Chemical Control Evaluations for Stink Bug and for Powdery Mildew

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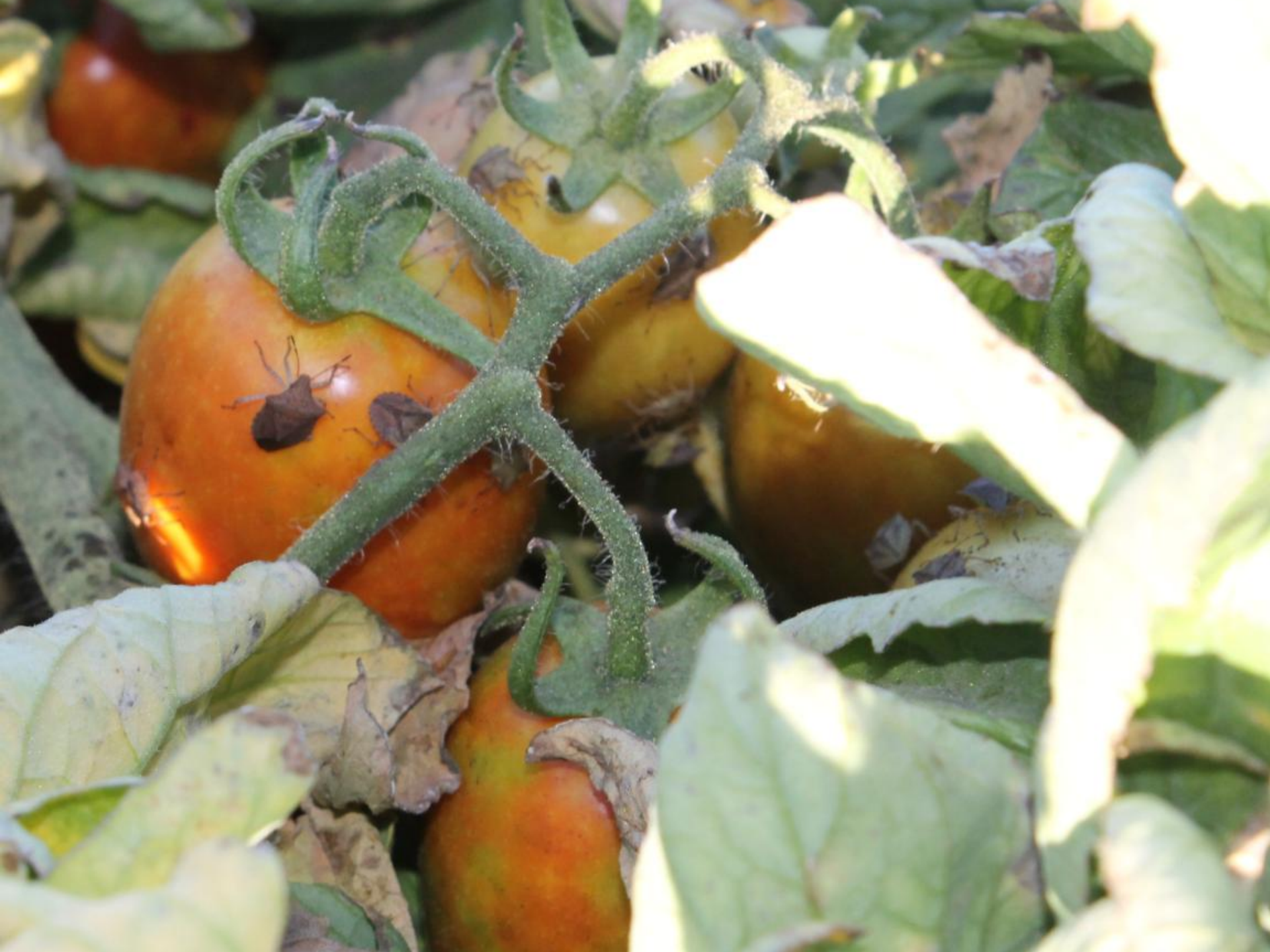

All Stink Bugs Identified During this Project were Consperse Stink Bug

Photos by E. Hannon 2014

Objectives:

- Overwintering site identification and evaluate seasonal population development
- Pheromone trap evaluation
- Insecticide comparisons and program evaluation

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Insecticide Trials (Efficacy and Programs)

