

Tomato Research Progress Report 2009

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Project Title: UCCE Statewide Processing Tomato Variety Evaluation Trials, 2009

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Summary:

UCCE farm advisors conducted seven mid-maturity tests in 2009, however only 5 locations were harvested. This year, there were no early maturity varieties submitted, a decision that was made by the processors because of a lack of suitable new entries. Seed companies submitted 16 replicated and 14 observation entries for the mid maturity trial. Spring weather was warm and dry across most locations, and all the trials with the exception of the late-planted Fresno location (Fresno #2) had no significant stand establishment problems because of weather or pests. Insect pest pressure was generally low this season, but some of the locations were impacted by high powdery mildew pressure again in 2009, similar to what occurred last year. The Stanislaus County and Merced County trials were accidentally harvested early and no yield data were measured, though fruit were sampled at Stanislaus for PTAB analysis. This year, all locations utilized transplants and drip irrigation.

The mid maturity observational trial yielded well in all locations except Fresno #2, where stand establishment difficulties, virus diseases, and powdery mildew reduced yields to 15 to 40 tons per acre. When test locations were combined, significant differences in yield were found between varieties, with N6385 (Nunhems), H 5508, H 5608, UG 19406 (United Genetics), and BQ 205 (Woodbridge Seeds) having statistically better overall yields as compared to the other entries. No differences were found between °Brix and color between varieties, which averaged 5.2% and 24.1, respectively. Fruit pH, which in general appears to be increasing over time across all varieties, ranged from 4.35 for UG 19406 to 4.56 for BOS 8800 and BQ 172. In the replicated mid-maturity trial, best yields occurred with H 8504, CXD 255 (Campbells), HM 7883 (Harris Moran), PX 650 (Seminis) and PX 002 (Seminis); HM 7883 also had greater Brix than many other varieties, at 5.3. Significant differences were also seen for color and pH. Similar to the observation trial, pH was elevated, averaging 4.46 (Tables 1 and 2).

The full report is available at <http://cemerced/ucdavis.edu>.

Acknowledgements:

Many thanks to CTRI and participating processors and seed companies for their continued support for this project. The cooperation from PTAB and support of the processors is also greatly appreciated. Many thanks to Gail Nishimoto for her help with the statistical analyses. And lastly, this project would not be possible without the many excellent grower cooperators who were involved with this project.

Table 3a. 2009 Processing tomato mid-maturity observational combined analysis.

Variety	Yield tons/acre (5 locations)		Brix % 6 loc	Color 6 loc	pH 6 loc
974 N 6385	58.5 (01)	A	5.2 (11)	24.0 (05)	4.43 (05)
986 5508	57.7 (02)	A B	4.7 (14)	24.0 (05)	4.39 (02)
987 5608* ¹	54.6 (03)	A B C	5.0 (13)	23.1 (01)	4.44 (06)
961 UG 19406* ¹	51.4 (04)	A B C D	5.3 (06)	24.3 (09)	4.35 (01)
984 BQ 205* ¹	49.9 (05)	A B C D E	5.2 (07)	24.7 (12)	4.41 (04)
989 N 6393	49.8 (06)	B C D E	5.2 (08)	24.3 (10)	4.46 (08)
985 DRI 0309	49.7 (07)	B C D E	5.2 (08)	24.2 (08)	4.41 (03)
990 N 6394	48.7 (08)	C D E F	5.3 (01)	24.5 (11)	4.48 (10)
982 BQ 163	46.3 (09)	C D E F	5.3 (01)	23.5 (03)	4.49 (11)
970 CXD 269	44.9 (10)	D E F	5.3 (01)	24.0 (05)	4.47 (09)
988 HT1059** ¹	44.1 (11)	D E F	5.0 (12)	23.7 (04)	4.50 (12)
960 UG 4305* ¹	42.6 (12)	E F	5.2 (10)	24.7 (12)	4.45 (07)
981 BOS 8800	41.5 (13)	E F	5.3 (05)	26.0 (14)	4.56 (13)
983 BQ 172* ¹	40.2 (14)	F	5.3 (04)	23.3 (02)	4.56 (14)
* Yield mean adjusted for 1 missing plot					
** Yield mean adjusted for 2 missing plots					
Stanislaus did not have yield data					
¹ Brix, Color, pH mean adjusted for 1 missing plot					
Mean	48.3		5.2	24.1	4.45
% C.V.	14.0		6.9	6.7	1.2
LSD @ 0.05			NS	NS	
Yield: to compare 974, 986, 989, 985, 990, 982, 970, 981 with each other (5 locations per mean)					
LSD @ 0.05	8.61				
Yield: to compare 974, 986, 989, 985, 990, 982, 970, 981 (5 locations per mean) with 987, 961, 984, 960, 983 (4 locations per mean)					
LSD @ 0.05	9.13				
Yield: to compare 974, 986, 989, 985, 990, 982, 970, 981 (5 locations per mean) with 988 (mean composed of 3 locations per mean)					
LSD @ 0.05	9.94				
Yield: to compare 987, 961, 984, 960, 983 (4 locations per mean) with each other					
LSD @ 0.05	9.63				
Yield: to compare 987, 961, 984, 960, 983 (4 locations per mean) with 988 (mean composed of 3 locations per mean)					
LSD @ 0.05	10.40				
pH: to compare 986, 985, 974, 989, 970, 990, 982, 981 (6 locations per mean) with each other					
LSD @ 0.05	0.063				
pH: to compare 986, 985, 974, 989, 970, 990, 982, 981 (6 locations per mean) with 961, 984, 987, 960, 988, 983 (5 locations per mean)					
LSD @ 0.05	0.066				
pH: to compare 961, 984, 987, 960, 988, 983 (5 locations per mean) with each other					
LSD @ 0.05	0.069				

Table 4a. 2009 Processing tomato mid-maturity replicated combined analysis.

Variety	Yield tons/acre 5 locations	Brix % 6 locations	Color 6 locations	pH 6 locations
972 H 8504	52.4 (01) A	5.0 (15)	23.5 (05)	4.38 (02)
969 CXD 255	52.3 (02) A B	5.1 (13)	24.0 (12)	4.45 (07)
978 HM 7883	51.3 (03) A B C	5.3 (04)	24.0 (13)	4.53 (15)
980 PX 650	51.1 (04) A B C D	5.2 (07)	24.9 (15)	4.49 (12)
979 PX 002	49.8 (05) A B C D E	5.1 (12)	23.3 (02)	4.46 (08)
966 H 4007	49.5 (06) B C D E	5.0 (14)	22.5 (01)	4.51 (13)
919 SUN 6366	48.5 (07) C D E F	5.3 (06)	23.7 (08)	4.51 (14)
973 HMX 7885 **	48.3 (08) D E F	5.1 (11)	23.8 (09)	4.56 (16)
971 AB3 (DRI0303)	47.9 (09) E F G	5.4 (02)	23.5 (06)	4.44 (05)
866 H 9780	47.9 (10) E F G	5.2 (08)	24.1 (14)	4.40 (03)
967 HM 6898	47.0 (11) E F G	5.5 (01)	23.3 (03)	4.38 (01)
868 AB 2	46.2 (12) F G	5.3 (05)	23.8 (10)	4.42 (04)
975 N 6390	45.2 (13) G	5.4 (02)	25.0 (16)	4.45 (06)
865 H 2601	41.7 (14) H	5.2 (09)	23.9 (11)	4.48 (11)
976 CXD 282 *	41.3 (15) H	4.9 (16)	23.4 (04)	4.47 (09)
977 HM 6903	34.1 (16) I	5.1 (10)	23.6 (07)	4.48 (10)
<i>* Missing 4 plots (Yolo)</i>				
<i>** Missing 1 plot (Yolo)</i>				
Mean	47.2	5.2	23.8	4.46
CV=	9.8	6.0	5.7	1.3
LSD @ 0.05=	2.88	0.18	0.77	0.033
To compare all varieties except 973 and 976 with each other				
LSD @ 0.05	2.88	0.18	0.77	0.033
To compare all varieties except 973 with 976				
LSD @ 0.05	3.06	0.19	0.81	0.035
To compare all varieties except 976 with 973				
LSD @ 0.05	2.92	0.18	0.78	0.033
To compare variety 976 with 973				
LSD @ 0.05	3.09	0.19	0.82	0.035
Variety X Location mean separation				
To compare all interaction means except Yolo 973 with each other (4 plots/mean)				
Variety X Location LSD 0.05	6.45	0.43	1.90	0.081
plots/mean)				
Variety X Location LSD 0.05	6.97	0.47	2.05	0.087

Fresh Market Tomato TSWV Variety Trial 2009

Scott Stoddard, UCCE Merced County
Brenna Aegerter, UCCE San Joaquin County

Objective: a field trial with commercial growers to evaluate the performance and horticultural qualities of fresh market tomato varieties (bush type, green pick for California round market) that have been bred for resistance to tomato spotted wilt. Disease resistance ratings will also be made if disease pressure is present.

As part of larger thrips monitoring project, yellow sticky cards can be placed around project area.

Sow date: May 1, 2009

Transplant date – Merced: June 23, 2009. Location: Live Oak Farms. Field south of LeGrand and Burchell Rds, near Le Grand.

