

Tomato Powdery Mildew

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Tomato Powdery Mildew
Leveillula taurica (Oidiopsis sicula)



Symptoms

Yellow spots (or not)

Powdery white sporulation (or not)

Turning necrotic in age



Leaf underside



Photo by Scott Stoddard



Photo by Gene Miyao

Tomato Powdery Mildew Epidemic in 2007 and 2008

- ▶ Higher incidence than previous years
- ▶ Abundant sporulation
- ▶ Variability in processing varieties
- ▶ Difficult to control at some locations

What has changed?

- ▶ Fungicide resistance?
- ▶ The weather?
- ▶ “New strain”?

Dept. of Plant Pathology
University of Arizona



Oidium neolycopersici

Occurs in greenhouses
and can be a minor
problem in coastal-
grown tomatoes







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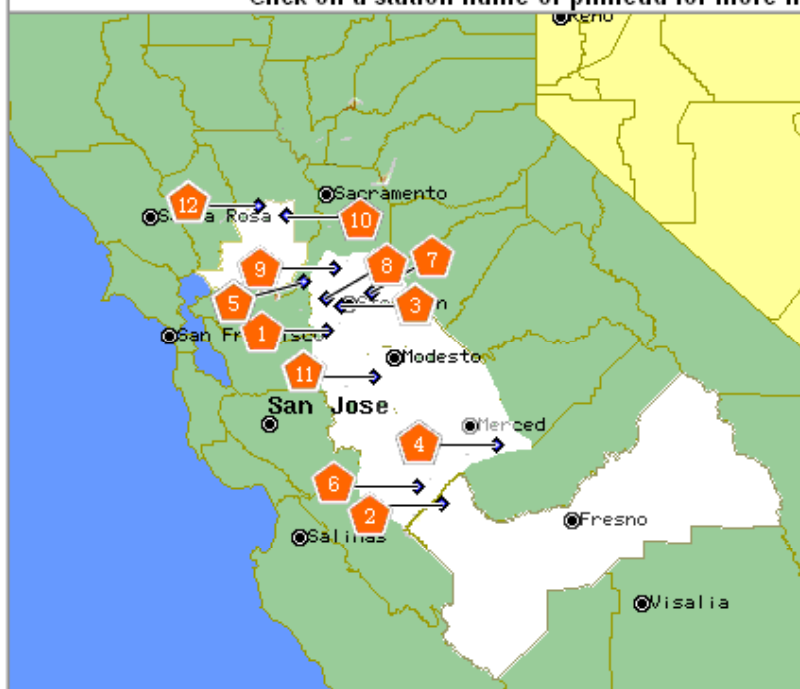
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2006 California Tomato Network Weather Stations

Click on a station name or pinhead for more information.



PestCast

1. [Fabian Tract-01](#) (CTR3)
2. [Firebaugh Ranch-01](#) (FRS1)
3. [Holt-05](#) (CTR1)
4. [Le Grand-01](#) (MER2)
5. [Jackson Slough-01](#) (CTR4)
6. [Merced Springs-01](#) (MER1)
7. [Morada-01](#) (SJQ1)
8. [Rindge Tract-06](#) (CTR4)
9. [Thornton-05](#) (CTR2)
10. [UCD Ag Fields-02](#) (YOL2)
11. [Westley-03](#) (STS1)
12. [Winters-08](#) (BTV1)