Insecticides with Activity against Stink Bug

> 80% control (adults and nymphs)	
Beta cyfluthrin	Baythroid
Permethrin	Ambush, Pounce and others
Lambda-cyhalothrin + thiamethoxam	Warrior II + Actara
Bifenthrin	Brigade, Bifenture, Capture, and others
Dimethoate	Dimethoate
Dinotefuron	Venom
> 60% control (adults and nymphs)	
Beta-cyfluthrin + imidacloprid	Leverage
Lambda-cyhalothrin	Warrior II
Thiamethoxam	Actara
Clothianidin	Belay
Methomyl	Lannate
< 50% control of adults and > 80% control of nymphs	
S-cypermethrin	Hero, Mustang Max

From Frank Zalom (UC Davis Entomology)

Insecticides Selected for 2014 Trials

IRAC #*	Trade name	Common name
1A	Lannate	methomyl
1B	Dibrom 8E	naled
1B	dimethoate	dimethoate
2B	Thionex	endosulfan
3A	Danitol	fenpopathrin
3A	Warrior II	lambda-cyhalothrin
3A + 4A	Endigo ZCX	lambda-cyhalothrin + thiamethoxam
3A + 4A	Leverage	imidicloprid + cyfluthrin
3A + 28	Voliam Xpress	lambda-cyhalothrin + chlorantraniliprole
4A	Venom	dinotefuran
21A	Torac	tolfenpyrad
28	Coragen	chlorantraniliprole

* IRAC# mode of action as assigned by the Insecticide Resistance Action Committee

Efficacy Trial Details

Belay 4 oz + Warrior II 1.92 oz
Danitol 10.67 oz
Dibrom 8E 1.0 pts
Dibrom 8E 1.0 pts **TRAP***
Dimethoate 1 pt
Endigo CX 4.5 fl oz
Endigo ZCX 4.5 fl oz
Lannate SP 1 lb Asana 9.6 fl oz
Leverage 2.7 3.75 oz
Leverage 2.7 3.75 oz **TRAP**
Thionex 1 1/3 qts
Torac 21.0 fl oz
Venom 70 SG 4 oz
Warrior II 1.92 oz
Untreated

H5608 planted 21 May; harvested 15-17 Sep

- All plots received an application on 8 and 29 Aug

* Treatments followed by **'TRAP'** were applied on 18 Jul after 1st capture.

** Asana was applied on 15 Aug in addition to the Lannate applications on 8 and 29 Aug,

Not all pesticides mentioned in this presentation are currently registered in tomatoes.

Carefully read all current labels before writing a pesticide recommendation

Stink bug efficacy, yield and quality

		Fruit quality (%)				
Treatment	yield (t/a)	reds	greens	sunburn	rot	stink bug
Venom 70 SG 4 oz	39.24	60.83	12.44	10.01	9.99	6.72
Leverage 2.7 3.75 oz trap	40.82	73.46	5.31	4.25	9.52	7.47
Thionex 1 1/3 qts	45.80	74.35	6.54	4.34	5.33	9.41
Leverage 2.7 3.75 oz	40.84	55.88	10.09	9.83	13.86	10.34
Danitol 10.67 oz	37.40	66.04	9.84	4.92	8.49	10.71
Belay 4 oz + Warrior II 1.92 oz	41.80	69.46	5.76	5.36	7.36	12.05
Endigo CX 4.5 fl oz	37.22	59.62	15.77	4.45	7.29	12.87
Torac 21.0 fl oz	41.09	50.05	7.78	13.06	10.66	18.44
Warrior II 1.92 oz	37.00	60.67	8.72	5.73	6.41	18.48
Lannate SP 1 lb Asana 9.6 fl oz	47.52	58.43	14.55	2.46	6.00	18.56
Dibrom 8E 1.0 pts trap1	45.75	46.33	10.55	11.54	10.69	20.89
Endigo ZCX 4.5 fl oz	41.79	57.33	7.84	4.94	8.47	21.44
Dibrom 8E 1.0 pts	37.70	53.13	8.12	2.79	9.26	26.70
Dimethoate 1 pt	40.84	47.82	6.60	11.83	6.62	27.13
Untreated	38.91	52.84	7.02	7.46	7.30	25.38
LSD (P=0.05)^{s}	8.440	15.935	7.305	8.425	6.346	12.357
CV (%)	14.33	18.89	56.04	85.95	52.37	52.64

Unless otherwise specified all applications were made on 8 and 29 Aug. Treatments followed by 'trap' were applied on 18 Jul after 1st capture. Asana was applied on 15 Aug in addition to the Lannate applications on 8 and 29 Aug, H5608 planted 21 May and harvested 15-17