Transplant date – San Joaquin: July 2, 2009. Location: Lagorial Farms. Kingsley Rd., S99 Frontage Rd., Baker Ranch.

Varieties:

1. BHN 856.
2. BHN 933
3. BHN 934
4. BHN 935
5. Harris Moran Trinity
6. Rogers Bobcat (STD)
7. Rogers Quali T-21 (STD)
8. Rogers Quali T-27
9. Rogers Quali T-47
10. Seminis PS 2935
11. Seminis PS 2942
12. Takii AT98a (only 35 plants per plot)
13. Takii AT98b (only 35 plants per plot)

Field plot layout: randomized complete block with 4 replications. Plots are about 50 plants each. Center 6 – 10 feet destructive harvest to estimate yield.

Results.

Yield results for Merced County are shown in Table 1, and fruit and vine characteristics are shown in Table 2. This field location had about 4 – 6% TSWV in the field and standard varieties. Rogers Quali T-47, Takii AT98b, Quali T-27, and BHN 934 all had statistically highest yields over 2500 boxes per acre. Fruit quality was superior with T-27 and T-47. Harris Moran's Trinity did not fare well at this location, probably because of the late plant date for this trial (Trinity does better as an early season variety).

Results for San Joaquin County are shown in Table 3. There was almost no TSWV at this location. The trial yielded less than Merced, and the varieties performed differently, though T-27 and Seminis PS 2942 yielded well at both locations. Trinity did better at this location than Merced, probably because of cooler temperatures. A comparison of the two locations is shown in Figure 1.

A fruit sample from each plot was gassed with ethylene and evaluated after one week for fruit ripening characteristics (Figure 2). Results were similar across all varieties at both locations.

Based on the results of these trials, some new TSWV varieties bred for the California fresh market tomato industry are agronomically equivalent or superior to current standards and should be considered when growing in areas where there is a potential for TSWV to occur.

Table 1. Fresh market tomato (round) TSWV variety trial yield and grade results. Merced County (Le Grand), 2009

Code Variety	Market Yield		M --- % Marketable Yield ---	L	XL	Total Yield		
	Tons/A	Boxes/A				Red %	culls %	small %
9 Rogers Quali T-47	35.8	2865	24.7%	46.0%	29.4%	0.0%	25.4%	21.5%
13 Takii AT98b	34.4	2751	18.6%	45.4%	36.1%	4.1%	39.1%	14.7%
8 Rogers Quali T-27	34.3	2743	28.1%	43.8%	28.2%	6.6%	34.2%	15.8%
3 BHN 934	32.6	2610	30.8%	42.5%	26.7%	0.7%	25.4%	22.9%
12 Takii AT98a	30.2	2416	27.9%	52.1%	20.0%	3.7%	16.2%	24.9%
11 Seminis PS 2942	29.8	2383	29.0%	47.9%	23.1%	0.0%	32.5%	27.8%
7 Rogers Quali T-2 (STD)	28.2	2257	35.9%	45.0%	19.1%	3.6%	13.9%	27.4%
4 BHN 935	27.4	2193	33.9%	42.1%	24.0%	12.2%	35.6%	30.0%
2 BHN 933	26.6	2130	36.9%	45.9%	17.3%	13.8%	20.1%	30.5%
6 Rogers Bobcat (STD)	25.6	2044	34.2%	44.3%	21.5%	4.1%	38.4%	27.4%
1 BHN 856	23.6	1891	29.5%	42.0%	28.5%	0.1%	42.9%	29.7%
10 Seminis PS 2935	21.7	1735	45.1%	44.4%	10.5%	1.0%	17.0%	43.5%
5 Harris Moran Trinity	18.3	1462	53.2%	33.9%	12.9%	0.3%	13.5%	49.9%
Average	28.3	2267.8	32.9%	44.2%	22.9%	3.9%	27.3%	28.2%
p-value		0.001	0.001	0.23	0.01	0.01	0.01	0.001
LSD 0.05		385	12.4	ns	10.8	7.7	16.9	8.2
CV, %		10.1	22.4	13.6	28	118	36.8	17.2

Market yield = XL + L + M size fruit, average of four replications. One box = 25 lbs.

XL, L, M% = weight of respective fruit sizes divided by marketable yield.

Red% = weight of all red fruit divided by total yield. Indicates relative maturity among tested varieties.

Culls, %: Any fruit so disfigured (due to rot, cat facing, insect damage, etc.) as to be unmarketable.

XL = 3 inches and larger in diameter

L = 2.5 to 3"

M = 2.25 to 2.5"

S = 2 to 2.25"

LSD 0.05 = least significant difference at the 95% probability level.

Means within the same column that differ by less than this amount are not significantly different.

NS = not significant at the 95% probability level.

CV = coefficient of variation, a measure of the variability in the experiment.

Table 2. Fresh market tomato fruit and vine characteristics. Merced County, 2009. TSWV resistant round varieties.

Var #	Variety	Vine Size	Leaf cover	Fruit shape	Roughness	Blossom end	Sunburn	Cat-facing	Zip-pers	disease rating	Comments
1	BHN 856	L	G	FG	S	SL	N	SL	N	4	deep red on mature fruit
2	BHN 933	L	G	G	S	T	N	N	N	7	powdery mildew severe
3	BHN 934	L	G	G	MR	T	N	S	N	2	deep shoulders
4	BHN 935	L	G	G	M	SL	N	N	N	3	shoulders
5	Harris Moran Trinity	VL	G	G	S	SL	N	N	N	1	large vine, small fruit
6	Rogers Bobcat (STD)	L	G	FG	M	SL	N	N	N	3	lg fruit, TSWV present
7	Rogers Quali T-21 (STD)	VL	VG	G	S	SL	N	N	N	3	TSWV present
8	Rogers Quali T-27	L	G	G-FG	S	SL	N	N	N	2	lg fruit
9	Rogers Quali T-47	L	G	G-FG	S	SL	N	SL	SL	2	lg fruit
10	Seminis PS 2935	L	G	G	S	T	N	N	N	2	medium fruit
11	Seminis PS 2942	L	G	G	S	SL	N	N	N	3	TSWV symptoms on some
12	Takii AT98a	L	G	G-DG	S	SL	N	N	SL	7	fruit cracking
13	Takii AT98b	L	G	DG	S	T	N	N	S	6	fruit cracks

Vine Size: M = medium ML = medium large L = large VL = very large
 Leaf Cover: P = poor OK = adequate G = good
 Leaf Roll: N = none SL = slight S = some
 Fruit Shape: DG = deep globe G = globe FG = flat globe
 Shoulder roughness: S = smooth M = medium MR = medium rough R = rough
 Blossom End: T = tight SL = slight scar M = medium size scar
 Sunburn: N = none SL = slight S = some
 Cat Facing: N = none SL = slight S = some
 Zippers: N = none SL = slight S = some

disease rating: Powdery mildew rating on vine, 0 - 10 score (0 = nothing)

Table 3. Fresh market tomato (round) TSWV variety trial yield and grade results. UCCE San Joaquin County (Stockton).

Variety	Total yield (tons/A)		Marketable (%)		Market yield (tons/a)		Fruit size			Notes
							% XL	% L	% M	
PS 2942 (Seminis)	54.3	a	35.5	abc	19.3	a	9.9	37.3	27.2	very good fruit size, fair leaf coverage, some rough shoulders
Bobcat (Syngenta)	46.9	ab	37.0	a	17.4	a	7.4	33.1	28.9	leaf coverage good, many stems sticking, smooth shoulders
Quali T-27 (Syngenta)	47.6	ab	36.7	a	17.4	a	14.9	40.0	22.0	good leaf coverage, some rough shoulders, zippers and growth cracks, fruit set spread out
BHN 935 (BHNSeed)	47.5	ab	36.1	ab	17.1	a	13.2	34.8	20.4	poor leaf coverage, foliage not holding up well, some rough shoulders, early maturing, fruit set spread out
Quali T-21 (Syngenta)	47.0	ab	34.3	abc	16.1	ab	10.2	34.7	26.7	good fruit size, some rough shoulders and stems sticking, later maturing
Trinity (Harris Moran)	45.1	abc	34.5	abc	15.8	abc	5.0	33.4	27.1	large vines, good leaf coverage, later maturing, some stems sticking
BHN 934 (BHNSeed)	46.0	ab	33.1	abcd	15.1	abc	13.1	36.8	16.0	poor leaf coverage, foliage not holding up well, fruit set spread out
Quali T-47 (Syngenta)	41.8	bcd	36.7	a	15.1	abc	14.1	38.3	21.3	good leaf coverage, some rough shoulders, very good fruit size
AT98b (American Takii)	36.5	bcde	32.1	abcd	12.2	bcd	11.0	27.9	26.2	good leaf coverage, good fruit size, many stems sticking
PS 2935 (Seminis)	37.7	bcde	30.8	bcd	11.6	bcd	3.5	29.0	27.6	large vines, good leaf coverage, smooth shoulders, stems sticking
AT98a (American Takii)	32.5	de	35.0	abc	11.3	cd	8.4	34.1	26.1	good leaf coverage, small fruit size
BHN 856 (BHNSeed)	34.0	cde	30.2	cd	10.2	d	6.6	33.4	20.1	poor leaf coverage, some rough shoulders, small fruit size
BHN 933 (BHNSeed)	28.3	e	28.7	d	8.1	d	3.0	30.2	22.0	poor leaf coverage, early maturing, small fruit size, fruit set not concentrated, stems sticking
Mean	41.9		33.9		14.4		9.3	34.1	24.0	
LSD 5%	11.8		5.5		4.8		NS	NS	NS	
P value	0.0045		0.057		0.0015		NS	NS	NS	
CV %	16.6		9.5		19.8		60.1	14.4	27.3	

Notes: Numbers represent the mean of 4 observations, means in the same column followed by the same letter are not statistically different. Bold lettering indicates standard commercial varieties included for comparison, all varieties except standards are resistant to tomato spotted wilt virus (TSWV). Some Verticillium wilt and powdery mildew uniformly throughout trial, TSWV pressure light, only seen in non-resistant varieties.

