

A photograph of a field filled with pumpkins. Some pumpkins are healthy and orange, while others show signs of disease, appearing discolored or shriveled. The background is a mix of green grass and brown straw.

# Managing Cucurbit Diseases

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**UNHCE Plant Health Specialist**  
**Cucurbit School – 1/11/17**



**University of New Hampshire**  
Cooperative Extension

A photograph of a field filled with numerous pumpkins of various sizes, scattered across a bed of dry grass and straw. The pumpkins are orange and appear to be in a field setting.

# **basic strategies... and what's new**

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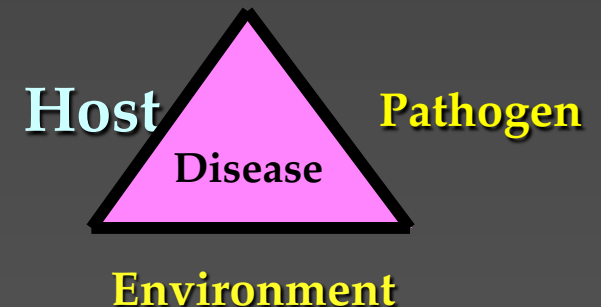
# Use multiple techniques to manage pests

- Cultural controls:

  - Resistant varieties

  - Crop rotation

  - Sanitation



- Fungicides

  - Rotate fungicide classes/groups

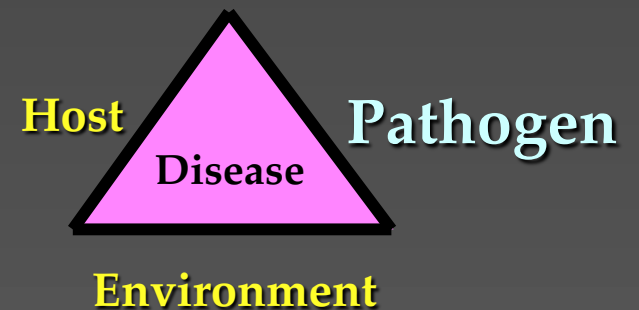
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**Phytophthora  
blight...don't rotate  
cucurbits with  
peppers**



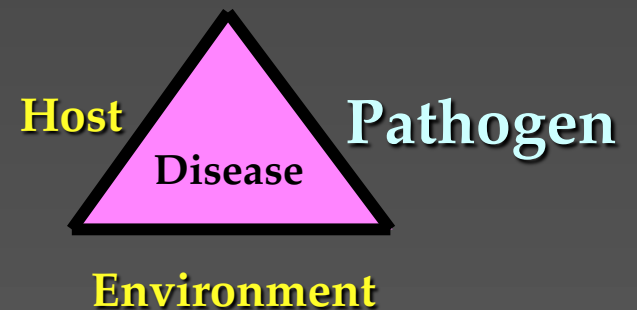
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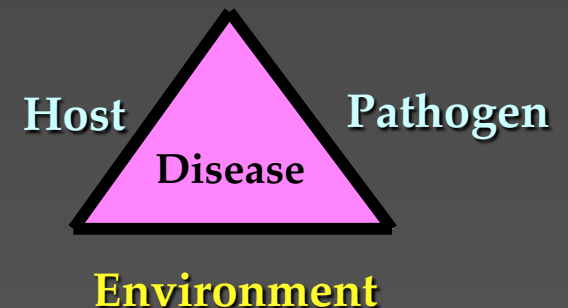
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# Powdery mildew



# Powdery mildew

Disease can not be avoided:

- Fungus produces abundance of wind-dispersed spores
- Disease develops under broad range of environmental conditions
- Produces survival spore in fall
- Reduced yield and poor quality fruit  
*poor flavor/storability*



## Fungicides and resistant varieties are primary management tools, but:

- Fungus has high potential for developing fungicide resistance
- ‘Has developed resistance to every chemical class (with resistance risk) after repeated use somewhere in the world’
- New races evolve in response to PM resistant varieties...

