

Powdery mildew management in processing tomatoes

Brenna Aegerter

University of California

Cooperative Extension, San Joaquin County

Tomato powdery mildew pathogens

- *Leveillula taurica*
(*Oidiopsis sicula*)
- *Oidium neolycopersici*
- *Oidium lycopersici*



Leveillula taurica
(*Oidiopsis sicula*)



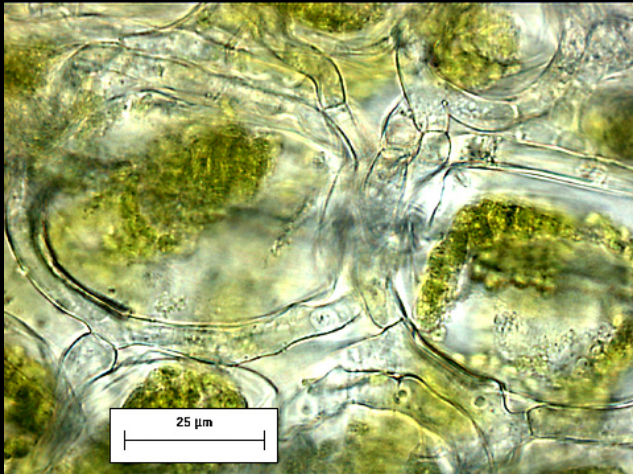






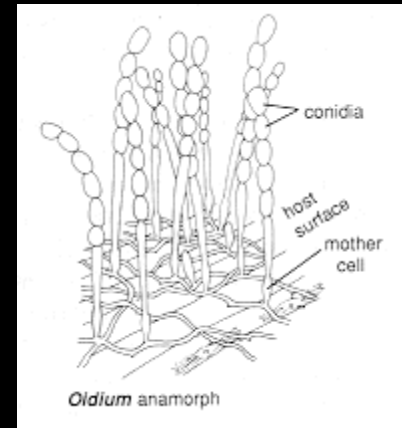






Leveillula
Endoparasitic mildew

Extensive fungal mycelium inside
leaf mesophyll



Oidium
Ectoparasitic mildew

Fungal mycelium on leaf surface



Leveillula



Oidium

Oidium mildew control

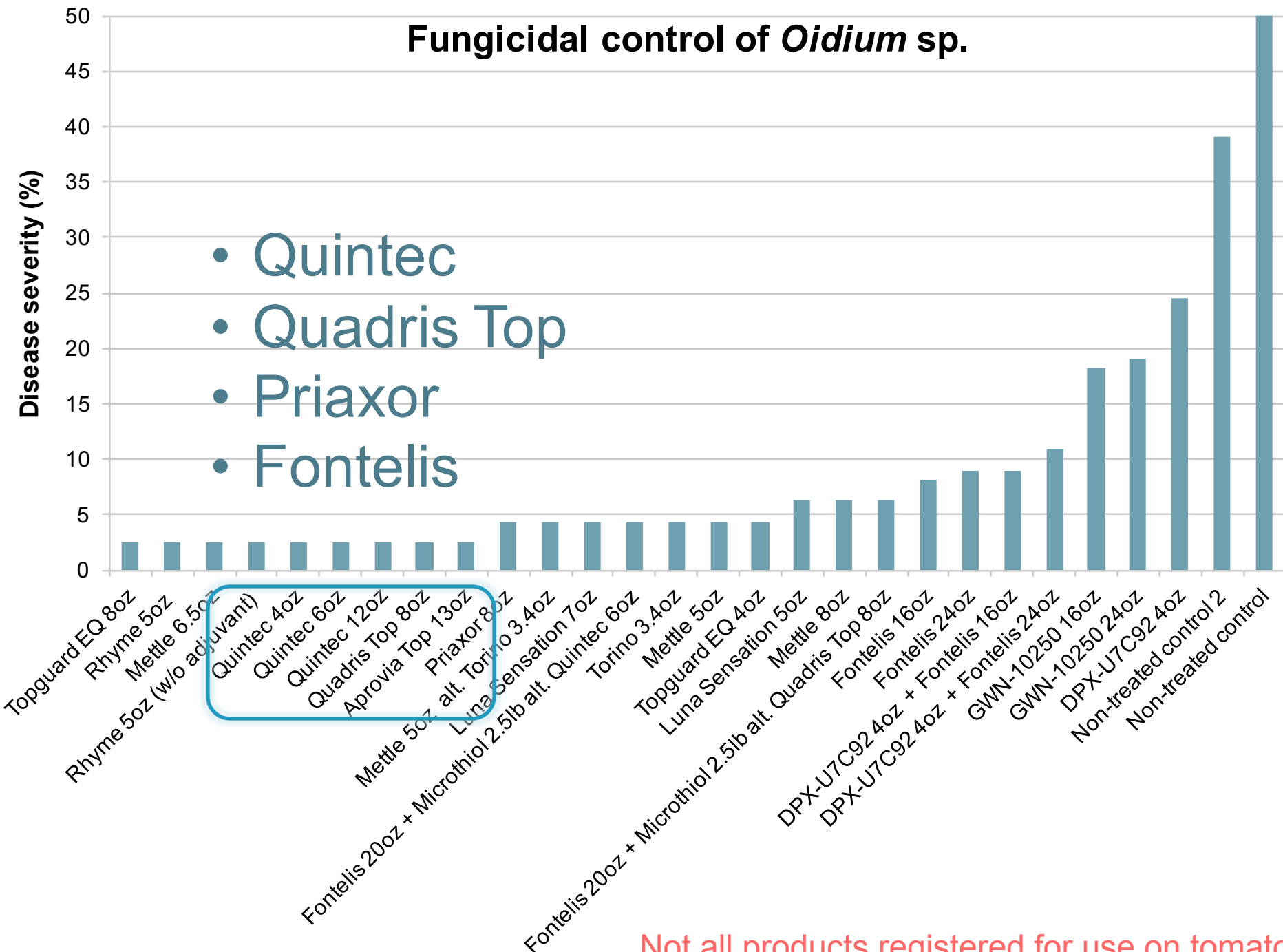
-----Disease severity-----
(percent of foliage affected)

Product	Interval	Sprays	19-Aug	26-Aug	13-Sep	NDVI
Quadris Top	10 day	6	2.5a	0a	0.8a	0.64a
Quadris	10 day	6	5.0ab	1.7a	11.2a	0.59ab
Quadris Top	20 day	3	2.5a	5.0a	35.3 b	0.60ab
Quadris	20 day	3	5.0ab	7.5a	35.3 b	0.59ab
Rally	10 day	6	7.5ab	11.2a	40.3 b	0.56 b
Cabrio	10 day	6	13.7 bc	19.5ab	50.0 b	0.56 b
Rally	20 day	3	8.7ab	15.8ab	73.3 c	0.49 c
Cabrio	20 day	3	13.7 bc	15.8ab	82.7 c	0.49 c
Non-treated control		0	22.0 c	35.3 b	92.5 c	0.45 c
		Mean	8.94	12.43	46.83	0.552
		LSD	10.12	20.52	20.71	0.063
		<i>P-value</i>	0.014	0.054	< .0001	0.0002

Fungicidal control of *Oidium* sp.