Stink bug efficacy, yield and quality

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H5608 planted 21 May and harvested 15-17 Sep

Pre-Harvest Stink Bug Counts and Damage Evaluation

Stink bug efficacy, field evaluations

	Stink bug counts (per 4 ft)			Stink bug damage (0-10)		
Treatment	21-Aug	28-Aug	5-Sep	21-Aug	28-Aug	5-Sep
Venom 70 SG 4 oz	0.0	2.0	0.8	1.0	3.3	2.0
Leverage 2.7 3.75 oz trap	0.0	0.0	1.0	1.0	0.5	1.0
Thionex 1 1/3 qts	1.3	0.3	0.5	0.8	1.0	1.0
Leverage 2.7 3.75 oz	0.8	3.8	0.8	1.3	2.0	1.0
Danitol 10.67 oz	0.4	3.2	1.6	0.6	4.0	1.0
Belay 4 oz + Warrior II 1.92 oz[v]	1.5	0.5	1.3	1.5	1.5	1.0
Endigo CX 4.5 fl oz	0.5	3.0	3.3	1.0	2.0	2.0
Torac 21.0 fl oz	1.0	1.3	1.8	2.3	2.3	2.3
Warrior II 1.92 oz	0.8	1.3	1.0	1.5	1.5	1.0
Lannate SP 1 lb/Assana 9.6 fl oz	0.5	1.0	2.3	1.3	1.0	2.0
Dibrom 8E 1.0 pts trap	0.3	2.3	2.5	1.5	4.0	2.3
Endigo ZCX 4.5 fl oz	1.3	1.3	0.3	2.8	1.8	0.7
Dibrom 8E 1.0 pts	0.0	0.5	4.3	1.5	1.8	1.7
Dimethoate 1 pt	1.0	3.3	3.0	2.8	3.5	3.7
Untreated	1.3	0.5	4.0	4.5	2.8	3.3
LSD (P=0.05)[t]	NS[s]	3.05	3.23	1.93	2.24	1.39
CV (%)	149.46	133.74	120.69	80.74	71.74	55.45

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Leverage 2.7 3.75 oz trap	0.0	0.0	1.0	1.0	0.5	1.0
Thionex 1 1/3 qts	1.3	0.3	0.5	0.8	1.0	1.0
Leverage 2.7 3.75 oz	0.8	3.8	0.8	1.3	2.0	1.0
Danitol 10.67 oz	0.4	3.2	1.6	0.6	4.0	1.0
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Dimethoate 1 pt	1.0	3.3	3.0	2.8	3.5	3.7
Untreated	1.3	0.5	4.0	4.5	2.8	3.3
LSD (P=0.05)[t]	NS[s]	3.05	3.23	1.93	2.24	1.39
CV (%)	149.46	133.74	120.69	80.74	71.74	55.45

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Common name (example trade name)	Mode of action[1]	Selectivity[2] (affected groups)	General predators[3]	Parasites[3]	Honey bees[4]	Duration on natural enemies[5]
methomyl (Lannate)	1A	(insects, mites)	H	H	III	moderate
dimethoate	1B	(insects, mites)	H	H	I	long
esfenvalerate (Asana)	3A	(insect, mites)	M	H	I	moderate
beta-cyfluthrin (Baythroid)	3A	(insects, mites)	H	H	I	moderate
bifenthrin (Capture)	3A	(jnsects, mites)	H	H	I–III[9]	long
lambda-cyhalothrin (Warrior)	3A	(plant bugs, beetles, caterpillars)	H	H	I	moderate
permethrin (Pounce,)	3A	(insects, mites)	H	H	I	long
fenpropathrin (Danitol)	3A	(insects, mites)	H	H	I	—
zeta-cypermethrin (Mustang Max)	3A	(insects, mites)	M	M	I	moderate
thiamethoxam, systemic (Plantinum)	4A	(sucking insects)	—	M	I	moderate
dinotefuran (Venom)	4A	(sucking insects)	L	—	—	—
acetamiprid (Assail)	4A	(sucking insects)	—6	—	III	moderate
chlothianidin (Belay)	4A	Lygus bugs, aphids	L	L	IV	short
imidacloprid, systemic (Admire Pro)	4A	(sucking insects)	L	—	II	—
imidacloprid, foliar	4A	(sucking insects)	—	H	II	short -mod
thiamethoxam, foliar (Actara)	4A	(sucking insects)	M/H	M/H	I	moderate

