

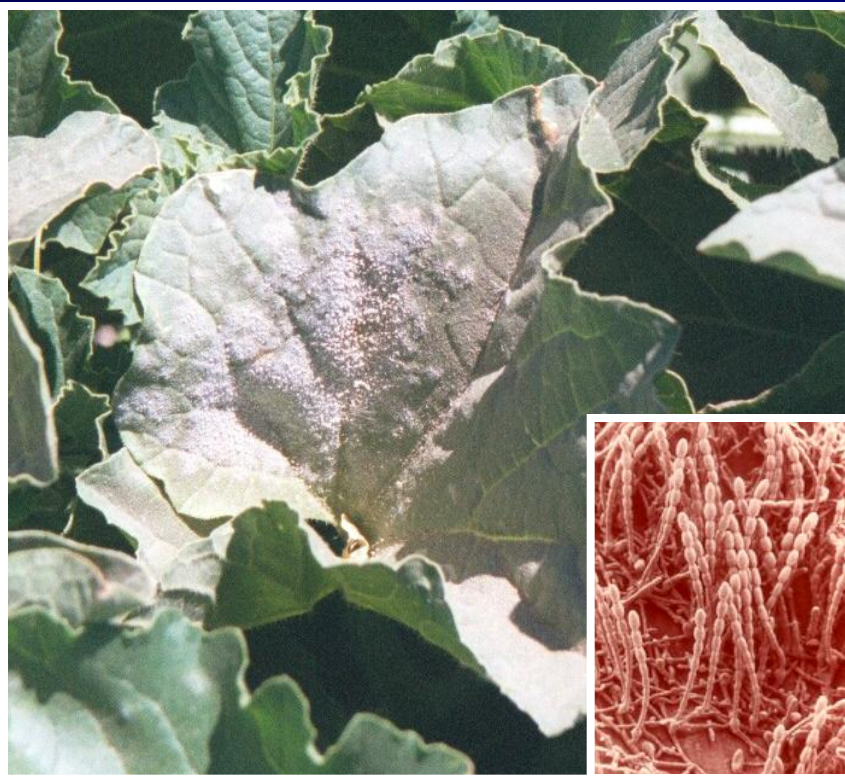
Effective Management of Melon Powdery Mildew in the Desert

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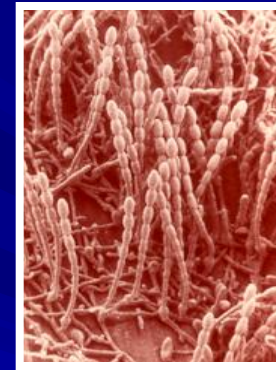
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Powdery mildew on melons:
Caused by: *Podosphaera xanthii*
(syn. *Sphaerotheca fuliginea*)



Requirements for disease development

Plant disease triangle



**Disease
severity**

Favorable environment

Environmental factors favoring powdery mildew

- Infection occurs from 50 to 90°F
- Time between infection and appearance of symptoms ranges from 3-7 days
- Powdery mildew development is arrested at temperatures at or above 100°F
- High relative humidity (RH) favors infection; however, infection can occur at a RH below 50%
- Dense plant growth and low light intensity

Powdery mildew of cucurbits:

Management options

- Planting resistant cultivars
- Application of fungicides

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**The disease management tool used
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The disease management tool used can effect the pathogen population

- Resistant cultivars
 - In the U.S., at least 3 different races of the cucurbit powdery mildew pathogen now exist
- Fungicides
 - Overuse of individual chemistries has led to development of pathogen populations resistant to that mode of action
 - To inhibit resistance development, application of products with different modes of action is necessary

How can we minimize development of insensitivity to a fungicide or resistance in the powdery mildew pathogen population?

- By deploying a resistant cultivar when available and using fungicides with different modes of action

Major conventional fungicides available to manage powdery mildew on melons

Trade name – (Active ingredient)	FRAC #
Topsin M – (Thiophanate-methyl)	1
Rally – (Myclobutanil)	3
Procure – (Triflumizole)	3
Inspire Super – (Difenoconazole + cyprodinil)	3,9
Endura – (Boscalid)	7
Cabrio – (Pyraclostrobin)	11
Flint – (Trifloxystrobin)	11
Quadris – (Azoxystrobin)	11
Quintec – (Quinoxifen)	13
Microthiol Disperss – (Sulfur)	M 2
Bravo – (Chlorothalonil)	M 5

Some biofungicides available to manage powdery mildew on melons

Trade name – (Active ingredient)	FRAC #
Actinovate – (<i>Streptomyces lydicus</i>)	NC
Kaligreen – (Potassium bicarbonate)	NC
Serenade – (<i>Bacillus subtilis</i>)	NC

Goals of fungicide efficacy field trials conducted since 1998 in Yuma

- Evaluate and compare individual chemistries for effectiveness in managing powdery mildew on melons
- Develop treatment programs that will provide high levels of disease control and at the same time preserve the effectiveness of disease control products