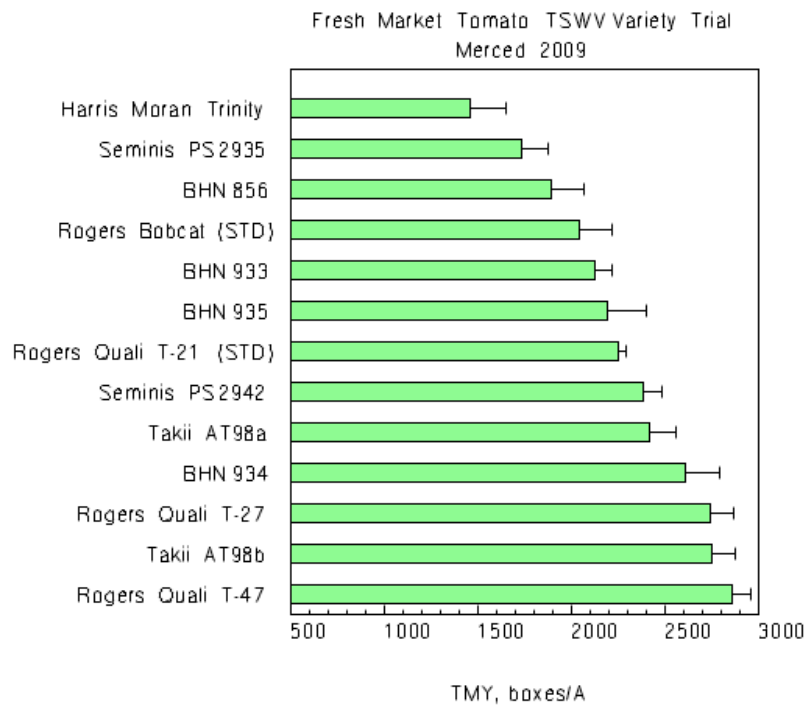
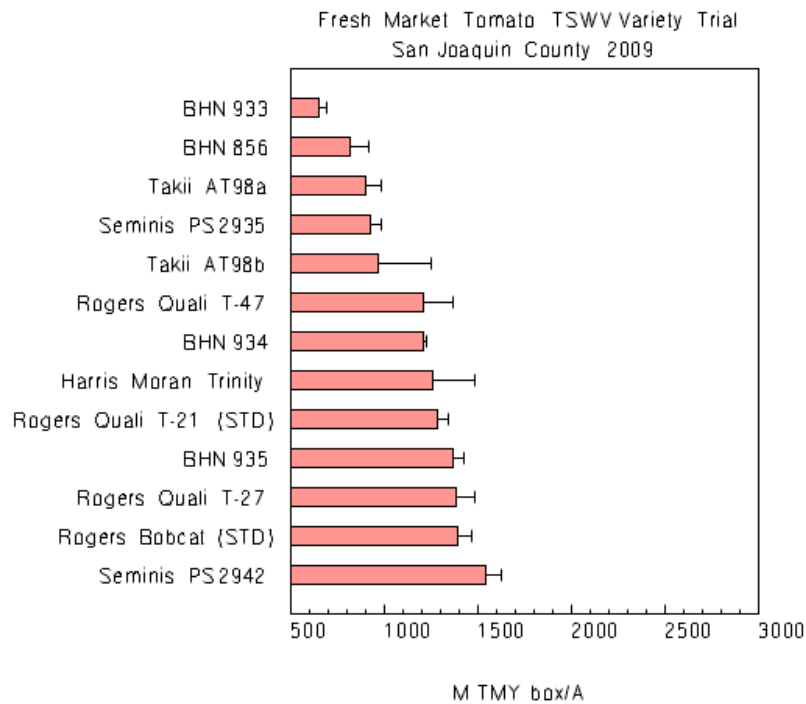


Figure 1. Total marketable yields for the 2009 TSWV resistant fresh market tomato variety trial for Stockton (above) and Merced (below).

Fruit Ripening 1 Week Post-Harvest

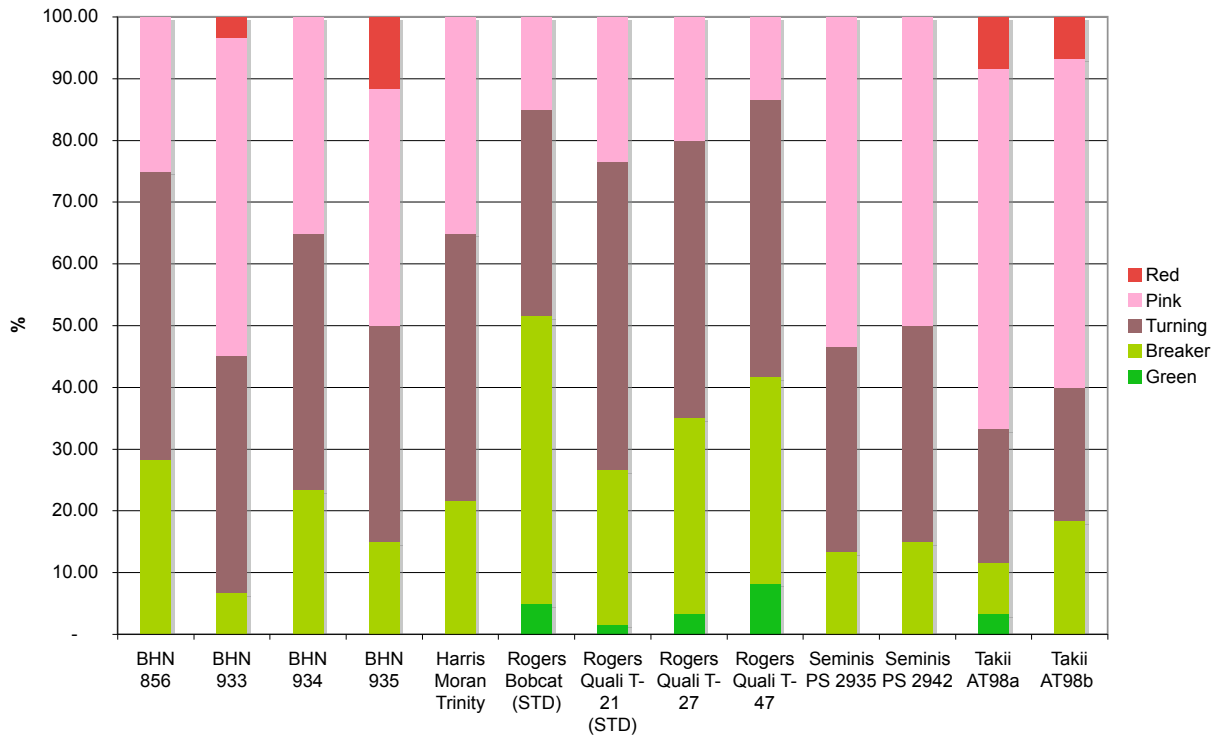


Figure 2. One box of fruit from each plot was gassed with ethylene (200 ppm) and then evaluated after one week to observe fruit ripening characteristics for each variety (Merced location).

Tomato worm control 2009
Research Project Summary Report
Scott Stoddard, UCCE Merced County

Objective: Evaluate efficacy of different insecticides and insecticide tank mix combinations for control of late season worm pests and fruit damage in fresh market tomatoes.

Location: Snyder Rd and Hwy 33, near Gustine, Merced County, CA
Cooperator: Jeff Dolan and Steve Thorpe (PCA), DiMare Tomato Company

Location: South of Burchell and LeGrand Rds, near Le Grand, Merced County.
Cooperator: Bob Giampaoli, Live Oak Farms

Treatments:

- 1 UTC
- 2 Rimon 12 fl oz/A
- 3 Rimon 12 fl oz + Proclaim 4.8 oz tank mix
- 4 Rimon 12 fl oz + Proclaim 4.8 oz sequential
- 5 Rimon 12 fl oz + Avaunt 3.5 oz sequential
- 6 Intrepid 4 oz/A
- 7 Coragen 5 oz/A
- 8 Proclaim 4.8 oz/A
- 9 Voliam Xpress 9.0 oz/A

RCB design, plots 1 bed x 50 ft x 6 reps, both locations

2 gallons water per treatment (50 gpa equivalent). Dynamic or Induce NIS used for all. Used 8004 nozzles at 30 psi, applied by hand.