Legend

Networks and Stations

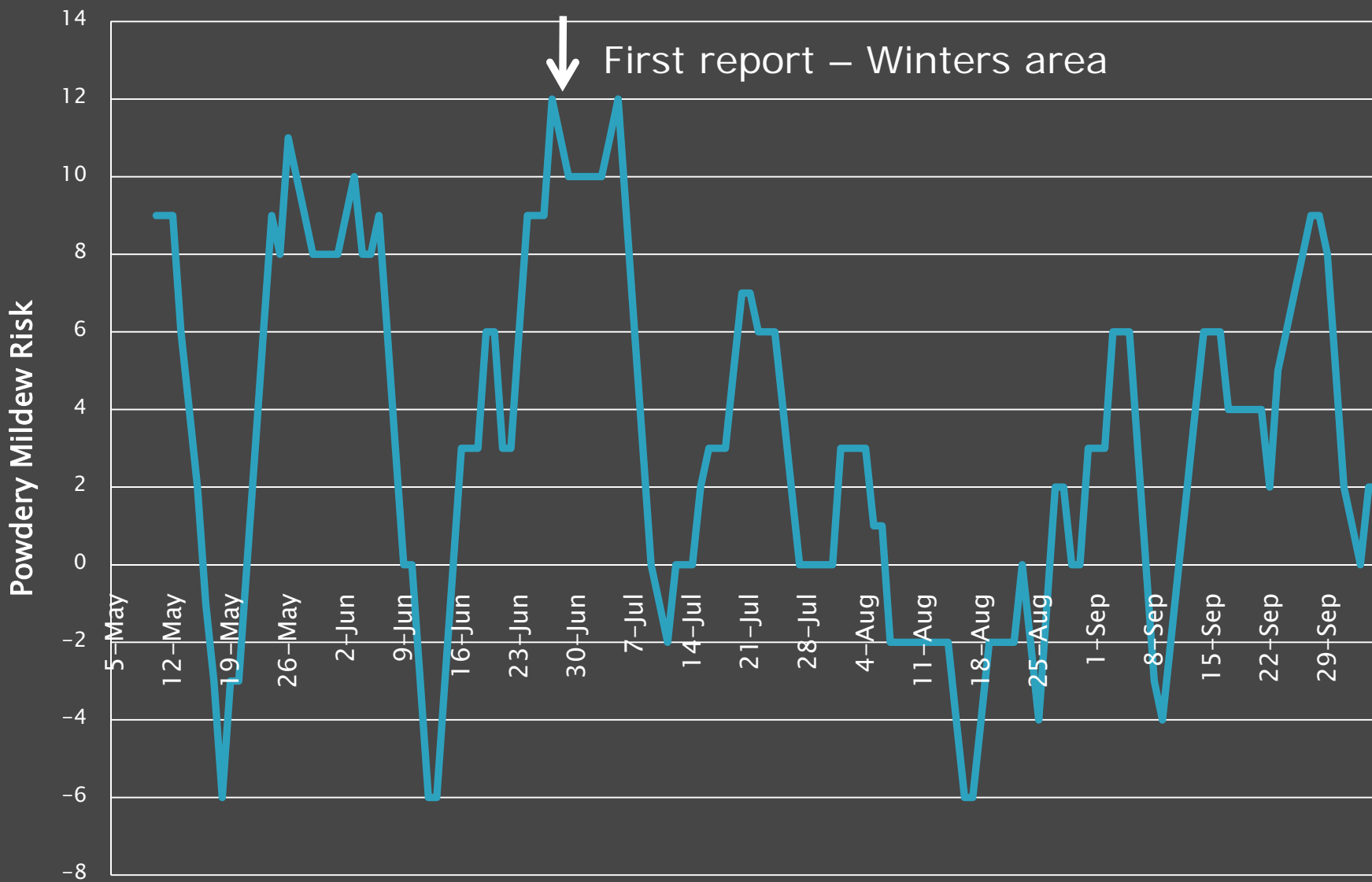
- * Inactive
- Automatic (daily, current data)
- ▲ TouchTone (daily, current data)
- ⬠ PestCast (daily & hourly, current data)
- ▲ Climate (daily, at least 30 months data)

Map

- County
- Water
- Expressway
- Highway
- Connector

- 2008 Powdery Mildew Risk -

Model prediction based on data from weather station near Winters



Powdery Mildew Reports, 2008

- ▶ First week in July: Yolo County
- ▶ Second week in July: San Joaquin Co., Merced Co.
- ▶ Third week in July: widespread problems and severe in some spots
- ▶ Sporadic but occasionally severe outbreaks throughout the Central Valley

