Relative response of processing tomato varieties to *Tomato spotted wilt virus*

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Symptoms of TSWV

TSWV Resistance

- SW5: Single dominant gene
- In widespread use in the Central San Joaquin Valley for nearly 10 years
- Documentation of resistance-breaking strains in CA 2016

Sw-5 Resistance-breaking strain

First detection mid-Apr 2016, Sw-5 fresh market tomatoes in Cantua Creek (Fresno Co.), with other reports in Firebaugh and Huron

Resistance-breaking TSWV distribution, 2019

- 2017: Additional reports in Fresno and Merced
- 2018: Continuing issues in Fresno and Merced with reports in Kern and Kings
- 2019: Lower overall but throughout Fresno Co.
- 2020: Higher incidence within previous reported areas

Relative Susceptibility of Processing Tomato Varieties to TSWV (2018 - 2020)

- Quantify response of commercial varieties to TSWV
- Document strain present

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Ag Seeds and **TS&L** commercial field trials (Fresno, Kings and Merced)

Company representatives provided maps of commercial trials

UC Advisors evaluate trials with substantial TSWV levels w/in 3 weeks of harvest (6-9 trials/year)

Representative samples of at least six entries from at least three trials per year are tested for resistance breaking status (R. Gilbertson lab)

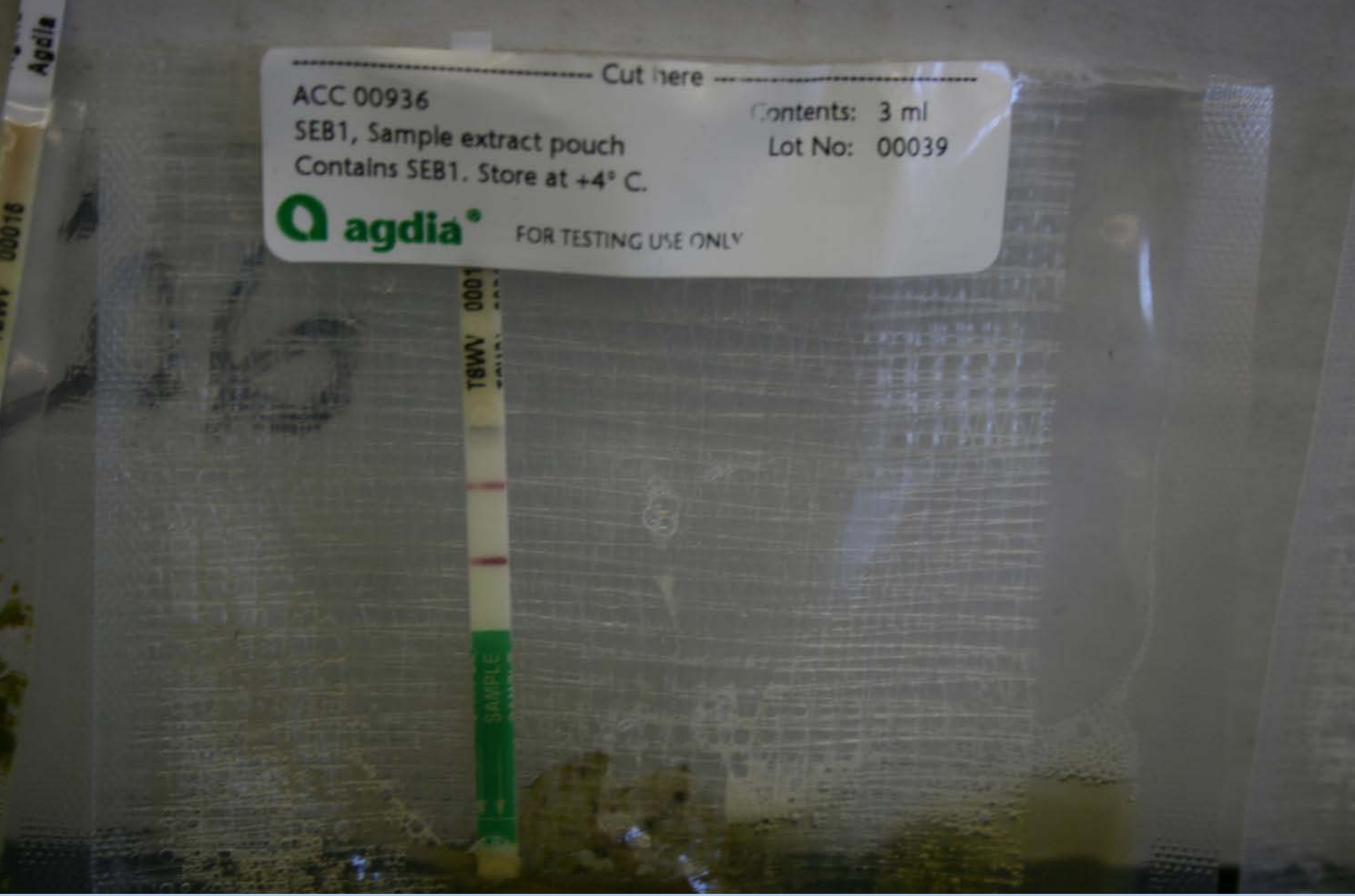
Symptom Categories

1 shoot dieback

2 fruit symptoms with few foliar symptoms

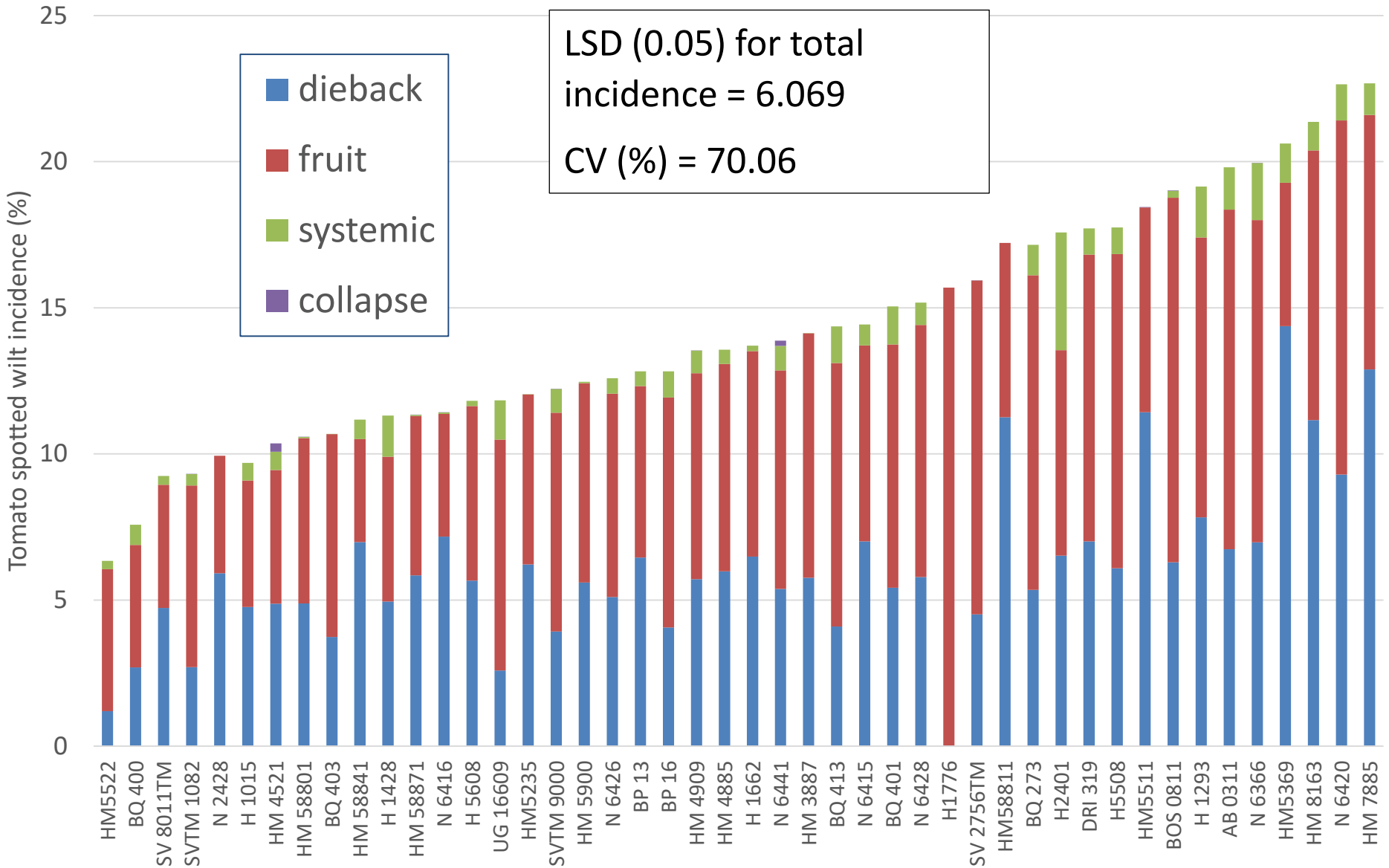
3 systemic symptoms through leaves and fruit

