

Chemical and varietal approaches to FRD management

Patricia Lazicki
Brenna Aegerter
UC Cooperative Extension
palazicki@ucanr.edu
bjaegeter@ucanr.edu

In collaboration with

Cassandra Swett & Myles Collinson
UCD Dept of Plant Pathology
clswett@ucdavis.edu

Lance Stevens & Ross Lopez
AgSeeds Unlimited

Tom Turini, Zheng Wang, Amber Vinchesi-Vahl; UCCE

South Sacramento Valley Annual Processing Tomato Production Meeting
January 14, 2025
Woodland, CA



Materials evaluated:

Please note that Propulse is not registered for use on California tomatoes.

Fungicides (applied at planting and early season):

- **Miravis** (Syngenta) – pydiflumetofen (FRAC group 7)
- **Velum One** (Bayer) – fluopyram (7)
- **Propulse** (Bayer) – prothioconazole (3) + fluopyram (7)
- **Rhyme** (FMC) – flutriafol (3)

Fumigant (applied at least two weeks prior to planting):

- **K-Pam (AMVAC)** – metam potassium

Chemical effectiveness in product trials, 2019-2024

- Results of 10 trials in Yolo, Solano, and San Joaquin counties
- Diseases present include FRD, fusarium wilt and other soilborne diseases

Product (active ingredient)	Sig. disease effect?	Sig. yield effect?	Range in average yield boost (where sig.)
K-Pam (metam potassium) ~30 gal/acre	3 (of 6 trials)	5 (of 7 trials)	3.5 – 26 t/a
K-Pam (metam potassium) ~15 gal/acre	2 (of 3)	2 (of 3)	11.9 – 13.6 t/a
Miravis (pydiflumetofen)	3 (of 3)	1 (of 3)	9.2 t/a
Rhyme (flutriafol)	2 (of 3)	1 (of 1)	10 t/a
Velum One (fluopyram)	1* (of 3)	0 (of 3)	

*Effect was statistically weak

Site	UC Davis	Yolo Co.	San Joaquin Co.	San Joaquin Co.	San Joaquin Co.	Yolo Co.	Solano Co.	San Joaquin Co.	Yolo Co.	Yolo Co.	
Year	2019	2019	2019	2020	2021	2023	2023	2024	2024	2024	
Disease	FRD	FRD	FRD	Fol & FRD	Fol & FRD	Fol, FRD, Forl, s. blight	FRD, Forl	RKN & FRD	FRD, vert	FRD	
Product	Vine decline in non-treated control	47%	73%	20%	31%	30%	55%	16%	19%	18%	21%
K-Pam ~30 gal	<i>Disease</i>				+	++	NS	++		NS	-
	<i>Yield</i>			7.2 t/a	NS	26 t/a	4.7 t/a	3.5 t/a		NS	7.5 t/a
K-Pam ~15 gal	<i>Disease</i>		NS		+	++					
	<i>Yield</i>		11.9 t/a		NS	13.6 t/a					
Miravis	<i>Disease</i>	+			+	++					
	<i>Yield</i>	NS			NS	9.2 t/a					
Rhyme	<i>Disease</i>				+	++			NS		
	<i>Yield</i>				NS	10 t/a			NS		
Velum	<i>Disease</i>	+			-				NS		
	<i>Yield</i>	NS			NS				NS		
	Disease P-value	NS	NS	Not tested	P=0.06	P=0.0004	NS	P=0.008	NS	NS	P=0.04
	Yield P-value	NS	P=0.01	P=0.016	NS	P=0.015	P=0.05	P=0.01	NS	NS	P=0.0006

+=statistically weak positive effects ++=statistically strong positive effect; NS=not significant