Summary of 16 field trials 2006 - 2008

Disease pressure	Model performance	Sprays saved
None (2 locations 2006)	---	1 - 2
Low (3 locations in 2006, 2 locations in 2008)	Model and calendar similarly good control	0 - 3
Moderate to high (2 locations in 2006, 3 locations in 2007, 4 locations in 2008)	Similarly good control at 4 locations	0 - 2
	Calendar better at 3 locations	1 - 2
	Similarly poor control at 2 locations	0 - 1

Model Evaluation – summary

- ▶ Over three years and sixteen trials, the calendar treatment averaged 3.5 sprays per season, while the model treatment averaged 2.3 sprays
- ▶ At 11 of the 14 locations where powdery mildew appeared, the calendar and model treatments provided a similar level of control
- ▶ At three locations the calendar treatment provided better control

Some of the challenges...

- ▶ Model assumes presence of inoculum and uniformly susceptible varieties
- ▶ Cost of in-field weather stations, maintenance, data quality control
- ▶ Sensitivity of model to small differences in data (both real microclimate differences but also errors)

Fungicide Resistance Risk

Group Code	Chemical group name	Common names	Product examples	Risk
11	Quinone outside inhibitors (QoI)	azoxystrobin trifloxystrobin pyraclostrobin	Quadris Flint Cabrio	high
3	Demethylation inhibitors (DMI)	myclobutanil	Rally	medium
M	M2 – inorganic	sulfur	Microthiol Disperss, Thiolux, dust, etc.	low
	Not categorized	potassium bicarbonate	Kaligreen, Armicarb, Milstop, etc.	unknown, presume very low

Fungicide Efficacy Trials

- ▶ Fungicides applied with a backpack sprayer
- ▶ High volumes of water (equivalent of 50 gallons per acre spray volume)
- ▶ Two replicated trials in commercial fresh market tomato fields
- ▶ 4 fungicide applications at each site – 10 to 12 day intervals starting preventatively