**Management: INTEGRATED approach**



# Powdery mildew

## Effective management program:

- Select resistant varieties
- Scout regularly beginning @ fruit set
- Apply targeted (specific/mobile) fungicides weekly with protectants
  - ROTATE fungicide class (FRAC #)

# **Powdery mildew & fungicide resistance management**

**Resistant varieties reduce the need for high-risk fungicides (disease onset delayed)**

**Select 'high resistance' varieties when available**

**Should be used in combination with fungicides**

**Especially for all squash and melons**

**(melons had issues on LI in recent years)**

- don't plant main-season cucurbit crops next to spring crops treated with high risk fungicides**

# PM Resistant Varieties

for resistant varieties see:

[nevegetable.org](http://nevegetable.org)

[vegetablemdonline](http://vegetablemdonline)

# Scouting

**action threshold:**

- Scout weekly, both leaf surfaces:  
5 old crown leaves in 10 locations in field
- Apply specific fungicides when:  
PM found on at least 1 of 50 leaves





**Look  
underneath!**



# **Powdery Mildew Fungicides (targeted)**

**(U8) Vivando**

**(U6) Torino**

**(13) Quintec (volatile redistribution)**

**(3-DMI) Proline, Procure, Rally, Aprovia Top,  
Tebuzol, Inspire Super\***

**(7) Luna (Privilege/Experience\*/Sensation),  
Fontelis, Pristine\*, Merivon\***

**\* Contain other ai fungicides**

# **Powdery Mildew Fungicides**

**No longer recommended due to resistance:**

**MBC fungicides (FRAC 1 – Topsin M)**

**QoI fungicides (FRAC 11 – Quadris, Cabrio, Flint)**

# **Protectant Fungicides - Powdery Mildew**

chlorothalonil (several)

copper (several formulations)

sulfur (several)

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botanical and mineral oils

biologicals

potassium bicarbonates

citric acid

plant extract

monopotassium phosphate

yeast extract hydrolysate+micros



# **Organic Fungicides - Powdery Mildew**

copper (several)

sulfur (several)

mineral oil (JMS Stylet-oil, TriTek)

botanical oil (Organocide, MildewCure, BacStop, Trilogy)

biofungicide (Actinovate, Companion, Double Nickel,  
Serenade, Sonata)

potassium bicarbonate (Armicarb, Kaligreen, Milstop)

hydrogen dioxide (Oxidate)

citric acid (Procidic)

plant extract (Regalia)

monopotassium phosphate (Nutrol)

yeast extract hydrolysate+micros (KeyPlex 350 OR)

# Downy mildew



# Downy mildew

- produces large # of wind-dispersed asexual spores
- does not survive over winter (yet) has to ‘blow in’
- does not affect fruit directly...  
but reduced yield and poor quality

# Cucurbit Downy Mildew Pathogen

Host	Pathotype				
	1	2	3	4	5
Cucumber	X	X	X	X	X
Netted melon	X	X	X	X	X
<i>C. melo</i> var. <i>conomon</i>		X	X	X	X
<i>C. melo</i> var. <i>acidulus</i>			X	X	X
Watermelon				X	X
Pumpkin					X
Squash					X

# Downy mildew

## Effective management program:

- Select resistant varieties  
(still have partial resistance)  
DMR 401 cucumber (commonwealth seeds)
- Scout (begin @ start of crop dev.)