How melon powdery mildew fungicide trials are conducted

- 'Topmark' cantaloupe seeded in early March
- First application of products: May 15 -20
 - From 2 to 5 applications of treatments, depending on year; spray interval ranged from 7 to 10 days
- First application of products usually from 7 to 14 days before visual detection of powdery mildew in plots
 - Exceptions were 2004 and 2010, when first application made after first detection of powdery mildew

How melon powdery mildew fungicide trials are conducted

- Powdery mildew usually appears in late May
- Disease ratings taken at crop maturity (mid-June)
 - 10 leaves collected from each plot and disease severity was rated on the upper and lower leaf surface

Disease severity rating system

- 0 = No powdery mildew (PM) present on sampled leaves
- 1 = 1 to 5 PM colonies on leaf surface
- 2 = 6 to 10 PM colonies on leaf surface
- 3 = >10 PM colonies to 25% of leaf surface covered
- 4 = 26 to 50% of leaf surface covered with PM
- 5 = 51 to 100% of leaf surface covered with PM



Rating scale: 1

2

5

% control * **80**

60

0

* assuming nontreated melon plants have a rating of 5

Fungicide efficacy in management of powdery mildew on melons (1998-2009)

Trade name – (Active ingredient)	FRAC #	# of Trials	Disease reduction
Procure – (Triflumizole)	3	10	94
Quintec – (Quinoxifen)	13	11	93
Microthiol Disperss – (Sulfur)	M 2	9	91
Inspire Super – (Difenoconazole + cyprodinil)	3,9	4	90
Endura – (Boscalid)	7	5	80
Rally – (Myclobutanil)	3	10	79
Cabrio – (Pyraclostrobin)	11	10	74
Flint – (Trifloxystrobin)	11	8	68
Topsin M – (Thiophanate-methyl)	1	10	62
Quadris – (Azoxystrobin)	11	9	62
Bravo – (Chlorothalonil)	M 5	7	53

Biofungicide efficacy in management of powdery mildew on melons (1998-2009)

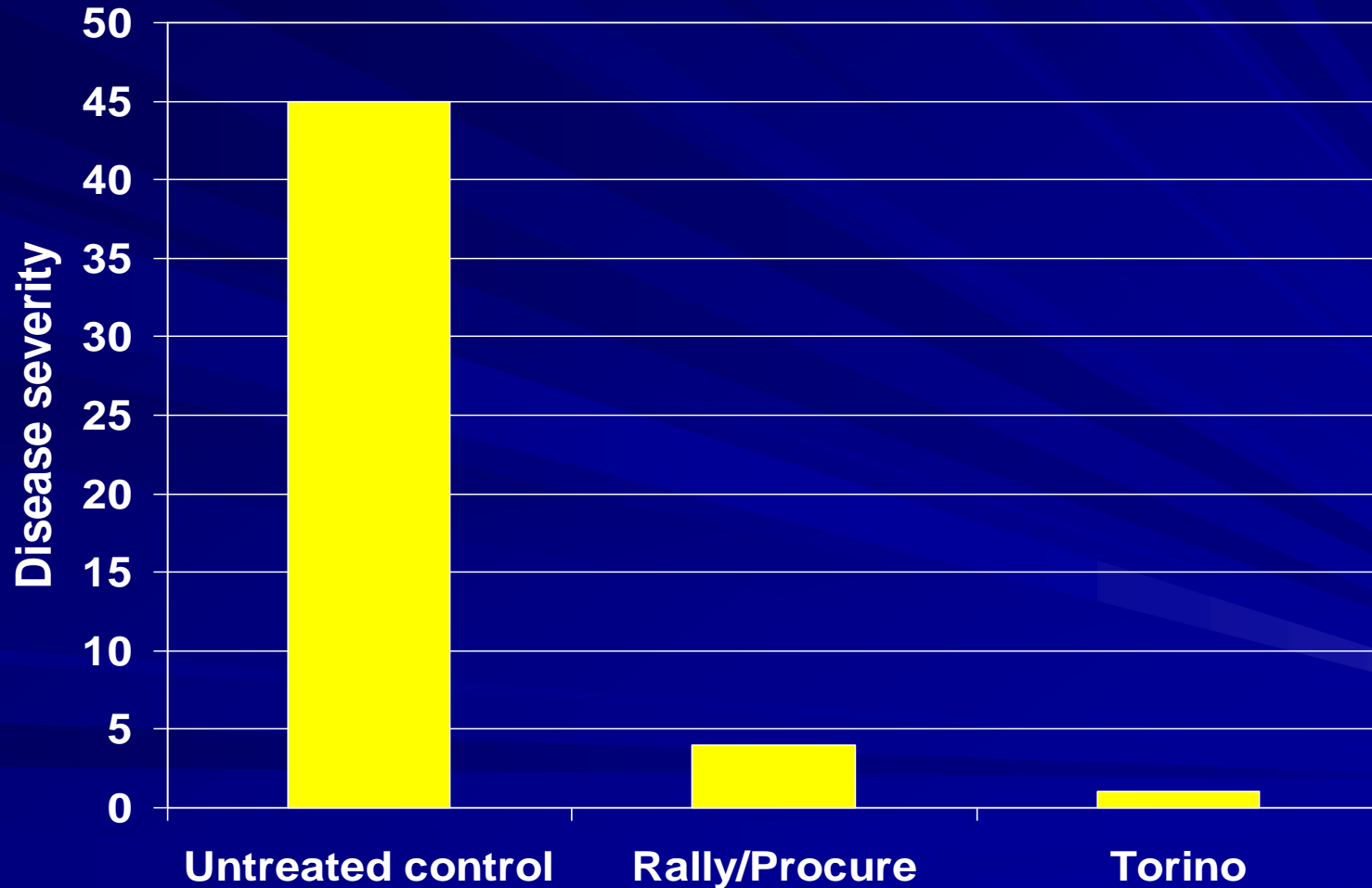
Trade name – (Active ingredient)	Disease reduction
Actinovate – (<i>Streptomyces lydicus</i>) (3 trials)	44
Kaligreen – (Potassium bicarbonate) (8 trials)	44
Serenade – (<i>Bacillus subtilis</i>) (5 trials)	44