Le Grand location: Treatments applied Aug 3 and 26, 2009.

Gustine location: treatments applied Aug 20, Sept 14, and Sept 28.

RESULTS AND DISCUSSION

These research trials were established in a commercial fresh market tomato fields near Le Grand and Gustine, CA, to evaluate the efficacy of various insecticides for control of late-season Lepidoptera pests. Insecticides included in the trial are low-risk and efficacy is limited mainly to worm pests. Treatments were designed to evaluate different materials as well as combinations of these materials. The fields were transplanted mid-July with a commercial round, semi-determinant variety typical for fresh market tomato production in this area. First insecticide application were made after field scouting indicated that egg laying and light worm activity was present. All treatments included a non-ionic surfactant, and were applied by hand using a CO₂ pressure sprayer at 30 psi and 50 gallons water per acre equivalent. Plots were first evaluated for worm control by counting live larvae that could be shaken from four plants onto a standard cafeteria tray. Plants were randomly chosen within each plot and shaken briskly for about 2 seconds. Subsequent insecticide applications were made to match grower practices based on PCA recommendations for the rest of the field. Very few worms could be found at either location after the first spray application, and in general worm pressure was light this year. The majority of worms in this trial were Beet armyworm, *Spodoptera exigua*, and to a lesser extent, cabbage looper, *Tricoplusia ni*.

Fruit damage from worm feeding was estimated by randomly picking 50 fruit from within the plot at crop maturity and scoring as either having or not having a hole or chewing marks made from worm feeding.

To reduce the heterogeneity of sample variance, worm sampling data were transformed using the square-root transformation [$\sqrt{(x + 0.5)}$] before performing the analysis of variance. These are shown in the “corrected” columns of Tables 1 & 2. Least significant differences were made at the 95% confidence level using Fisher’s Protected LSD method.

At one week after application, worm counts in the Rimon treatments were not significantly different than the untreated control unless it was tank-mixed with Proclaim (Figure 1). Eventually, all insecticide treatments dropped to very low levels, and all of the insecticide treatments significantly reduced fruit damage as compared to the untreated control at both locations (Tables 1 and 2). There were no significant differences seen between the insecticide treatments – all protected the fruit equally well at both locations. No phytotoxicity or changes to fruit sizing or quality were noted in the plots. While actual larvae counts were never high during this test, damage to fruit in the untreated plots averaged 6% - 12% (Figure 1), which represents a significant loss to the grower as any damage makes the tomato unable to be sold.

ACKNOWLEDGEMENTS. Much appreciation for the following individuals for their help and cooperation for this trial: Steve Thorpe, PCA; Jeff Dolan, DiMare Tomato; Bob Giampaoli and Mike Marchini, Live Oak Farms; Justin Cordoza, PCA; Henry Wu, Chemtura; Wayne Steel, DuPont; Josie Hugie, Syngenta; Andrew Ray, and Larry Burrow.

Table 1. Fresh market tomato worm control trial, Le Grand, CA, 2009.

plot name	10-Aug Worm count per 4 shakes	17-Aug	2-Sep	10-Aug Corrected	fruit damage %
1 UTC	10.0	1.7	2.3	3.00	12.0%
2 Rimon 12 fl oz/A	2.3	16.0	2.7	1.53	2.0%
3 Rimon 12 fl oz + Proclaim 4.8 oz tank mix	0.5	0.5	0.0	0.97	3.0%
4 Rimon 12 fl oz + Proclaim 4.8 oz sequential	6.7	4.0	1.3	2.35	3.3%
5 Rimon 12 fl oz + Avaunt 3.5 oz sequential	6.8	0.0	0.0	2.32	3.3%
6 Intrepid 4 oz/A	1.7	0.0	0.3	1.38	4.0%
7 Coragen 5 oz/A	1.0	0.0	0.0	1.01	1.3%
8 Proclaim 4.8 oz/A	2.7	0.0	0.0	1.70	1.3%
9 Voliam Xpress 9.0 oz/A	1.8	0.0	0.7	1.36	1.3%
Average	3.72	2.3	0.81	1.74	3.5
LSD 0.05	6.2	NS	NS	1.14	3.6
CV, %	143	305	197	57.10	88

Worm counts are from 4 randomly selected plants per plot.

Counts made 8/10 were corrected using the square root transformation to reduce variability.

Insecticide applications: Aug 3 and again on Aug 26.

Fruit damage estimates made at harvest on Sept 16 using 50 fruit per plot.

LSD = Least Significant Difference at the 95% confidence interval. NS = not significant.

Table 2. Fresh market tomato worm control trial, Gustine CA 2009.

plot name	27-Aug Worm count per 4 shakes	14-Sep	28-Sep	27-Aug Corrected	fruit damage %
1 UTC	36.3			5.24	6.0%
2 Rimon 12 fl oz/A	19.7			3.85	0.7%
3 Rimon 12 fl oz + Proclaim 4.8 oz tank mix	5.2			2.22	0.3%
4 Rimon 12 fl oz + Proclaim 4.8 oz sequential	22.7			4.40	0.0%
5 Rimon 12 fl oz + Avaunt 3.5 oz sequential	13.2			3.54	1.3%
6 Intrepid 4 oz/A	11.0			3.23	1.3%
7 Coragen 5 oz/A	9.7			2.93	0.0%
8 Proclaim 4.8 oz/A	7.2			2.54	0.7%
9 Voliam Xpress 9.0 oz/A	3.8			1.91	0.3%
Average	14.3	None detected		3.32	1.19
LSD 0.05	NS			2.09	2.01
CV, %	144.7			53.90	145.5

Worm counts are from 4 randomly selected plants per plot.

Counts made 8/27 were corrected using the square root transformation to reduce variability.

Insecticide applications: Aug 20, Sept 14, and again on Sept 28.

Fruit damage estimates made at harvest on Oct 12 using 50 fruit per plot.

LSD = Least Significant Difference at the 95% confidence interval. NS = not significant.

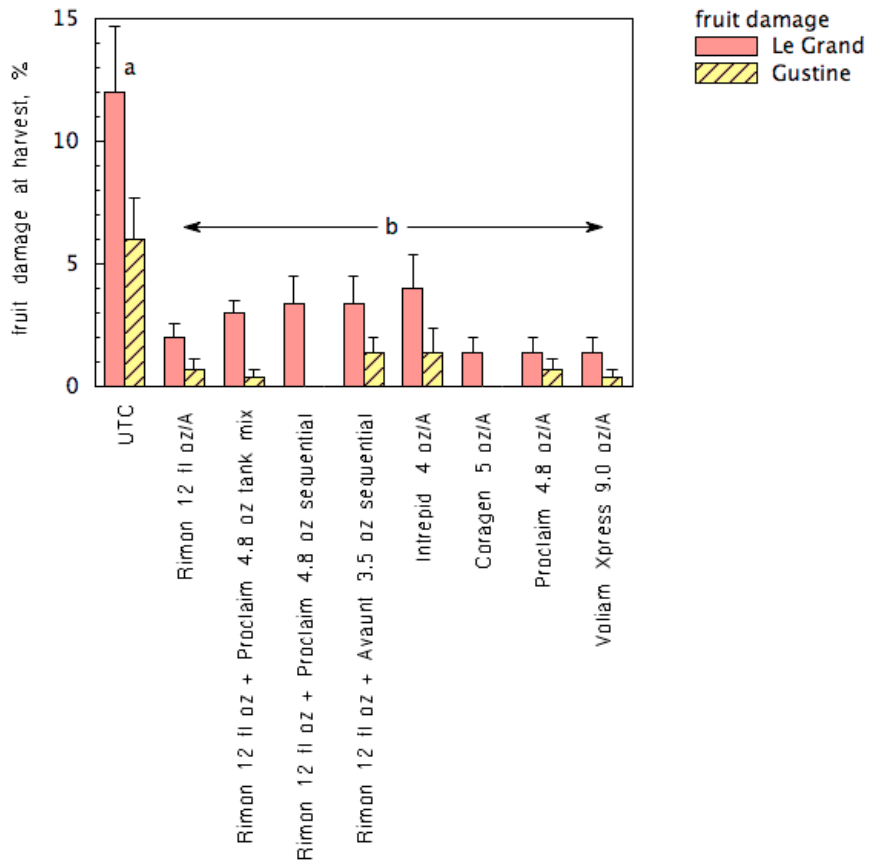
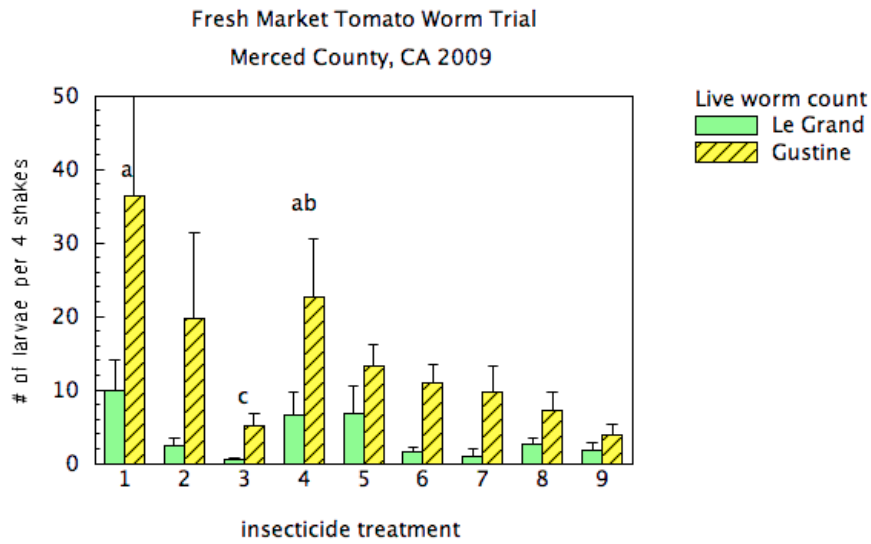


Figure 1. Tomato worm counts (top) and fruit damage (%) at harvest (bottom) as affected by insecticide treatment in Le Grand and Gustine. Significant differences occurred between the untreated (UTC) and treated plots, however, no insecticide worked significantly better than another in this test.