**Downy Mildew  
Butternut Squash**

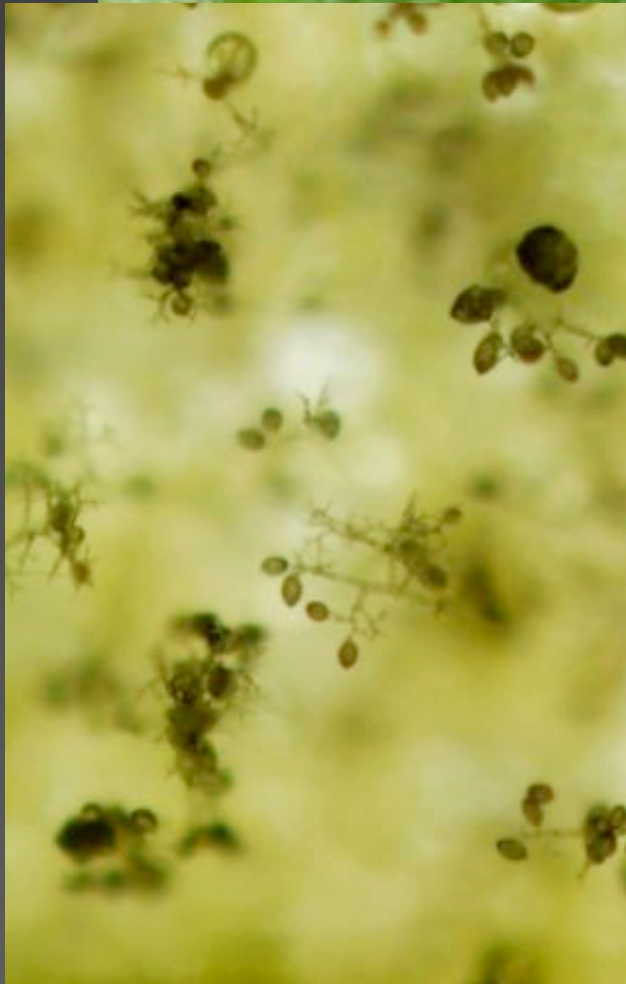


**Downy Mildew  
On  
Pumpkin**





# Downy Mildew On Pumpkin



# Managing Downy Mildew

## Monitor forecasts

Check <http://cdm.ipmpipe.org>

Watch for storm forecasts from affected areas

Subscribe to/look for extension alerts

## Scout for symptoms.

Young plants very susceptible.

Apply protectant fungicides when downy mildew risk is low/moderate & late in growing season.

Apply systemic fungicides when forecast risk is high or symptoms observed in area.

# **Fungicide Program - Downy Mildew**

**mancozeb or chlorothalonil before  
reported in area**

**can also use copper (not quite as  
effective)**



# Fungicide Program - Downy Mildew

Apply when forecasted / seen. Alternate among following:

(U15) Orondis

(21) Ranman

(27+11) Tanos, (some kickback, limited residual)

(27) Curzate (some kickback, limited residual)

(22+M3) Zing! (chlorothalonil), Gavel (mancozeb)

(40+45) Zampro

(40) Revus (poor on cucumber – excellent on pumpkin)

(29) Omega

Strobilurins (11), metalxyl/mefonoxam (4-Ridomil, etc), Previcure Flex and Presidio **NOT** recommended due to resistance.

# OMRI-listed Fungicides - Downy Mildew

**Actinovate** (*Streptomyces lydicus*)

**Coppers**

**Double Nickel** (*Bacillus amyloliquefaciens*)

**MilStop** (potassium bicarbonate)

**OxiDate** (hydrogen dioxide)

**Regalia** (extract of *Reynoutria sachalinensis*)

**Serenade Max** (*Bacillus subtilis*)

**Sonata, Ballad** (*Bacillus pumilus*)

**Trilogy** (neem oil)

cdmipmpipe.org



The banner features a green background with a cucurbit on the left. The text reads: **cucurbit downy mildew FORECASTING** and **PREPARE. PREDICT. PREVENT.** On the right is the Cucurbit PIPE logo, which includes a stylized plant and the text "Cucurbit PIPE".