Common name (example trade name)	Mode of action[1]	Selectivity[2] (affected groups)	General predators[3]	Parasites[3]	Honey bees[4]	Duration of impact to natural enemies[5]
spinetoram (Radiant)	5	(caterpillars, thrips, whiteflies, aphids, scales, leafminers)	M[10]	M/H	III	moderate[11]
emamectin benzoate (Proclaim)	6	(caterpillars)	—	—	III	—
Bacillus thuringiensis	11A	(caterpillars)	L	L	IV	short
abamectin (Agri-Mek)	6	(mites, leafminers)	L	M/H	II	moderate
pyriproxyfen (Knack)	7C	(aphids, whiteflies)	H[7]	L	IV	short
pymetrozine (Fulfill)	9B	(aphids)	L	L	III	short
flonicamid (Beleaf)	9C	(plant bugs, fleahopper, aphids)	L	L	IV	short
novaluron (Rimon)	15	(caterpillars)	L	—	I	short
buprofezin (Courier)	16	(sucking insects, beetles)	H[7]	L	IV	long
methoxyfenozide (Intrepid)	18	(caterpillars)	L	L	IV	none
indoxacarb (Avaunt)	22A	(caterpillars)	L	L	I	moderate
spiromesifen (Oberon)	23	(psyllids, mites, whiteflies)	—	—	—	—
spirotetramat (Movento)	23	(aphids, scale, psyllids, whiteflies)	L	L	—	short
chlorantraniliprole (Coragen)	28	(primarily caterpillars)	L	L/M	IV	short

Stink Bug Project 2014 Overview

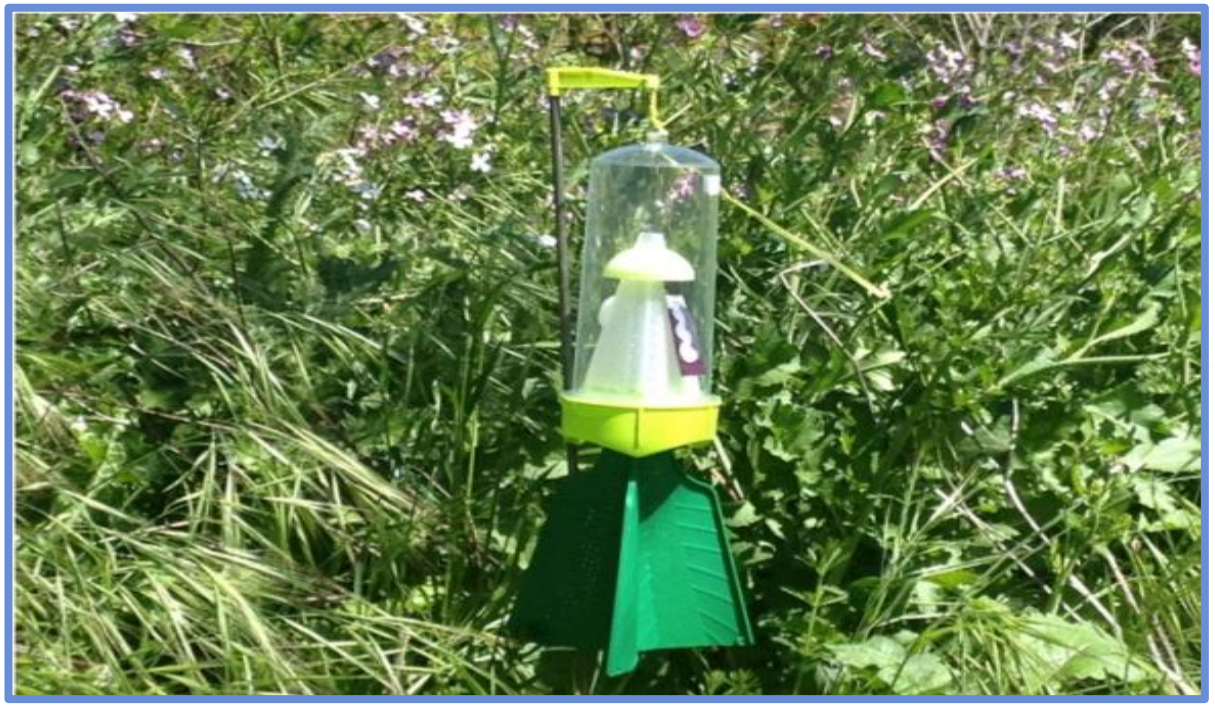
- Thionex, Venom, Leverage, Belay + Warrior II and Endigo reduced damage.
- With the exception of Thionex, the only materials with apparent activity were pyrethroids, neonicatinoids or a combination of the two.