Varietal tolerance



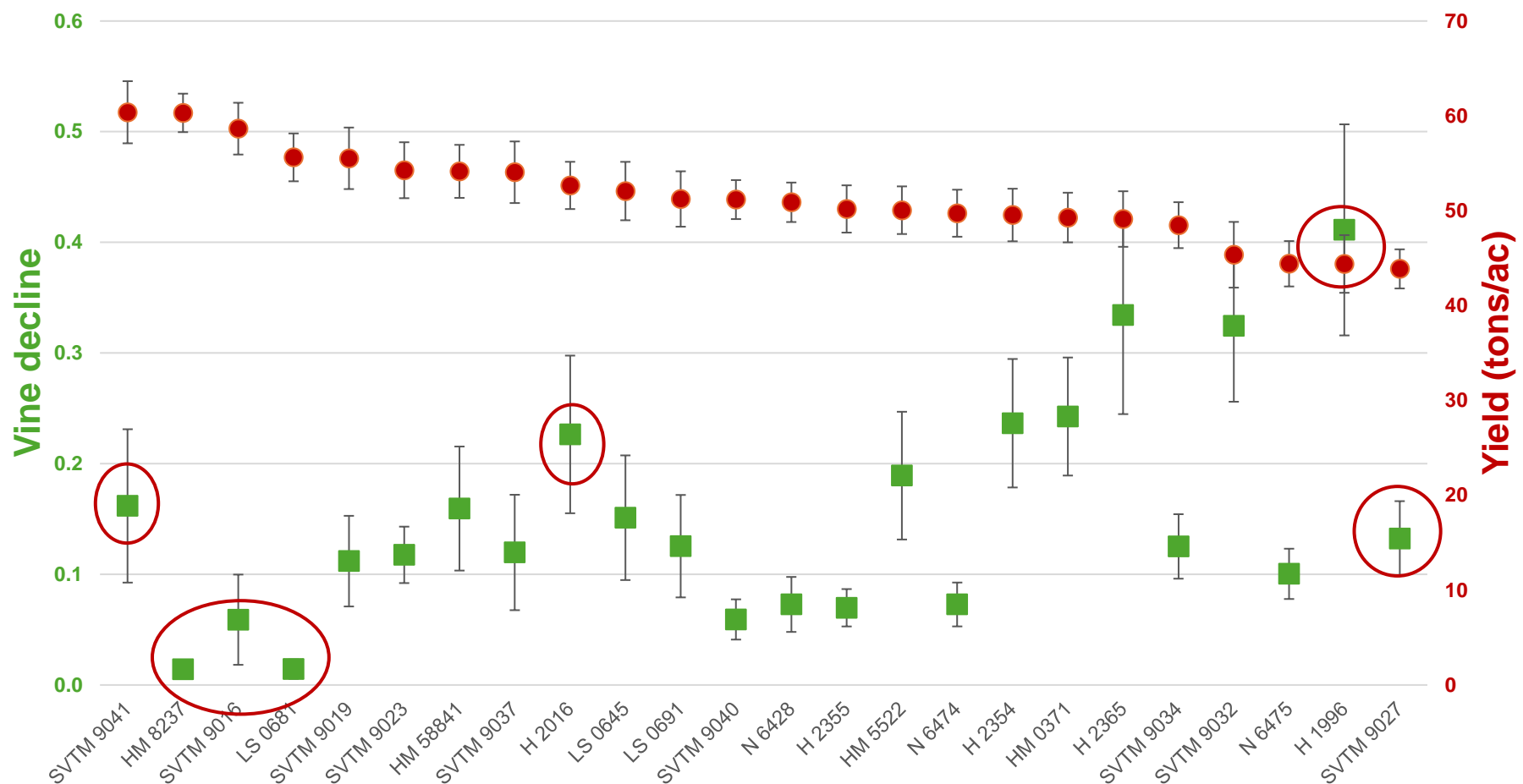
No resistance gene for FRD, but wide range of tolerance among varieties

Goal: Identify varieties which consistently perform well in infested fields

- Grower fields, UCD inoculated trials
- ~25 replicated trials 2019-2024
- Other non-replicated trials we find
- Variety choice:
 - Widely grown
 - New material
 - Unusually susceptible or tolerant (control)
- Challenges:
 - Variable disease pressure across the field
 - Many pests/pathogens/abiotic issues in a field
 - Other factors affect yields

