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- The webinar will start on the hour!
- To type in a question, use the question box on your control panel. We'll read the questions aloud after the presentation.
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# Cucurbit Downy Mildew Pseudoperonospora cubensis





Attacks all cucurbits – cucumbers most susceptible

# Symptoms

- First symptom is a yellowing spot on the upper surface of the leaf
- Spots expand turning tan and papery, but are bordered by veins
- Lower leaf surface has gray spores



### Young Lesion



## Older Lesion















#### Mildews





Downy Mildew

#### Downy Spread

- The pathogen can't survive over winter in NY. It blows in either from the south, or from greenhouse production around lakes Erie and Ontario, and generally does not arrive until late July or August
  - In Eastern NY, inoculum could come from either source, and may arrive later in the season























#### Downy Spread

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- Some commercially available resistant cucurbits
  but we are working on this, more varieties available soon

# Working with Breeders on Resistance



#### Downy Spread

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- Some commercially available resistant cucurbits
  but we are working on this, more varieties available
  soon
- Vegetable news letters provide information on where downy has been reported
- Excellent website <u>http://cdm.ipmpipe.org/</u>
  Sign up for alerts





#### Downy Mildew Control

- Many NY growers planting cucumbers early
  Harvesting by early August before disease is widespread
- High tunnels can provide some protection • Keeps pathogen off plants a bit longer
- Cucumbers are most susceptible, but all cucurbits can get downy. Different strain attacks cucumber vs squash, but both are present each year.
- There are products available for organic control

# Control of cucurbit downy in organic production

- Efficacy trials with 7 products approved for use in organic production
- Plants grown in field, replicated trial
- Used a very susceptible cucumber cultivar (Diva)
- Included plant activators and products that act directly on the pathogen
- Sprayed every 7 days
- Everything worked better than the control – but all treatments had over 40% disease by the last rating





Organic control of cucurbit downy					
Treatment	Active ingredient	Final rating % disease			
Zonix	Rhamnolipid biosurfactant	43.8 c			
Nordox 75 WG	Cuprous oxide	45.0 c			
Cueva FL	Copper octanoate	47.5 bc			
Regalia + Actinovate		48.8 bc			
Champ 30 WG	Copper hydroxide	50.0 bc			
Double Nickel	Bacillus amyloliquefaciens	50.0 bc			
Regalia	Reynoutria sachalinensis extract	51.3 bc			
Actinovate AG	Streptomyces lydicus	57.5 b			
Non-treated control		77.5 a			



Prc	duct Cost		
	Treatments	rate/A	cost/A
	Champ	2#/A	\$12
	Cueva	1gal/100gal	\$40
	Nordox	1.25#/A	\$11
	Actinovate	12oz/A	\$84
	Double Nickel	.5-6qt/A	\$132
	Regalia	4 qt/A	\$125
	Zonix	38oz/50 gal	\$108
Wh	en should I spra	ay?	







#### Detection

- Roto-rod type spore sampler
- Made by colleagues at USDA (Oregon St)
- Samples 62 liters of air per minute
- Runs 24/7 solar power with battery backup





#### Detection



- Unit is mounted to a 4X4 post
- Two metal stakes pounded into ground
- 4X4 is only a few inches in the ground
- Use large zip-tie's to attach spore trap unit to stakes

#### Detection

- The box containing the battery and motor is mounted on the 4x4
- We have attached a small weather station
- The crossbar and rods can be mounted on box (as seen here) or higher



#### Detection

- Rods can be easily replaced – it's just an Oring holding them in place
- We put a very thin layer of silicone grease on each rod so that they are sticky



#### Detection



- Rods can be easily carried to and from the field
- Can even be sent in the mail



#### Detection

- Rods are changed right in the field
- Must be changed at least twice per week
   Everything sticks to them
- For some experiments rods would be changed every day



#### Detection





- Rods are brought back to the lab
- DNA is extracted from everything that is stuck to the rod
- Use the DNA for PCR assay that is specific for cucurbit downy mildew

Results				
Date	PCR	Symptoms		
June 8-22	+ ??	No		
Early July	+/-	No		
July 13	+	No		
July 20	-	No		
July 23, 25, 27	+	No		
July 29	-	No		
August 1	+	No		
August 3	+	No		
August 7	+	Yes (< 1%)		

#### What's Next?

- Working on specific detection for cucurbit DM
  Don't want to detect hop downy
- Use detection in combination with • IPM forecast and weather data
- Screening breeding lines from Michael Mazourek (Cornell breeder) as well as other public and private breeders – cucumber, squash, pumpkin
   Projects funded by USDA

# Thanks!

- Smart lab members
- Grower cooperators
- Vegetable Extension Educators
- CDM IPM-PIPE folks
- NYS Ag Expt Station
- NYS Dept of Ag and Mkts
- USDA NIFA



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- Have an organic farming question? Use the eXtension Ask an Expert service at <u>https://ask.extension.org/groups/1668/ask</u>
- We need your feedback! Please respond to an email survey about this webinar which you'll receive later.
- Thank you for coming!