Stink Bug Project 2014 Overview

- Overwintering sites: Located in Fall 2014 singly or in groups up to 16 in leaf litter near late season tomatoes.

Stink Bug Project 2014 Overview

- Pheromone baited traps captured stink bugs before they were detected in the canopy, but quantities in traps did not correspond to canopy densities or damage observed.

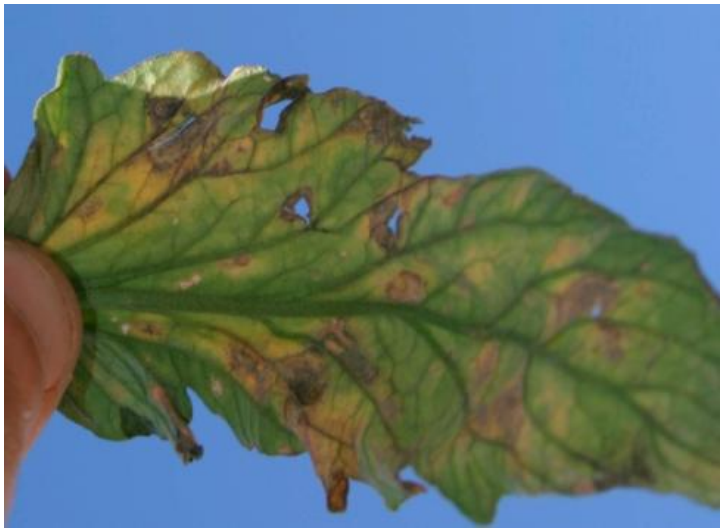


Acknowledgements

- CTRI
- Peter Goodell: UC IPM Kearney Ag Center
- Frank Zalom : UC Davis Entomology
- Les Ehler : Retired UC Davis
- Managers and PCA's of large scale ag operations in Fresno-area
- West Side Research and Extension Center

Tomato Powdery Mildew

Leveillula taurica
(Oidiopsis sicula)



2011

Treatments	Disease severity rating (0-10)[y]					
	30-Aug	7-Sep		14-Sep	
Quadris Top 8 fl oz	0.23	0.25	ab	0.18	e
Quintec at 4 floz	0.10	0.15	b	0.23	de
Priaxor 8 oz	0.10	0.25	ab	0.23	de
Torino SC 3.4 fl oz	0.13	0.23	ab	0.23	cde
Luna Sensation 7.6 fl oz	0.15	0.20	ab	0.25	cde
Priaxor 8 oz alt. w/ Vivando 15 fl oz + Silglow 0.05%	0.30	0.33	ab	0.35	bcde
Vivando 15 fl oz + Silglow 0.05 %	0.20	0.40	ab	0.53	bcde
Bravo Top 1.5 pt	0.33	0.53	ab	0.60	abcde
Mettle 8 oz	0.28	0.73	ab	0.90	abcd
Fontelis LEM SC 24 fl oz *without surfactant*	0.58	0.80	ab	0.93	abc
Bravo Top 2 pt	0.65	0.93	ab	1.00	abc
Bravo Top 1.5 pt *without surfactant*	0.53	0.58	ab	1.05	abc
Fontelis LEM SC 24 fl oz	0.85	1.08	ab	1.18	ab
Sonata ASO at 4 quarts	0.75	0.88	ab	1.38	a
Untreated Control	0.68	1.05	a	1.38	a

2012, Comparison of Conventional Fungicides

Treatments (24 Jul, 3 and 14 and 30 Aug)	**Disease severity rating (0-10)[y]**
	6 Sep
Quintec 12 fl oz	0.10
Quintec 6 fl oz	0.33
Quintec 4 fl oz	0.48
Fontelis 1.67SC 1.0 pt/acre (1,3) Quadris Top 8 fl oz + NIS 0.25% v/v (2,4)	0.75
Quadris Top 8 fl oz	1.03
Luna Sensation 5 fl oz	1.45
Torino 3.4 fl oz	1.50
Picoxy 2.08 SC 24 fl oz	1.55
Picoxy 2.08 SC 12 fl oz	1.63
BAS 700 04F 4.5 fl oz/acre + NIS 0.062%	2.08
Mettle at 8 fl oz	2.60
Priaxor 8 fl oz +NIS 0.062%	2.65
Mettle at 4 fl oz	2.70
Torino NO SURFACTANT	2.85
Mettle at 6 fl oz	2.88
Untreated Control	5.25
$LSD_{0.05}$[x]	1.31
CV (%)	49.30