Comparison of fungicide programs for control of powdery mildew (*Leveillula taurica*) on processing and fresh market tomatoes.

Research project summary report 2009
Scott Stoddard, UCCE Merced and Madera Counties

An evaluation of fungicide programs for control of tomato powdery mildew was conducted in two locations in Merced County in 2009: near Dos Palos, on processing tomatoes (SUN 6368) as part of a multi-county trial funded by CTRI; and near Gustine, on fresh market tomatoes. Both locations were conducted in commercial fields; plot size was 1 bed by 50 feet long, with 4 – 6 replications. All fungicides were applied using a backpack sprayer at 30 psi with 8004 T-Jet nozzles and 60 gpa water equivalent. Adjuvants (NIS, Induce, Dynamic, Latron B-1956) were added at 0.25% v/v at all dates and treatments except the dusting sulfur. Dusting sulfur was applied by hand using a hand-held applicator.

Appendix 1 and 2 list the treatment protocols for each site.

The treatment protocol for the CTRI trial on processing tomatoes began on 24-Jun, 2009, prior to any onset of powdery mildew and treatments were made on a regimented weekly or bi-weekly schedule. The fresh market trial was established late in the season because disease severity was minimal in the processing trial. The fresh market location treatment protocol was based on grower application of fungicides. Disease incidence and severity ratings were made at various times through the season by randomly picking 10 leaves from each plot and rating according to the scale shown in Appendix 3.

Results for the processing tomato location are shown in Table 1. Despite being conducted with a susceptible variety and the weather station model indicating conducive conditions throughout the period of evaluation, there was very little powdery mildew infection at this site, with an average of only 27% incidence and no significant differences among treatments for either incidence or severity. Some slight phytotoxicity was noted from the spray treatments after the 4-Aug application.

Table 1. Powdery mildew fungicide trial on processing tomatoes (SUN 6368). Dos Palos, CA 2009

Treatment Program	Phyto 11-Aug	PM Infection. %		Severity (0 - 10 scale)	
		1-Sep	11-Sep	1-Sep	11-Sep
1 Preventative. Cabrio rotated with Rally on 7 day schedule, 10 apps	2.75	12.5%	20.0%	0.75	1.33
2 Spread out. Cabrio/Rally rotation on 14 day schedule, 5 apps	3.25	5.0%	15.0%	0.50	1.25
3 Late. Weekly Cabrio/Rally apps starting 7/28, 5 apps	4.00	7.5%	10.0%	0.75	0.75
4 Early. Weekly Cabrio/Rally apps starting 6/30, 5 apps	3.00	10.0%	30.0%	0.75	1.00
5 Sulfur dust, 50 lbs/A, 5 apps starting 6/30	0.00	15.0%	35.0%	1.00	1.13
6 UTC	0.00	5.0%	40.0%	0.50	1.75
7 BASF 560. Weekly applications starting 7/28, 5 apps	1.00	7.5%	30.0%	0.25	1.00
8 Sygenta Quadris Top 8 fl oz/A, starting 7/28, 5 apps	3.25	5.0%	35.0%	0.25	1.00
9 Regalia 1. Regalia 0.5% v/v + 2.5 oz Rally, 8 applications	0.25	7.5%	35.0%	0.75	1.29
10 Regalia 2. Regalia 0.5% v/v + 8 oz Cabrio, 8 applications	1.50	5.0%	20.0%	0.25	0.63
11 UC Model. Cabrio/Rally rotation based on weather data, 4 apps	2.00	2.5%	25.0%	0.25	1.17
Average	1.9	0.75	26.8%	0.54	1.12
LSD 0.05	1.1	NS	ND	NS	ND
CV, %	40.4	137		114	

See program schedule for rates and timings of fungicide applications.

Crop phytotoxicity scores rated using 0 - 10 scale, where 10 = extreme crop damage.

LSD 0.05 = Least significant difference at the 95% confidence level. NS = not significantly different.

CV = coefficient of variation.

ND = not determined because of lack of data.

Results for the second trial in Gustine on fresh market tomatoes are shown in Table 2. Powdery mildew incidence was 70% - 100% in all treatments by 28-Sept (Figure 1), though some of the treatments did significantly reduce measured incidence. However, there was no difference in disease severity among treatments. The percentage of sunburned fruit was significantly reduced for all fungicide treatments as compared to the untreated control, with lowest sunburn in the BASF 560 and Quadris Top programs (Table 2). The Regalia + half-rate of Cabrio treatment (#6) had reduced efficacy as compared to the others.

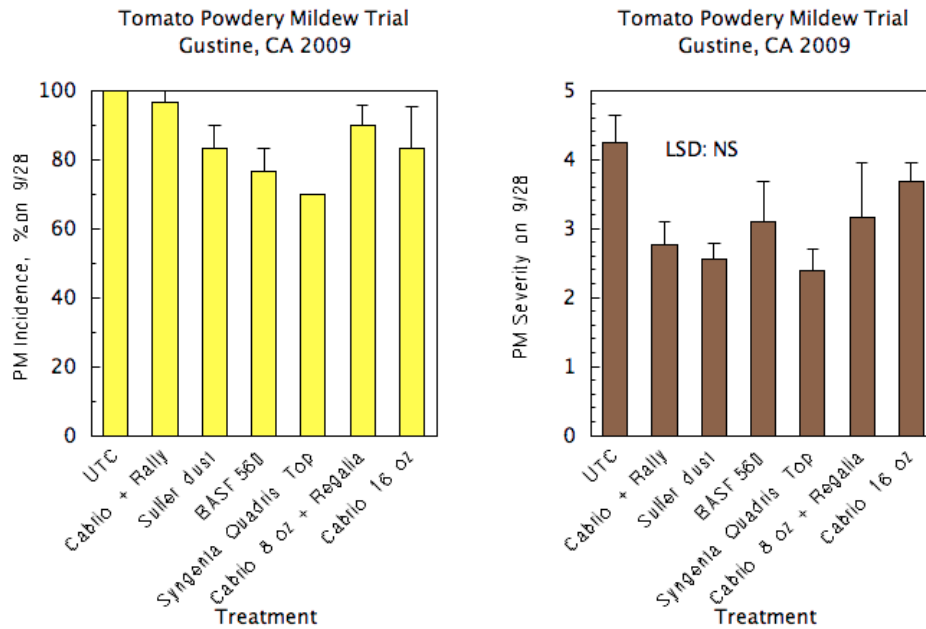


Figure 1. Powdery mildew disease incidence (left) and severity (right) at the Gustine trial location. Severity is based on a 0 – 10 scale, with higher values indicating greater disease severity.

Acknowledgements. This was a regional trial conducted with the help of fellow farm advisors Michelle LeStrange (Kings & Tulare), Tom Turini (Fresno), Brenna Aegerter (San Joaquin), and Gene Miyao (Yolo), with financial support from the California Tomato Research Institute. Many thanks to Dan Burns, San Juan Ranch; and Steve Thorpe and Jeff Dolan, DiMare, for help and cooperation with this test.

Table 2. Powdery mildew fungicide trial on fresh market tomatoes. Gustine, CA 2009

Treatment	Powdery Mildew Infection, %			Severity (0 - 10 scale)			Sunburn	
	3-Sep	11-Sep	28-Sep	3-Sep	11-Sep	28-Sep		12-Oct
1 UTC	90%	85%	100%	2.7	4.0	4.2	4.8	21.7% a
2 Cabrio 16 oz/A rotated with Rally 4 oz/A	78%	70%	97%	1.9	3.4	2.8	2.7	10.7% b c
3 Sulfer dust, 50 lbs/A	87%	---	83%	2.2	---	2.6	3.0	11.0% b c
4 BASF 560 1.5 fl oz/A	90%	---	77%	2.7	---	3.1	2.8	8.0% c
5 Syngenta Quadris Top 8 fl oz/A with Bravo Weather Stick 2.75 pints/A	87%	---	70%	2.3	---	2.4	2.2	9.3% b c
6 Cabrio 8 oz/A - Rally 4 oz/A rotation with Regalia 0.5% v/v	82%	---	90%	2.7	---	3.2	3.2	14.7% b
7 Cabrio only 16 oz/A	75%	---	83%	2.6	---	3.7	2.8	12.0% b c
Average	84.0	77.5	85.7	2.4	3.7	3.1	3.1	12.5
LSD 0.05	NS	NS	18.5	NS	NS	NS	1.0	5.9
CV, %	12.7	22.2	12.1	21.1	26.4	24.1	27.4	40.4

Fungicide applications made on 8/27, 9/14, and 9/28

Sunburn rating based on 50 fruit random sample from plots at time of harvest (Oct 12, 2009).