[A](#) [A](#)

### The Cucurbit Downy Mildew Forecast Homepage

Happy New Year! The 2017 forecasting season will begin around mid-March / early April. Please contact us if you have any questions or comments. Your feedback is appreciated! \*\*\*

**[SIGN UP TO RECEIVE CUSTOMIZED TEXT AND/OR EMAIL ALERTS WHEN NEW OUTBREAKS ARE CONFIRMED!](#)**

Click the CDM Alert System link on the left hand side of the page to sign up.

Click the map for a larger image):



A placeholder for a map, showing a blue sky with white clouds and a grey ground line.

# **Free cucurbit DM confirmation!**

**Please send samples to UNH-PDL for confirmation  
– NO CHARGE**

**Write ‘CDM confirmation’ at top of form**

**I’ll enter in Forecast data base**

**Can also send image to get initial diagnosis**

# Plectosporium

**Symptoms:**

**White lesions (< 1/4") on vines, stems & handles**





# fruit symptoms







**Advanced fruit  
symptoms**



**Soil-borne fungus (several years), also winters on crop residue.**

**Not reported to be seed-borne.**

**Spores produced in lesions and carried on the wind.**

**Likes cool, wet weather.**

# **Plectosporium blight management**

- **Crop rotation**
- **Site selection (good air flow, SW exposure, hill top)**
- **Scout! (same time as PM, check vines leaves & fruit for lesions)**
- **Clean equipment between fields**
- **Avoid planting subsequent crops next to each other (especially if plecto is present in early crops)**
- **Fungicides**



# **Plectosporium Fungicide program**

**Summer Squash:** chlorothalonil weekly, beginning @ fruit set (preventative)

**Pumpkin & squash:** if Plectosporium detected first, weekly chlorothalonil, until PM detected, then same as for PM; If PM detected first, then program for PM

**Plectosporium only:** Strobilurins will provide control (rotate with protectant)...but if PM...

**Protectants:** Bravo, Maneb

(apply fungicides with 40+ gallons water/A)

# Phytophthora blight



# Phytophthora blight

- Can move between farms/fields via water, in soil & on equipment
- First develops in low (or sloped areas)
- Produces survival spore in fall
- Peppers and possibly beans are also hosts



**Phytophthora  
Blight**

M.T. McGrath photo



## advanced fruit rot





# Phytophthora blight on peppers



# **Phytophthora blight management**

- **Avoid pathogen (low areas, fields with history)**
- **Long rotation (3+ years no cucurbit, solanaceous, beans?)**
- **Plant in well-drained fields, high organic matter**
- **Subsoil to improve drainage**
- **Don't move soil between fields (wash equipment), work suspect/infected fields last**
- **Irrigate as needed, not excessively (drip best)**

# **Phytophthora blight management**

- **Don't work wet fields**
- **Remove culled fruit from fields**
- **Scout for symptoms after heavy rain**
- **Control solanaceous weeds**
- **Deep plow infected crop residue**
- **Preventative drenches (also biopesticides)**
- **Fungicides**
- **Biofumigation**





M.T. McGrath photos



# **Fungicide Program – Phytophthora blight**

**Apply when forecasted / seen. Alternate among following:**

**(U15) Orondis (Gold for drench, others foliar)**

**(21) Ranman**

**(27+11) Tanos**

**(22+M3) Gavel**

**(40+45) Zampro**

**(40) Revus**

**(33) Agri-fos, Phostrol, ProPhyt**

**(29) Omega**

**(43) Presidio**

**chlorothalonil, mancozeb & copper have some efficacy as protectants**

# Viruses



# Viruses

Can be seed-borne

Can be transmitted by insects,  
mechanically (tools, hands...)

Infected plants can't be cured

UNH-PDL can test for several viruses

Don't save seed from symptomatic plants

Special thanks to

*Margaret Tuttle McGrath*

*Dept. of Plant Pathology and Plant-Microbe Biology*

*LIHREC, Cornell University, Riverhead, NY*



# Questions?

[unhpdl.org](http://unhpdl.org)

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