Powdery mildew fungicide trials, San Joaquin County 2008

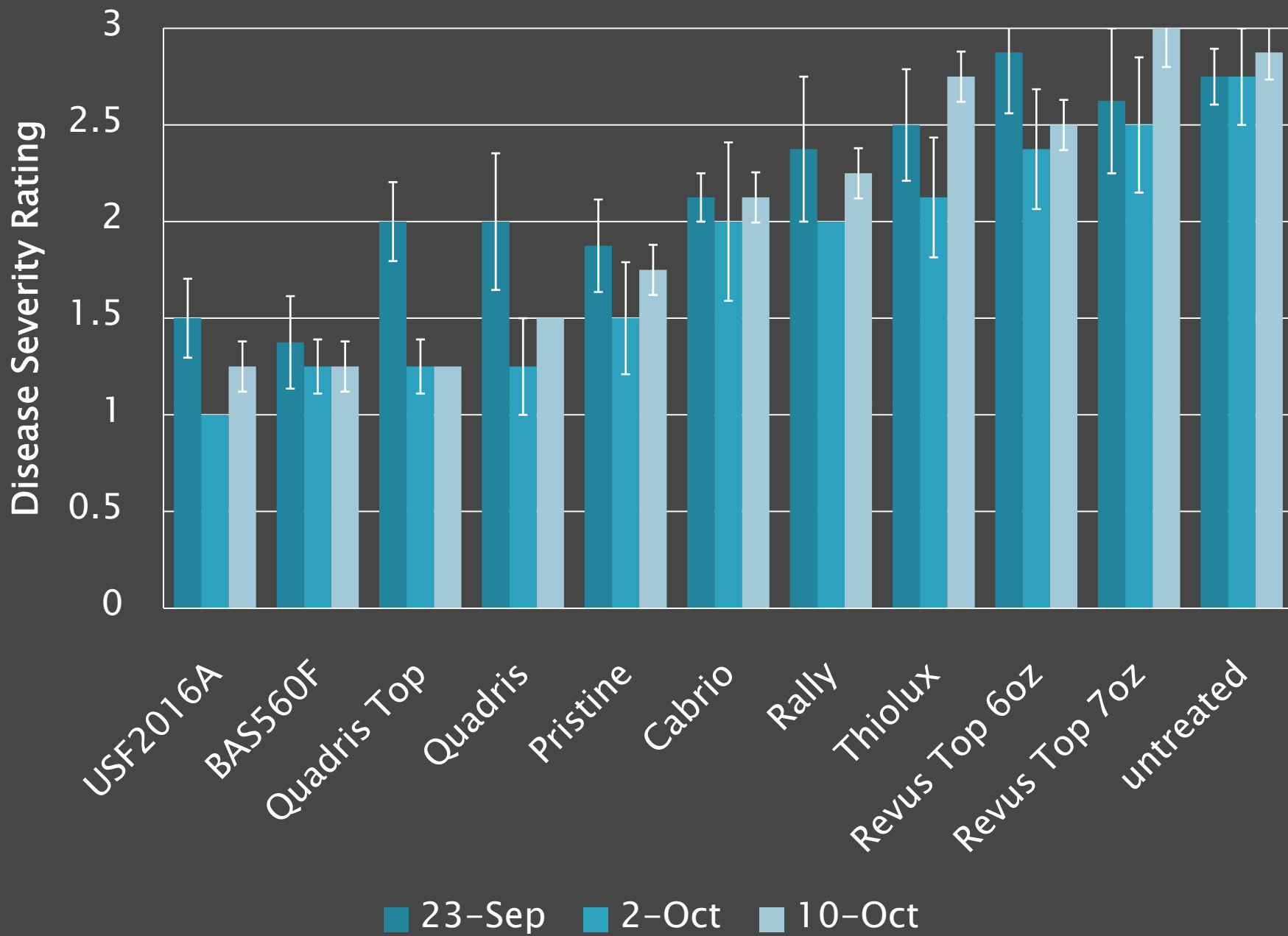
<u>Registered materials:</u>		<u>FRAC</u>
□ Cabrio	pyraclostrobin	11
□ Quadris	azoxystrobin	11
□ Rally	myclobutanil	3
□ Revus Top	mandipropamid + difenoconazole	40 + 3
□ Thiolux	wettable sulfur	M2