LSD 0.05 = Least significant difference at the 95% confidence level. NS = not significantly different.

CV = coefficient of variation.

Appendix 1.

Tomato powdery mildew 2009

Scott Stoddard, Farm Advisor
UC Cooperative Extension

Location: North of Dos Palos, end of Willis Rd and SJ River
Cooperator: Dan Burns, San Juan Ranch
Variety: SUN 6368
Transplant: 12-May-09
Weather Sta: First installed 6/3/09, but not operative until June 18. Removed Sept 11.
Early June weather very mild.

Spray Programs

		6th week 24-Jun	7th week 30-Jun	8th week 8-Jul	9th week 15-Jul	10th week 21-Jul	11th week 28-Jul	12th week 4-Aug	13th week 11-Aug	14th week 18-Aug	15th week 25-Aug	total # of sprays
1	Preventative	A	B	A	B	A	B	A	B	A	B	10
2	Spread out		A		B		A		B		A	5
3	Late app				---		A	B	A	B	A	5
4	Early app		A	B	A	B	A					5
5	S dust		C	C	C	C	C					5
6	UTC				---							0
7	BASF 560				---		560	560	560	560	560	5
8	Syngenta				---		Q	Q	B	Q	Q	5
9	Regalia 1			R	R	R+B	R+B	R+B	R+B	R+B	R+B	8
10	Regalia 2			R	A	R+A	R+A	R+A	R+A	R+A	R+A	8
11	UC Model	---	A, 6/29	---	B, 7/15	---	A, 7/30	---	---	B, 8/18	---	4

A = Cabrio 16 oz/A = 0.5% v/v R11
B = Rally, 4 oz/A + 0.5% v/v R11
C = Sulfur dust, 50 lbs/A
560 = BASF560 experimental fungicide 15oz/a + Dynamic adjuvent
Q = Syngenta Quadris Top 8 oz/A
B = Syngenta Bravo Weather Stick 2.75 pts/A
R1 = Regalia 0.5% v/v + 0.25% v/v Latron B-1956 spreader sticker + Rally 2.5 oz/A
R2 = Regalia 0.5% v/v + 0.25% v/v Latron B-1956 + Cabrio 8 oz/A

Plot size 2 beds x 50 ft, but only left bed is sprayed (other bed is buffer)
Reps 4
Volume 1.5 gals (65 gpa equivalent)
Pressure 30 psi
Boom 5 ft boom with 8004 and 8004 OC
Adjuvents R11 for Cabrio and Rally; nothing for sulfur; Latron B-1956 spreader-sticker for Regalia

Appendix 2.

Tomato powdery mildew 2009

Scott Stoddard, Farm Advisor
UC Cooperative Extension

Location: Gustine, Snyder and Hwy 33
Cooperator: DiMare (Steve Thorpe and Jeff Dolan)
Variety: fresh market round
Transplant: July 20, 2009
Weather Sta: none at this location

	Rep 1			Rep 2			Rep 3			Rep 4			Rep 5		Rep 6			
107				202		206		302	305	403	406			505	507	601	604	
104	105	106		204	205		306	307	304	401	407	405	504	502	501		602	606
101	102	103		201	207	203		303	301	402	404			503	506	607	605	603

TREATMENTS

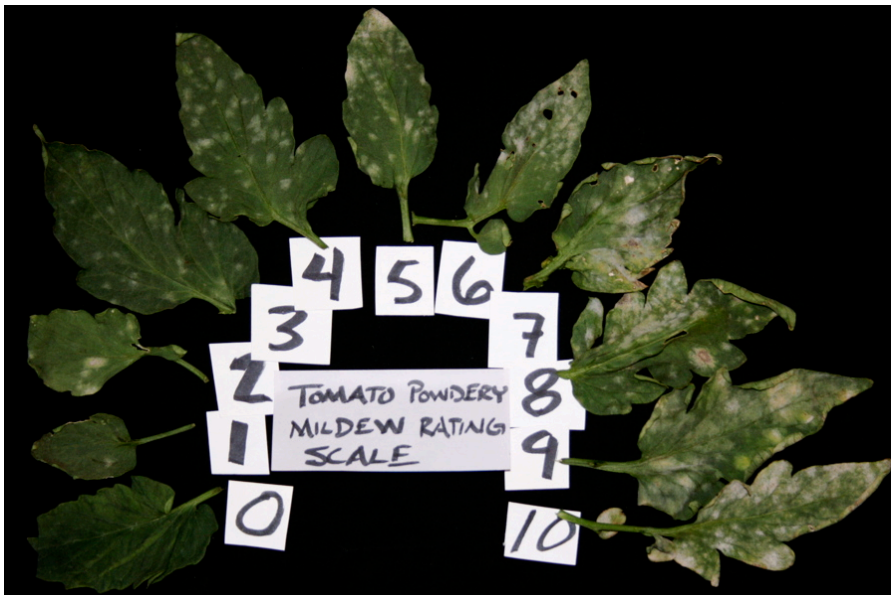
- 1 UTC
- 2 Cabrio 16 oz/A rotated with Rally 4 oz/A
- 3 Sulfur dust, 50 lbs/A
- 4 BASF 560 15 fl oz/A
- 5 Syngenta Quadris Top 8 fl oz/A with Bravo Weather Stick 2.75 pints/A
- 6 Cabrio 8 oz/A - Rally 4 oz/A rotation with Regalia 0.5% v/v
- 7 Cabrio only 16 oz/A

My plot rate:

- 0
15.6 g/3.9 g
1.7 lbs
15.5 ml
8.2 ml/45.4 ml
7.8 g/2.7 g + 19 ml
15.6 g

Plot Size: 1 bed x 50 ft x 6 reps
2 gals H₂O, 30 psi, 8004 nozzles 60 gpa equivalent
0.25% Induce added with each treatment, except sulfur
treatments overlay worm trial

1st app: Aug 27
2nd app: Sept 14
3rd app: Sept 28
final evaluation on 10/12/2009
Crop destruct for BASF plots on Oct 12.



Appendix 3. Tomato powdery mildew rating scale.

Year 2009 Research Project Report

CALIFORNIA TOMATO RESEARCH INSTITUTE, INC.

18650 E. Lone Tree Rd.

Escalon, CA 95320

209-838-9759

Project Title: Drip irrigated double- row tomatoes on 80-inch beds

Project Leader: Scott Stoddard,
Farm Advisor, Merced & Madera Counties

Co-investigators: Thomas A. Turini (Co-investigator)
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Summary:

This study was designed to provide information regarding costs of production, yield and quality, and optimal plant population of processing tomatoes under alternative drip/bed configurations. Main plot treatments included 1) standard 66-inch bed with buried drip tape and one row of transplants in the center of the bed; 2) 80-inch bed with one buried drip tape in the center of the bed and two rows of transplants on top of the bed; 3) 80-inch bed with two buried drip lines and two rows of transplants. Split-plot treatments were plant spacing: 5700, 7300, 8900, and 10,300 plants per acre. Challenges in 2009 were numerous: limited water availability which resulted in an entire treatment being dropped (#4: 80" bed, one drip tape, 125% of E.T.), poor stand establishment in some plots which required replanting, heavy powdery mildew and stink bug pressure, and a delayed hand harvest because of the unavailability of a harvester set up on 80-inch centers. Nonetheless, the trial provided good preliminary data on the potential of the 80-inch, double-row system. Yields were significantly greater with the 80" beds with 2 drip lines, while the highest plant spacing resulted in a significant reduction in yield.

Methods

Trial location was at the University of California West Side Research and Extension Center (WSREC), near Five Points, CA. Soil type is a Panoche clay loam, deep and well drained. Spring soil sampling indicated low levels of N and P, but sufficient K (Table 1). On April 24, 2009, the drip tape was installed into previous formed, clean beds at a depth of about 8". The drip tape used was Eurodrip, 5/8" 10 mil thickness with 12" emitter spacing. Double-line treatments had 0.16 gph emitters, while the single line treatments used 0.42 gph emitters. The use of different flow rates was to keep the total amount of water applied between treatments about the same.

On 6 May 2009, Sun 6368 processing tomato variety was hand transplanted on the Panoche clay loam soil. A randomized complete block split-plot design with four replications was used. High winds shortly after planting resulted in poor stand and missing plants were replaced on 11 May. As a result, actual plant spacing was less than target. Main plot treatment was bed size and drip tape configuration, sub-plot

treatment was plant spacing. Each main-plot treatment was 300 ft long by three beds wide and sub plot treatments were 75 feet long. All plots were irrigated with sprinklers for the first two weeks after transplanting, on May 6, 8, 11, 13, and 15 for a total of 4 inches/A water, prior to being drip irrigated. Treatments compared include the following:

1. Standard. 66" beds with a one drip tape at the center of the bed, single row of transplants.
2. 80" bed with single drip tape at the center of the bed, double row of transplants.
3. 80" bed with two lines of drip tape, double row of transplants.
4. 80" bed, single drip tape. The drip lines were installed for this treatment, but it was not planted due to lack of available irrigation water on station.