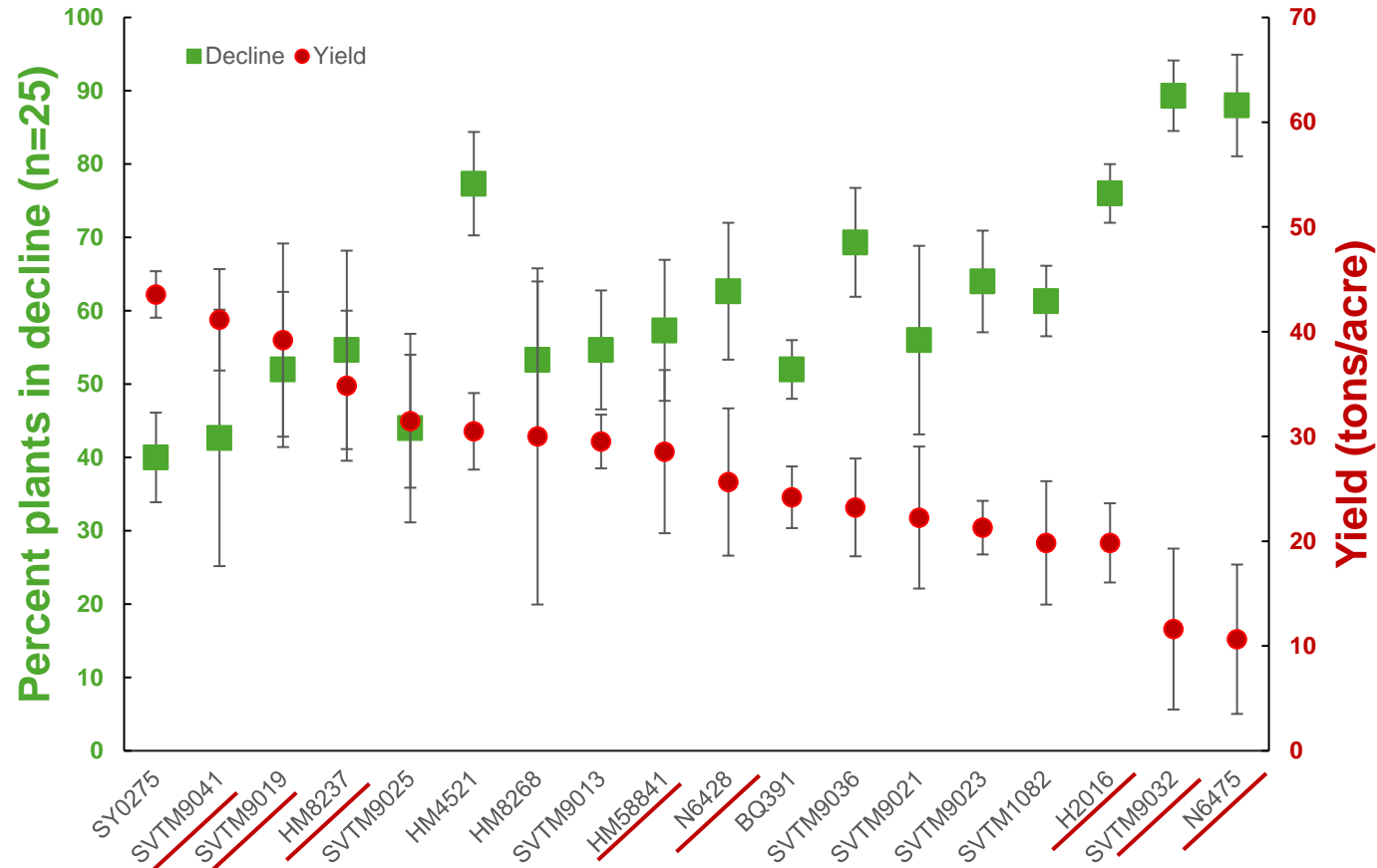


2024 results: AgSeeds Bioassay Trials



6 commercial fields: Yolo, Sutter, Colusa, San Joaquin counties. 3 replicates at each site

2024 results: Inoculated UCD trial



2024 trial summary

Normalized to trial mean (Values>1= higher than trial average yield or vine decline)