4 collapse



Immunostrips available from AgDia (www.agdia.com)

Disease Incidence (46 entries x 21 sites), 2018-20



Disease Incidence (46 entries x 21 sites), 2018-20

Variety	Use	Total incidence
HM5522	inter	6.339
BQ 400	early	7.579
SV 8011TM	inter	9.241
SVTM 1082	thin	9.317
N 2428		9.506
H 1015	*early*	9.693
HM 4521	inter	10.360
HM 58801	inter	10.579
BQ 403	early	10.675
HM 58841	inter	11.171
H 1428	thick	11.313
HM 58871	inter	11.336
N 6416	early	11.415
H 5608	thick	11.814
UG 16609	inter	11.834
HM5235	inter	12.041
SVTM9000	early	12.226
HM5900	inter	12.463
N6426	thick	12.589
BP13	early	12.823
BP16	inter	12.824
HM4909	inter	13.539
HM4885	thick	13.567
H1662	thick	13.704
N6441	inter	13.876
HM3887	inter	14.130
BQ413	early	14.363
N6415	thick	14.428
BQ401	inter	15.047
N6428	inter	15.172
H1776	thick	15.278
SV2756TM	thick	15.783
HM58811	thick	16.974
BQ273	inter	17.150
H2401	thick	17.572
DRI319	thin	17.718
H5508	thick	17.743
HM5511		18.262
BOS0811	thick	19.016
H1293	pear	19.150
AB0311	thin	19.808
N6366	thin	19.956
HM5369	pear	20.618
HM8163	pear	21.362
N6420	pear	22.641
HM7885	pear	22.679
$LSD_{0.05}$		6.069
CV (%)		70.060

Testing for Sw5 Resistance Breaking TSWV (R. Gilbertson lab)

- From three locations per year
- At least six entries
- Three shoots per entry

Variety Trial: Strain Determination 2018

Variety	SW5	Strain detected (rb or wt)		
		Five Pts	Huron	Merced
S6366	-	Rb	Rb	Rb
UG19406	-	Rb	Rb	Rb
BQ413	+	Rb	Rb	Rb
UG16609	+	Rb	Rb	Rb
HM5900	+	Rb	Rb	Rb
H1293	+	Rb	Rb	Rb
N6420	+	Rb	Rb	Rb
BOS811	+	Rb	Rb	Rb
AB311	+	Rb	Rb	Rb

Strain identification
Sw-5 resistance breaking (Rb)
Wild type (wt)

Variety Trial: Strain Determination 2019

Variety	SW5	Strain detected (rb or wt)		
		Five Pts	Dos Palos	San Joaquin
S6366	-	Rb	---	Rb
UG19406	-	Rb	---	Rb
BQ413	+	Rb	---	Rb
UG16609	+	Rb	---	Rb
HM5900	+	Rb	---	Rb
H1293	+	Rb	Rb	Rb
N6420	+	Rb	Rb	Rb
BOS811	+	Rb	Rb	Rb

Strain identification: Sw-5 resistance breaking (Rb) Wild type (wt)

* TSWV was weakly positive

** TSWV was detected in 1 of 3 samples

Variety Trial: Strain Determination, 2020

Variety	SW5	Strain detected (rb or wt)		
		Mendota	Huron	Helm
AB0311	+	Rb	Rb	Rb
BQ413	+	Rb	Rb	Rb
N6472	+	Rb	Rb	Rb
H1293	+	Rb	Rb	Rb
H5608	+	Rb	Rb	Rb
SVTM9016	+	Rb	Rb	Rb
UG16609	+	Rb	Rb	Rb

Alternative Genetics to Sw5

Evaluation of Commercial entries at UC West Side Research and Extension Center 2019-20