Fungicide Comparison 2013

Treatments 25 Jul, 5, 16 and 30 Aug	**Disease severity rating (0-10)**[y]		
	14 Aug	3 Sep	13 Sep
Quintec 4 fl oz	0.78	1.53	3.70
Quintec 12 fl oz	0.73	1.48	3.78
Quintec 6 fl oz	0.75	0.85	4.03
Priaxor 6 fl oz	0.78	2.15	4.18
Priaxor 8 fl oz	0.38	1.95	4.20
Quadris Top 8 fl oz	0.38	1.38	4.50
Luna Sensation 4 fl oz + Sonata 2.0 qts (1), Sonata 3qts (2) Luna Sensation 4.0 oz+ Sonata 2.0 qts (3), Sonata 3 qts (4)[x]	0.75	1.98	4.55
A13703N 8 fl oz	0.43	1.88	4.58
Luna Sensation 5 fl oz (1,3)	0.80	1.70	4.65
A19334A 8.5 fl oz	1.00	2.03	4.71
Quadris Top 8 fl oz (1,3)	0.77	2.80	4.80
A19334A 13 fl oz	0.60	1.68	5.18
Fontelis 1.67SC 1.0 pt (1,3) Quadris Top 8 fl oz (2,4)	1.05	2.40	5.30
Quadris Top 8 fl oz (1), Taegro 5.2 oz (2), Quadris Top 8 fl oz + Taegro 5.2 oz (3), Taegro 5.2 oz (4)	0.73	2.75	5.33
Luna Sensation 5 fl oz (1), Sonata 3qts (2) Luna Sensation 4.0 oz+ Sonata 2.0 qts (3), Sonata 3 qts (4)	0.88	3.08	5.40
Vivando (BAS 56003) 15 fl oz	1.18	4.05	5.70
Gem 3 oz (1), Sonata 3 qts (2), Gem 2 oz+Sonata 2qts (3),Sonata 3qts (4)	1.00	3.23	5.93
Untreated Control	1.83	6.28	7.10
$LSD_{0.05}$[w]	0.408	1.053	1.395
CV (%)	34.98	30.96	20.20

2014

Treatments	Rating (0-10)	
	15 Aug	22 Aug
Luna Sensation 7 fl oz	2.05	0.53
Priaxor at 8 oz/A	2.40	1.50
Quadris Top 8 fl oz	1.38	1.58
A18126B 5.0 oz	2.75	1.65
Luna Sensation 7 fl oz (1) Sonata 2 qts (2)	1.68	2.00
A19334A 13.5 fl oz	2.45	2.08
Fontelis SC 1 pt (1), Quadris Top 8 fl oz (2)	3.55	2.28
Fontelis SC 1.5 pt (1), Quadris Top 8 fl oz (2)	3.35	2.30
Quadris Top 8 fl oz (1), Taegro 5.2 oz (2)	2.50	2.60
Vivando at 15 oz/A + Sylgard 309 6 oz/A	3.03	2.70
A19334A 10.5 fl oz	2.80	2.90
Quintec at 12 fl oz	3.63	3.40
Quintec at 6 fl oz	3.73	3.50
Quintec at 4 fl oz	2.88	3.60
Untreated	4.55	4.13
LSD (p=0.05)	1.561	1.084

Powdery mildew fungicides

- Sulfur dust (or wettable sulfur)
- Quadris Top (3 + 11)
- Quadris (11), Cabrio (11)
- Biofungicides (Sonata, Regalia, Taegro & others)
- Rally (3)
- Priaxor (7 + 11)
- Fontelis (7)
- Vivando (U8)
- Quintec (13)
- Luna Sensation (7 +11)
- Torino (U6) Not registered
- Mettle, Rhyme (3)

Acknowledgements

- California Tomato Research Institute (CTRI)
- Growers and PCAs in Fresno and Kings Co.
- West Side Research and Extension Center
- Brenna Aegerter: San Joaquin Co. Farm Advisor
- Michelle Le Strange: Kings/Tulare Farm Advisor
- Gene Miyao: Yolo Co. Farm Advisor
- Scott Stoddard: Madera/Merced Farm Advisor

Questions?

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