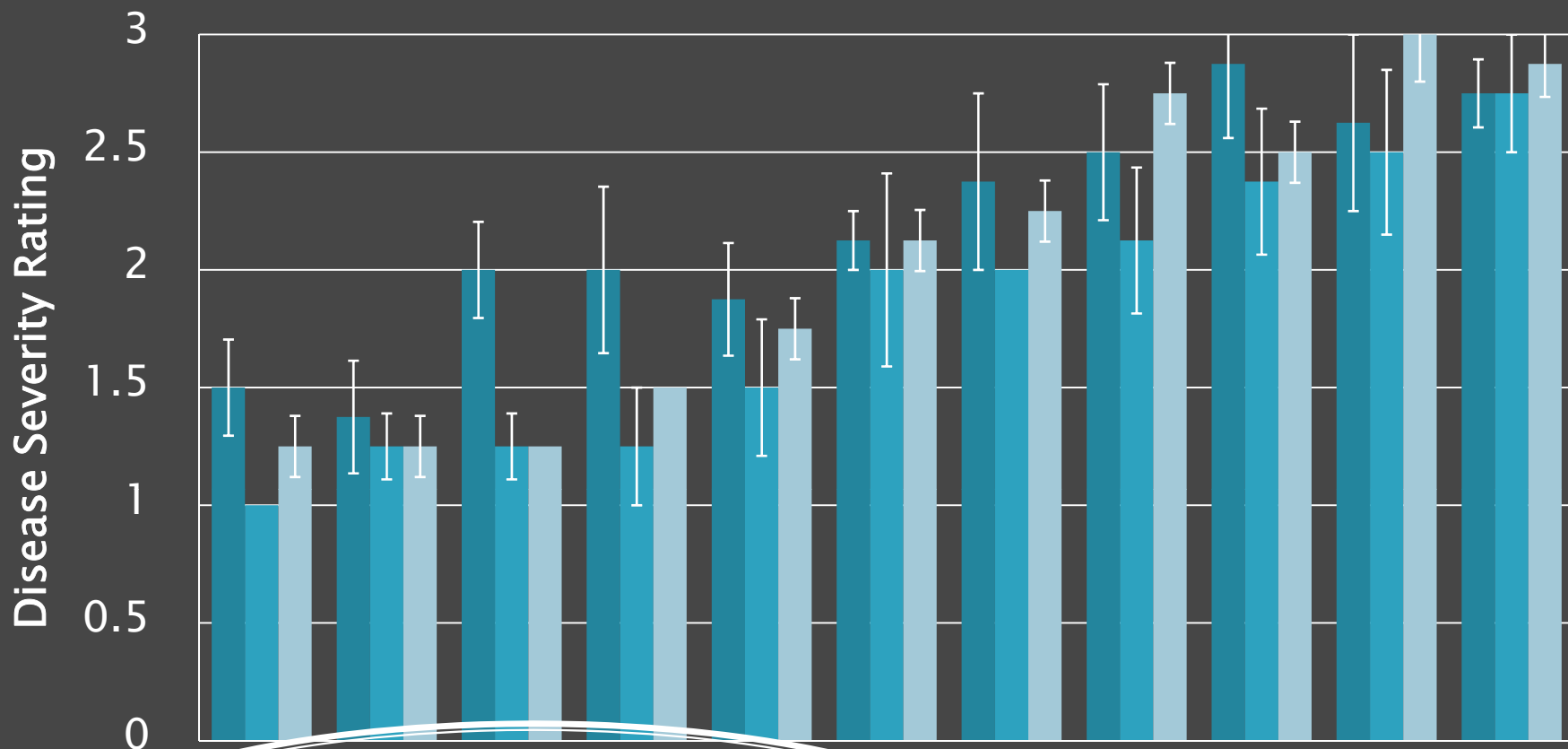
Powdery mildew fungicide trials, San Joaquin County 2008

Experimental materials:

FRAC

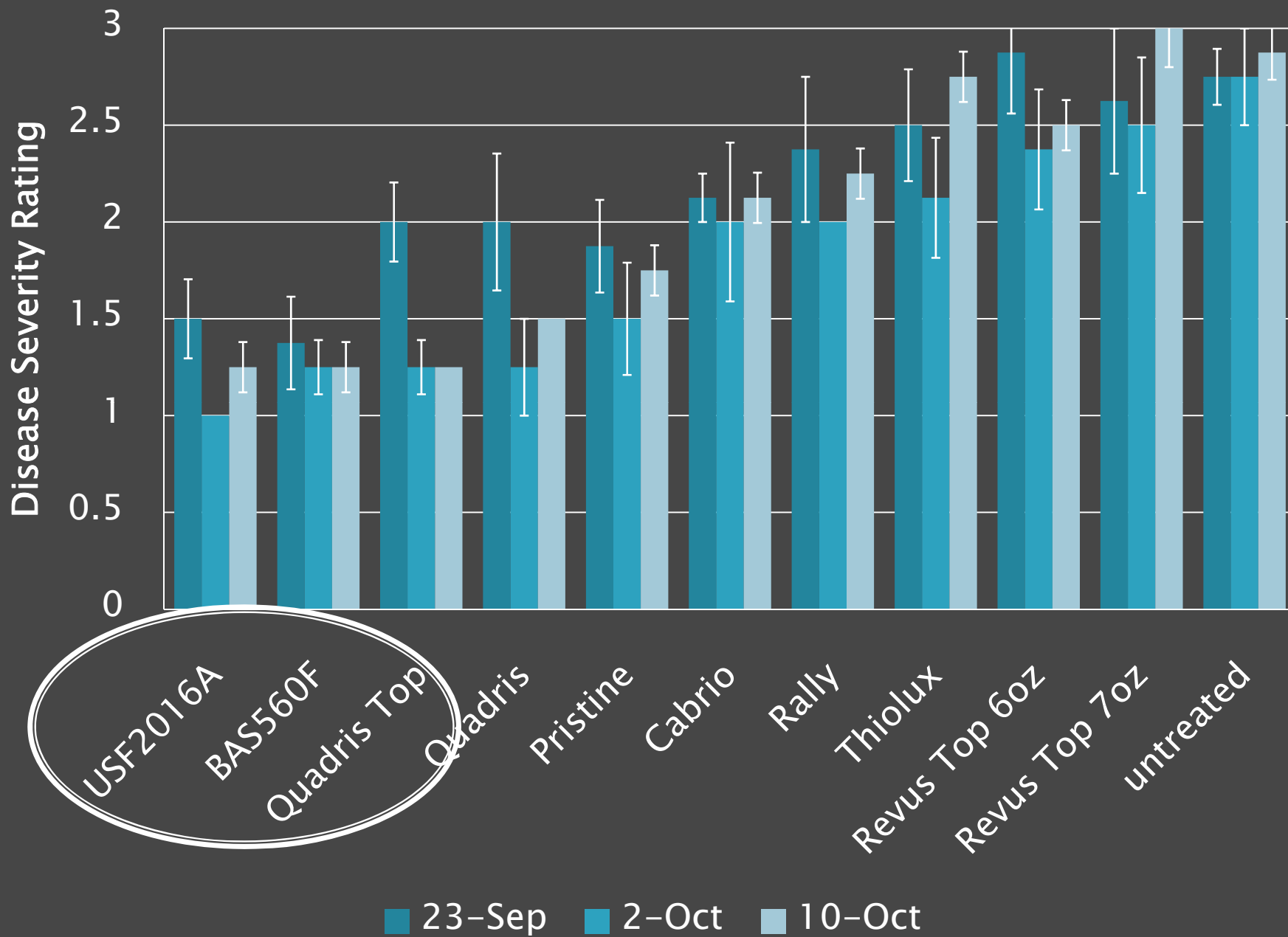
□ BAS560 F	metrafenone	U8
□ LEM17	?	?
□ Pristine	pyraclostrobin + boscalid	11 + 7
□ Quadris Top	azoxystrobin + difenoconazole	11 + 3
□ USF2016A	?	?





USF2016A
BAS560F
Quadris Top
Quadris
Pristine
Cabrio
Rally
Thiolux
Revus Top 6oz
Revus Top 7oz
untreated

■ 23-Sep ■ 2-Oct ■ 10-Oct



Late- season Processing Tomatoes Gene Miyao, Woodland 2008

Fungicide treatments ¹	15-Sep % mildew	23-Sep % infection	7-Oct % necrosis	9-Oct Yield (T/A)
Non treated control	8	62	89	48.1
Cabrio 16oz + Endura 5oz fb Cabrio + Endura	4	46	68	49.4
Quadris fb Quadris	4	27	68	51.9
Cabrio fb Endura	4	34	68	49.3
Rally fb Rally 4oz + 4lbs Kocide	11	34	65	53.6
LSD @ 5%	5.2	11.3	NS	NS
% CV	63	21	19	7
Average	6.2	40.6	71.7	50.5

Powdery mildew chemical control

- ▶ Early treatment
- ▶ Resistance management: rotations and tank mixes
- ▶ Good coverage, penetrate canopy

Acknowledgements

- ▶ California Tomato Research Institute
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