Statewide rank	Variety	Sutter 1 (1-70% VD) <i>FRD, RKN</i>		Colusa (0-9% VD) <i>FRD, s. blight</i>		Yolo 1 (1-25% VD) <i>FRD, Fol, RKN</i>		Sutter 2 (1-69% VD) <i>FRD, Fol, Ff</i>		Yolo 2 (0-55% VD) <i>FRD, Fol, Bc</i>		San Joaquin (2-87% VD) <i>FRD, s. blight, Bc, anthracnose</i>		UCD inoculated (40-89% VD) <i>FRD</i>		Mean	
		VD	Yield	VD	Yield	VD	Yield	VD	Yield	VD	Yield	VD	Yield	VD	Yield	VD	Yield
2	HM8237	0.1	1.1	0.1	1.1	0.4	1.2	0.0	1.3	0.0	1.2	0.1	1.3	0.9	1.3	0.13	1.19
44	SVTM9041	0.6	1.2	0.5	1.2	0.3	1.2	1.4	1.2	0.1	1.2	1.4	1.0	0.7	1.5	0.72	1.17
1	SVTM9016	0.1	1.1	0.9	1.1	0.3	1.1	0.1	1.2	0.2	1.2	0.8	1.1			0.39	1.15
	LS0681	0.1	1.1		1.0	0.1	1.1	0.0	1.1	0.0	1.1	0.2	1.2			0.08	1.08
11	SVTM9019	0.9	1.1	1.5	1.0	0.8	1.1	0.6	1.1	0.0	1.1	0.8	1.1	0.9	1.4	0.76	1.07
15	SVTM9023	1.0	1.1	0.3	1.0	1.1	1.0	0.6	1.1	0.4	1.0	0.8	1.0	1.1	0.8	0.69	1.05
4	HM58841	0.5	1.0	1.1	1.1	0.9	1.1	0.9	1.0	0.2	1.1	1.7	1.0	0.9	1.1	0.90	1.05
22	SVTM9037	0.3	1.1	0.1	1.1	0.3	1.0	1.4	0.8	0.0	1.1	1.0	1.0			0.53	1.04
5	H2016	1.9	1.0	2.0	1.0	0.8	1.0	2.1	1.0	0.3	1.0	1.2	1.2	1.2	0.7	1.37	1.03
	SVTM9040	0.2	0.9	0.4	1.0	0.7	0.9	0.3	1.1	0.2	0.9	0.6	1.1			0.39	1.00
	LS0645	0.6	1.0	0.4	1.1	0.3	1.0	1.5	0.9	0.3	1.0	1.3	1.0			0.73	1.00
9	N6428	0.5	1.0	0.5	1.0	0.6	0.9	0.2	1.1	0.3	1.1	0.7	1.0	1.0	0.9	0.44	1.00
	LS0691	1.3	1.0	1.1	1.0	0.5	1.0	0.4	1.1	0.0	1.0	1.0	0.8			0.72	0.99
6	HM5522	0.7	0.9	0.7	1.1	4.4	0.9	0.5	1.2	1.2	0.9	1.5	0.9			1.50	0.98
	H2355	0.7	0.9	1.6	1.0	0.2	1.0	0.1	1.0	1.0	0.9	0.3	0.9			0.66	0.98
25	N6474	0.7	1.0	1.5	0.9	0.2	1.0	0.6	1.1	0.1	0.9	0.3	1.0			0.56	0.97
	H2354	1.3	1.0	1.3	1.0	1.5	1.0	1.5	1.0	8.8	0.8	0.5	1.0			2.48	0.96
	HM0371	1.5	1.0	2.2	1.0	2.3	1.0	1.6	0.9	2.9	0.9	1.3	1.0			1.95	0.95
	H2365	3.3	1.0	0.3	0.9	1.7	1.0	3.1	0.7	1.1	1.1	1.2	1.1			1.79	0.95
32	SVTM9034	0.7	0.9	0.4	1.0	1.0	0.9	0.6	0.9	1.1	0.9	1.1	1.0			0.81	0.94
18	SVTM9032	2.5	1.0	1.1	0.9	2.7	1.0	1.3	0.9	3.2	0.8	2.4	0.7	1.5	0.4	2.19	0.88
21	N6475	0.5	0.9	1.5	0.9	0.3	0.9	1.0	0.8	0.1	1.0	0.6	0.8	1.4	0.4	0.67	0.86
8	SVTM9027	0.5	0.8	1.7	0.8	0.3	0.9	1.2	0.8	2.3	1.0	0.6	0.8			1.10	0.86
3	H1996	3.5	1.0	1.6	0.8	2.5	0.9	3.2	0.7	0.2	0.8	2.7	0.9			2.27	0.85

Highest mean yield



Lowest mean yield

FRD = Fusarium vine rot and decline; RKN = root knot nematode; s. blight= southern blight; Fol= fusarium wilt; Ff=Fusarium foot rot; Bc= Bacterial canker

Green highlight: Yields >5% more than average, decline >5% lower than average (mean across all sites)

2024 Top ten northern varieties: FRD risk

2024 Rank (5-county)*	Variety	# trials	Performance	Risk in FRD-infested fields
1	9016, SVTM	18	Generally has good yield, low vine decline at high-pressure sites	Green
2	8237, HM	15	Normally but not always high yields, usually low vine decline. Performs well in high pressure fields	Green
3	58841, HM	19	High to medium yields, usually but not always low vine decline. Tends to perform well in high pressure fields where F3 not present. F2 variety	Light Green
4	2016, HZ	12	Often has high vine decline under high disease pressure. May have reasonably good yields even when vine decline is high	Yellow
5	8268, HM	9	More data needed. Tends to have low vine decline, medium yields.	Yellow
6	1996, HZ	10	Consistently high vine decline, generally low yields under disease pressure	Red
7	6428, N	17	Normally low vine decline, medium yields	Green
8	9032, SVTM	11	Tendency to low yields, high vine decline under disease pressure	Red
9	9027, SVTM	6	More data needed. In 2024: tendency to low yields, moderate to low vine decline.	Yellow
10	9019, SVTM	16	Generally has medium to good yield, low vine decline at high-pressure sites	Green

*PTAB loads for Colusa, Sacramento, Solano, Sutter, & Yolo counties

Questions about another variety? palazicki@ucanr.edu; (530-219-5198)

Acknowledgements

- California Tomato Research Institute
- Amber Vinchesi-Vahl, Tom Turini, Zheng Wang (UCCE)
- AgSeeds, TS&L
- Robben Ranch, Harlan Family Ranches, RDC Farms, R & J Sanguinetti Ranch, Coit Farms, Dresick Farms, Perez Farms; grower collaborators in variety trials
- Bill Vignolo, Simplot Stockton
- AMVAC, Syngenta, Bayer and FMC

