in Mississippi (2016)

- Locations

- Truck Crops Branch Experiment Station, Crystal Springs, MS
- North MS Research & Extension Center, Verona, MS

- Hosts/Varieties

- Cucumber 'Straight 9' (*Cucumis sativus*)
- Cantaloupe 'Hales Best' (*Cucumis melo*)
- Acorn Squash 'Table Queen' (*Cucurbita pepo*)
- Pumpkin 'Big Max' (*Cucurbita maxima*)
- Butternut Squash 'Waltham' (*Cucurbita moschata*)
- Watermelon 'Mickey Lee' (*Citrullus lanatus*)
- Genovese Basil (*Ocimum basilicum*)



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