Disease severity (%)

- Quintec
- Quadris Top
- Priaxor
- Fontelis



Not all products registered for use on tomato

Fungicides via the drip system

Disease control programs evaluated

0.21 lb fluopyram via drip once
~6 wks after transplanting

0.21 lb fluopyram via drip once
~8 wks after transplanting
plus 25 lbs sulfur dust 14-day interval

0.21 lb fluopyram via drip twice
~6 and 10 weeks after transplanting

0.114 lb flutriafol via drip twice
~6 and 10 weeks after transplanting

25 lbs sulfur dust 14-day interval

Non-treated control



Products and use pattern not yet registered

<u>Disease control program</u>	-----Disease severity----- (percent of the foliage affected)			NDVI*		--Fruit quality-- Sunburn Solids	
	19-Aug	28-Aug	17-Sep	17-Sep		(% by wt)	(° Brix)
0.21 lb fluopyram via drip once ~8 wks after transplanting plus 25 lbs sulfur dust 14-day interval	22.0ab	25.7 b	7.5a	0.64	a	2.26%	6.20
25 lbs sulfur dust 14-day interval	25.7ab	25.7 b	30.3ab	0.57	ab	1.56%	6.70
0.114 lb flutriafol via drip twice, ~6 and 10 weeks after transplanting	2.5a	5.0a	30.3ab	0.59	ab	0.86%	6.17
0.21 lb fluopyram via drip twice, ~6 and 10 weeks after transplanting	25.7ab	25.7 b	35.3ab	0.58	ab	1.34%	6.03
0.21 lb fluopyram via drip once ~6 wks after transplanting	18.3ab	30.3 b	50.0 b	0.53	bc	3.20%	5.43
Non-treated control	45.0 b	65.0 c	82.7 c	0.46	c	6.04%	5.27
Mean	23.2	29.6	39.4	0.56		2.54%	5.97
CV (%)	43.0	20.2	28.1	4.9		83.2	1.1
<i>P value</i>	<i>0.0097</i>	<i>< 0.0001</i>	<i>0.0002</i>	<i>0.0002</i>		<i>NS</i>	<i>NS</i>

* NDVI = Normalized difference vegetation index, which is a measure of photosynthetically active (live, green) tissue





FRAC Group Code(s)	Products (chemical common names)
11	Quadris (azoxystrobin), Cabrio (pyraclostrobin), Flint (trifloxystrobin)
3	Rally (myclobutanil)
11 + 3	Quadris Top (azoxystrobin + difenoconazole)
7	Fontelis (penthiopyrad)
7 + 11	Priaxor (fluxapyroxad + pyraclostrobin)
13	Quintec (quinoxifen)
M	Sulfur (dusting sulfur, wettable/sprayable/micronized sulfurs)
Not categorized	Kaligreen and others (potassium bicarbonate) Regalia (plant extract) Taegro, Sonata, Actinovate (biological fungicides)

Anticipated new fungicide registrations

FRAC Group Code(s)	Products (chemical common names)
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7 + 11	Luna Sensation (fluopyram + trifloxystrobin)
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U8	Vivando (metrafenone)
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3	Mettle (tetraconazole) Rhyme (flutriafol)
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U6	Torino (cyflufenamid)
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Fungicide Resistance Management

FRAC Group Code	Fungicide Resistance Risk*
Group 11 – e.g. Quadris, Cabrio	High
Group 7 – e.g. Fontelis	Medium to high
Group 3 – e.g. Rally Group 13 – e.g. Quintec	Medium
Mixtures combining medium/high risk groups – e.g. Quadris Top, Priaxor	Risk lower than using solo product
Group M – e.g. sulfur	Low
Not categorized – e.g. oils, biological fungicides, potassium bicarbonate	resistance not known – presume risk is low

*Risk categorization assigned by the Fungicide Resistance Action Committee (FRAC)

Some thoughts on *Oidium* mildew

- *Oidium* mildew may cause problems earlier in the season (e.g. July)
- Both mildew pathogens can be present in the same field
- More challenging to scout a field for early symptoms?
- Sulfur and other fungicides appear to control *Oidium* mildew in my trials

Optimizing chemical control

- Early treatment
- Consider other target pests and diseases when choosing a product
- Good coverage, penetrate canopy
- Resistance management: Utilize good product rotations, tank mixes or formulated mixtures

Acknowledgements



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