Irrigation scheduling was driven by Et. Water flow was monitored through the use of water meters over the course of the season. Nitrogen, from UAN32, was injected equally into the main plot treatments weekly from 22-June to 7-Aug to provide 190 – 250 lbs N/A.

Plant spacing (plants per acre):

1. 6000, actual 5748
2. 8000, actual 7315
3. 10000, actual 8933
4. 12000, actual 10262

Leaf and soil sampling was performed on June 24 and again on Aug 13. Pest management for weeds, powdery mildew, and stink bugs were performed by the WSREC station per standard management practices. Weeds were controlled using a pre-plant application of Roundup at 25 oz/acre on March 5, followed by Matrix herbicide at 2 oz/a on May 15 and 19. The entire plot area was sprayed for powdery mildew with wettable sulfur on June 30 followed by Quadris at 6 oz/A on July 30 and Rally 4 oz on Aug 17, but this disease was not adequately controlled and the field experienced nearly 100% desiccation by harvest. One application of Intrepid insecticide was made for worm control on July 30.

Harvest was performed on Sept 17 by cutting the middle 15 ft from each plot and weighing all red fruit. Hand harvest was required because a harvester capable of picking the 80" beds could not be found. Samples were taken at this time and submitted for PTAB analyses (Brix, color, pH).

Results

Plant stand measurements made three weeks post transplanting indicated that actual plant stand was less than the target, but nonetheless were spaced significantly apart. Due to plant stand establishment problems, the standard 66" beds had significantly less plants than the 80" beds when averaged across all plots (Table 3). There was a weak relationship between plants per acre and yield (Figure 1), however, there was no significant interaction between the 66" or 80" beds. Yields peaked between 8 – 9 thousand plants per acre regardless of bed configuration.

Leaf samples taken in mid-season showed little difference in nutrient status between main plot treatments (Table 2). This occurred even though the 66" beds received slightly more N through the drip tape (255 lbs N vs 190 lbs N/A).

Yield and PTAB results are shown in Table 3. When averaged across all plant populations, yields were highest in the 80"-two drip lines treatment at 41.8 tons per acre. When averaged across the bed/drip tape treatments, yields were highest at the 10,000 target (8,610 actual) plants per acre at 38.3 tons per acre (Figure 2). The plant spacing by bed/drip tape interaction was not significant. Color and fruit pH were not significantly impacted by any of the treatments, but the soluble solids were reduced in the 80"-two drip lines treatment.

Water use was similar for all three bed/drip configurations, ranging from 20.4 for the 80"-two drip lines to 23 inches per acre for the 66" standard bed configuration for the growing season.

While the 80"-two drip lines treatment had the best yields, this treatment also had the greatest expense with increased costs for drip tape and transplants. An economic analysis is planned pending additional research into this system.

Acknowledgements:

Many thanks to the California Tomato Research Institute, Inc., for financial assistance for this trial, and to the help and hard work of the WSREC staff.

Table 1. Spring soil sample results.

SAMPLE #	DESC	SP %	pH	EC dS/m	Ca (SP) meq/L	Mg (SP) meq/L	Na (SP) meq/L	Cl (SP) meq/L	NO3-N ppm	Olsen-P ppm	X-K ppm	SAR
1	66", 0 - 12	45	7.8	1.34	5.77	2.03	5.72	2.89	8.38	2.9	297	4.10
2	66", 12 - 24	42	7.8	1.09	4.51	1.68	4.45	2.46	6.18	1.5	198	3.58
3	80", 0 - 12	43	7.7	1.17	4.38	1.64	5.32	2.28	8.53	2.3	278	4.34
4	80", 12 - 24	44	7.8	0.97	3.75	1.43	4.17	1.95	4.96	1.1	183	3.66

SP, % = saturation percentage, grams of water required to saturate 100 grams of soil, is a measure of soil texture. Values between 35 - 50 usually indicate a loam soil with about 1.5" water holding capacity per 12".
 EC = electrical conductivity, a measure of soil salinity.
 SAR = sodium absorption ratio

Table 2. Leaf sample results from June and August indicate similar nutrient status for all treatments.

Treatment	N %	P %	K %	S ppm	B ppm	Ca %	Mg %	Zn ppm	Mn ppm	Fe ppm	Cu ppm
June 24, 2009 sample date											
1 66" bed, one drip line	4.86	0.30	2.66	21250	77.6	4.57	1.07	43.6	64.6	706.0	36.5
2 80" bed, one drip line	4.62	0.28	2.51	21350	79.7	4.69	1.09	45.9	68.8	879.5	36.4
3 80" bed, two drip lines	4.78	0.29	2.62	21100	78.4	4.37	1.01	44.1	64.6	972.5	36.7
Aug 18, 2009 sample date											
1 66" bed, one drip line	3.10	0.27	1.56					32.8	75.7	775.8	37.8
2 80" bed, one drip line	3.14	0.25	1.57					31.3	80.0	965.3	37.2
3 80" bed, two drip lines	2.98	0.25	1.53					31.1	79.7	924.0	35.5

All nutrients analyzed as total amount in leaf tissue.

Table 3. Year 2009 processing tomato yield and fruit quality as affected by treatments.

TREATMENT		Actual plants	yield	color	solids	pH
main	split	#/acre	tons/acre		%	
Main Plot: drip/bed configuration						
1	66", one drip line	7,516	31.208	27.3	4.38	4.50
2	80", one drip line	8,357	34.831	26.9	4.62	4.50
3	80", two drip lines	8,322	41.824	26.5	4.21	4.52
LSD 0.05		487	5.659	NS	0.34	NS
split plot: plants per acre						
	1 6,000	6,080	35.559	27.3	4.62	4.49
	2 8,000	7,405	36.429	26.4	4.36	4.51
	3 10,000	8,610	38.254	26.9	4.26	4.51
	4 12,000	10,166	33.576	26.8	4.37	4.51
LSD 0.05		877	3.787	NS	NS	NS
Main plot X split plot interaction		NS	NS	NS	NS	NS
Average		8,065	35.864	26.9	4.4	4.51
CV, %		13	12.6	4.8	8.08	1.15

LSD 0.05 = Least significant difference at the 95% confidence level. NS = not significant. CV = coefficient of variation.

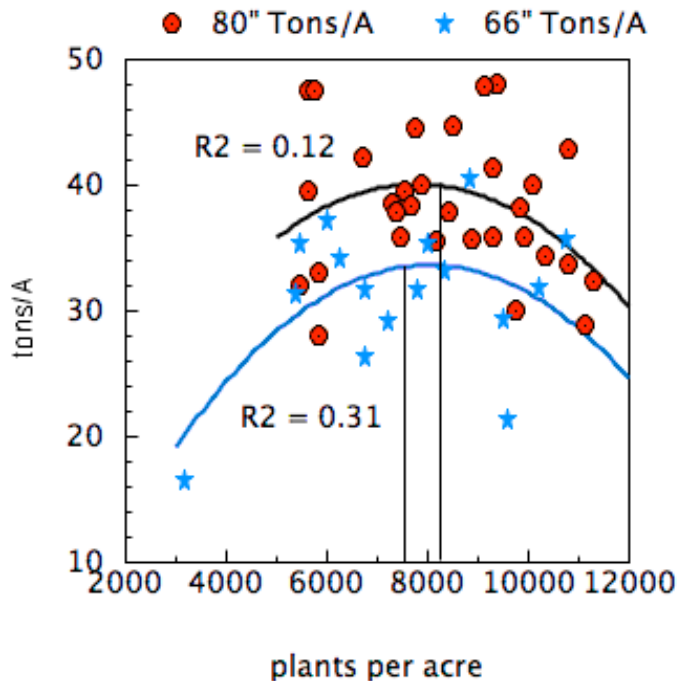


Figure 1. Processing tomato regression curve showing yield response to plant population for the 80" and 66" beds. While the regression coefficients are weak, yields were greater in the 80" beds at slightly higher plant populations.

80" Double-row Tomatoes 2009

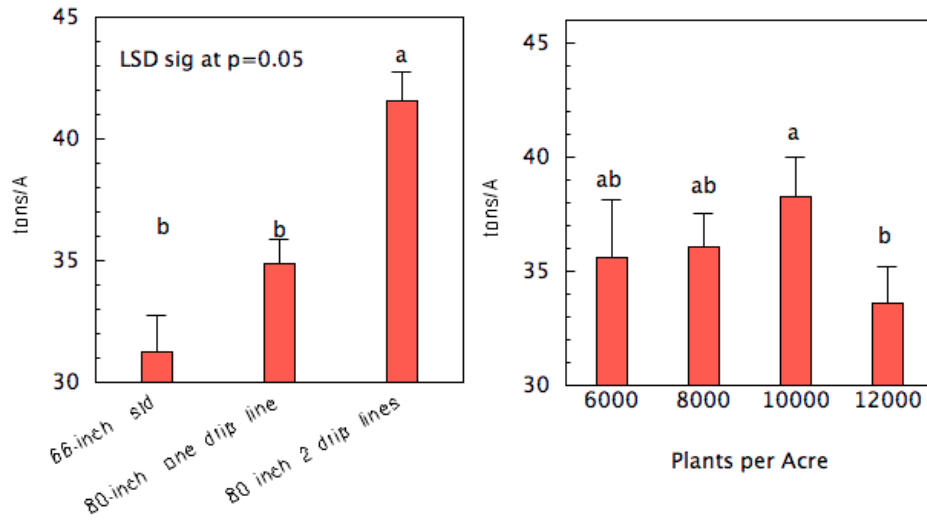


Figure 2. Processing tomato yields for the main effects of bed/drip line configuration and plant spacing, WSREC 2009.