2010 Fungicide evaluation trial

Trade name – (Active ingredient)	# of Trials	% Disease Reduction	
		98-09	2010
Registered products			
Quintec – (Quinoxifen)	11	93	83
Procure – (Triflumizole)	10	94	80
Endura – (Boscalid)	5	80	55
Inspire Super – (Difenoconazole + cyprodinil)	4	90	54
New products (first time tested)			
Torino – (Cyflufenamid)	-----	-----	100
LEM 17 – (Penthiopyrad)	-----	-----	66
BAS 703	-----	-----	60
NAI 2302 – (Tolfenpyrad)*	-----	-----	57
BAS 639	-----	-----	56
Cueva – (Copper octanoate)	-----	-----	48

2009 Imperial Valley melon powdery mildew trial

Donna Henderson, UCCE



What is the future for fungicides with moderate to low efficacy ?

- Can they be effective partners in treatment programs with stronger fungicides:
 - For resistance management?
 - For effective management of powdery mildew?
- Field trials were conducted in 2008 and 2009 to answer these questions

Color code for disease control levels

Green = 80-100%; Yellow = 60-79%; Red = below 60%

Fungicide application sequence (7-10 day application interval)				% Disease reduction	
1	2	3	4	2008	2009
Procure Quintec Sulfur	Procure Quintec Sulfur	Procure Quintec Sulfur	Procure Quintec Sulfur	98-100	98-100
Cabrio	Cabrio	Cabrio	Cabrio	80	74
Kaligreen Quadris Serenade Sovran Topsin	Kaligreen Quadris Serenade Sovran Topsin	Kaligreen Quadris Serenade Sovran Topsin	Kaligreen Quadris Serenade Sovran Topsin	30-60	24-52

Color code for disease control levels

Green = 80-100%; Yellow = 60-79%; Red = below 60%

Fungicide application sequence (7-10 day application interval)				% Disease reduction	
				2008	2009
Quintec	Sulfur	Procure	Sulfur	100	100
Quintec	Cabrio	Procure	Cabrio	90	95
Quintec	Kaligreen	Procure	Kaligreen	100	95
Quintec	Quadris	Procure	Quadris	98	100
Quintec	Serenade	Procure	Serenade	95	90
Quintec	Sovran	Procure	Sovran	90	95
Quintec	Topsin	Procure	Topsin	92	95

Color code for disease control levels

Green = 80-100%; Yellow = 60-79%; Red = below 60%

Fungicide application sequence (7-10 day application interval)				% Disease reduction	
				2008	2009
Sulfur	Procure	Sulfur	Quintec	100	100
Cabrio	Procure	Cabrio	Quintec	98	95
Kaligreen	Procure	Kaligreen	Quintec	80	86
Quadris	Procure	Quadris	Quintec	90	86
Serenade	Procure	Serenade	Quintec	90	90
Sovran	Procure	Sovran	Quintec	85	86
Topsin	Procure	Topsin	Quintec	100	93

What is the future for fungicides with moderate to low efficacy ?

- They can be effective partners in treatment programs with stronger fungicides:
 - For resistance management?
 - For effective management of powdery mildew?

Summary

Keys to successful management of powdery mildew on melon

1. Plant resistant cultivars if available and use effective fungicide application programs containing products with different modes of action

Summary

Keys to successful management of powdery mildew

2. Successful powdery mildew management is similar to successful fire management

– **THINK PREVENTION**

Start application of management tools when conditions favor disease development but before symptoms appear