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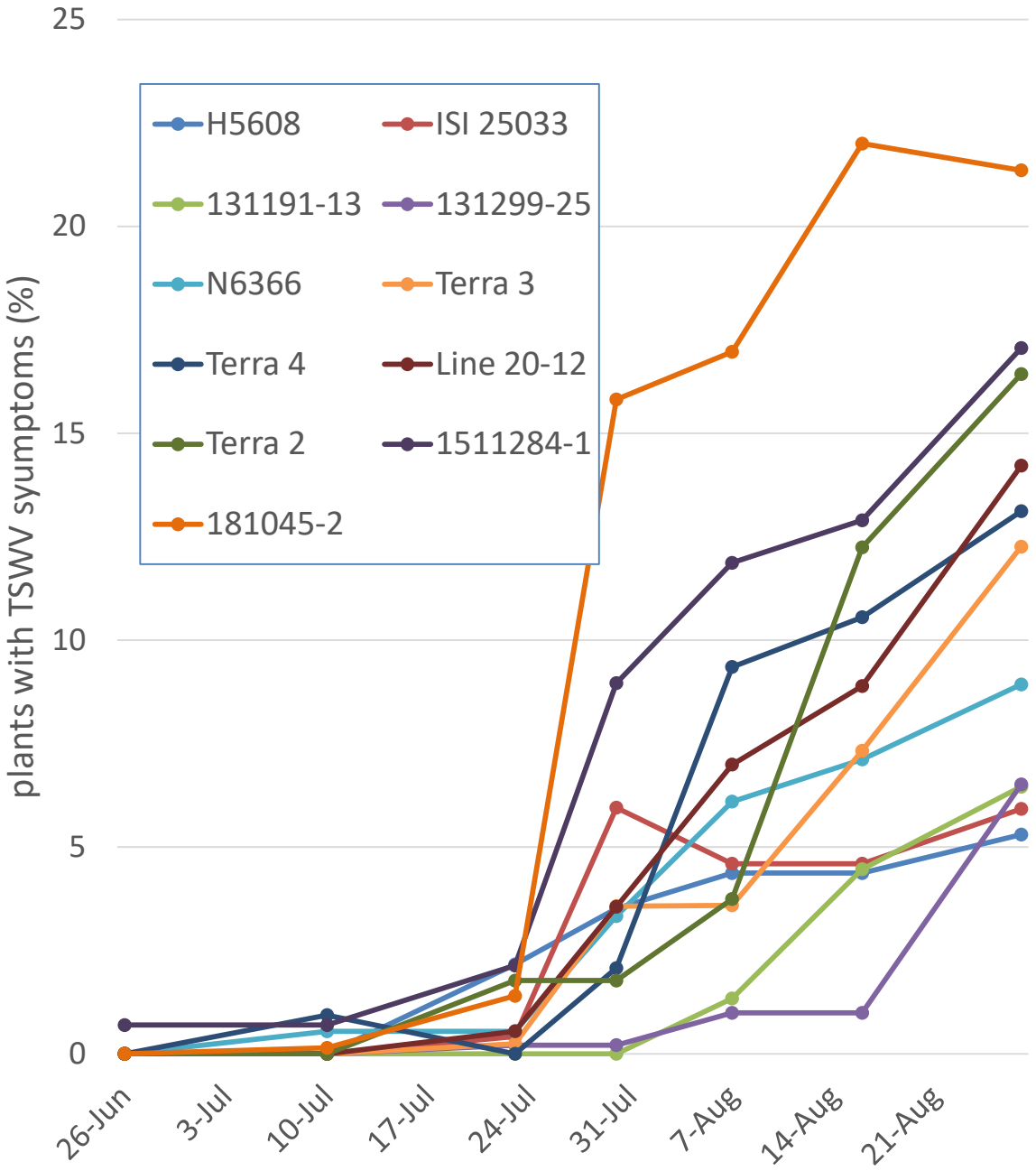
Response of varieties and breeding lines to TSWV at UC WSREC

Transplanted: 24 May
Plot size: single 60” bed by 75 ft
Plant spacing: 12”
Notes: Due to quantity of seed, as little as 5 ft per plot was used.

Response of tomato varieties and lines to Tomato spotted wilt virus 2019		
code	designation	
T1	131191-13	AL6/AL10/Sw5/AS
T2	131299-25	AL6/Sw5/AS
T3	1511284-1	FA7/AS
T4	181045-2	CV17NBL
T5	ISI 25033	
T6	Line 20-12	
T7	Terra 1	
T8	Terra 2	
T9	Terra 3	
T11	5608	Sw5 resistance
T12	6366	No TSWV resistance

Cooperation from Martha Muschler Chu and private industry

Tomato spotted wilt virus symptom incidence in 2019 at variety/line comparison at UC WSREC



Summary

- Sw5 resistance breaking Tomato spotted wilt virus is common in portions of Central California
- Genetic alternatives to Sw5?
- Expression of TSWV varies among varieties

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