Year 2009 Research Project Report

CALIFORNIA TOMATO RESEARCH INSTITUTE, INC.

Western Flower Thrips Abundance and Incidence of Tomato Spotted Wilt in Processing Tomato Fields in the Central Valley of California (2009)

Principal investigator: Robert L. Gilbertson
Department of Plant Pathology, University of California, Davis

Cooperating personnel: Ozgur Batuman, Postdoctoral Researcher, UC Davis
Michelle LeStrange, Farm Adviser, Kings County
Tom Turini, Farm Adviser, Fresno County
Scott Stoddard, Farm Adviser, Merced County
Gene Miyao, Farm Adviser, Yolo County
Diane E. Ullman, Department of Entomology, UC Davis

Summary

The goal of this project is improved understanding of thrips population dynamics and *Tomato spotted wilt virus* (TSWV) incidence in processing tomatoes in Central California, and development an IPM strategy for TSWV. Population densities of western flower thrips (WFT; *Frankliniella occidentalis*) and TSWV incidence were monitored in processing tomato transplant-producing greenhouses and associated fields in the Central Valley of California for a third year in 2009. Thrips were monitored with yellow sticky cards and in tomato flowers, whereas as TSWV incidence was assessed visually or with sensitive indicator plants. Similar to 2007 and 2008 results, tomato transplants had low thrips populations and no detectable TSWV infection. Monitoring of representative direct-seeded and transplanted tomato fields (including those established with monitored transplants) in Fresno, Kings and Merced Counties revealed that thrips populations in 2009 were similar to those detected in 2008, which were higher than populations detected in 2007. For all three years, thrips populations began to increase in April, peaked in May and gradually declined with low thrips populations detected in September (Figure 1). TSWV was first detected in mid-March in Yolo and Colusa, early April in Merced whereas in Fresno and Kings Counties, it did not appear until late April to early May. Eventually, TSWV was detected in most monitored fields, but at relatively low incidences (0-8%) up through harvest (Figure 2). For example, TSWV incidences in monitored tomato fields were 0-7% in Fresno and Kings Counties, 0-8% in Yolo and Colusa Counties and 0-4% in Merced County. Based on discussions with our farm advisor cooperators and growers, we believe that TSWV did not cause economic losses in any of the monitored fields.

Inoculum sources for thrips/TSWV vary depending on the county and agricultural production area. Thus, there is no single main source of the virus throughout the state. Almond orchards had low thrips populations, and winter and spring weed surveys revealed very low TSWV infection (<0.1%). However, weeds can be significant inoculum sources if allowed to multiply in fallow fields. For example, in Fresno, high TSWV in sowthistle and prickly lettuce (up %7 infection) was correlated with TSWV outbreaks in nearby tomato fields (Table 1). In Fresno, lettuce fields had low thrips populations and low TSWV infection. In Merced, radicchio can be an important source of thrips and TSWV. However, the implementation of effective management practices was seamed to minimize the inoculum source. In Yolo County, thrips and TSWV were detected associated with winter planted fava beans and early TSWV outbreaks in tomato were associated with fava bean.

Full text for this report is available on the CTRI website. www.tomatonet.org

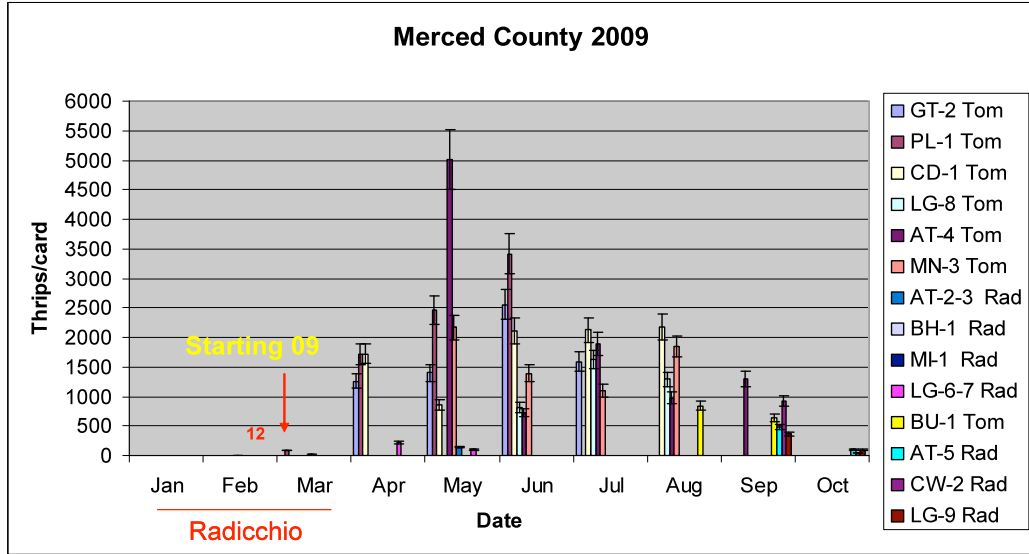


Figure 1. Average thrips counts on yellow sticky cards in Merced County in 2009. Beginning of monitoring shown with red arrow and red number represent average thrips population at indicated date.

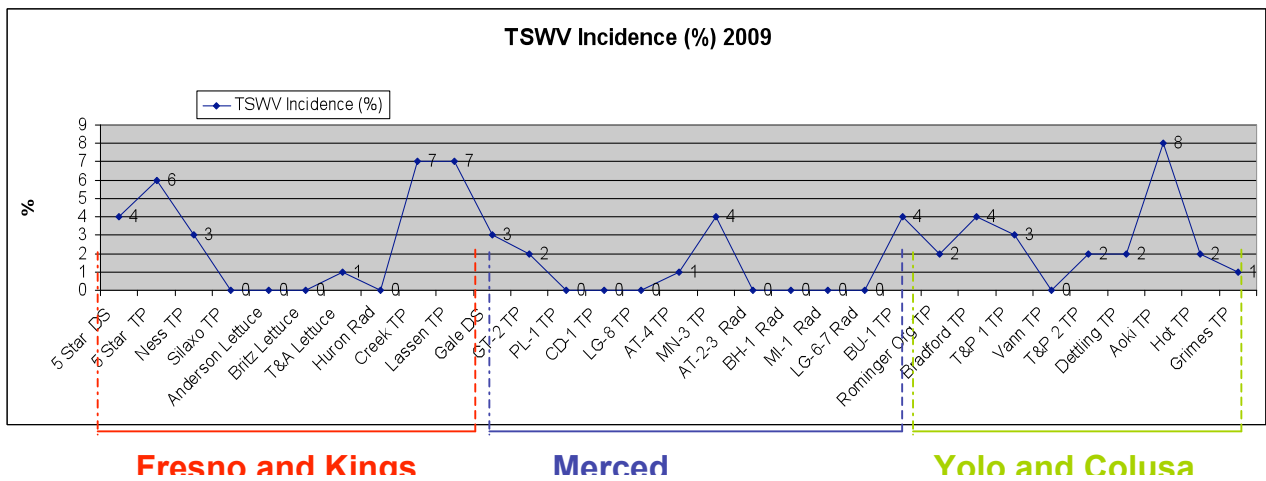


Figure 2. Percent of TSWV incidences in monitored fields in 2009.

Table 1. Weed survey results for TSWV incidence during 2008-09.

Weed	Tested (+)	Weed	Tested (+)
Barnyard grass	27 (0)	Lambs quarters	64 (0)
Black nightshade^{ab}	36 (2)	Malva^a	114 (1)
Bindweed^{abc}	37 (3)	Mustard	62 (0)
Bur clover	25 (0)	Nettle	25 (0)
Common sunflower	28 (0)	Pigweed	27 (0)
Dodder	25 (0)	Prickly lettuce^{abc}	96 (3)
Fiddle neck	26 (0)	Purslane	25 (0)
Ground cherry^a	25 (1)	Russian thistle	35 (0)
Groundsel^a	40 (1)	Sowthistle^{abc}	74 (4)
Jimsonweed	25 (0)	Tree tobacco	25 (0)

(+) number of plants tested positive for TSWV by Immunostrips and RT-PCR. ^{abc}, Merced, Yolo/Colusa, and Fresno/Kings Counties, respectively

Bindweed herbicide trial in processing tomatoes 2009

Scott Stoddard, UCCE Merced

Location: A-Bar Ranch, Los Banos

1st spray date (PPI): 5/26 & 5/27/09

2nd spray date (post): 6/22/09. Mid-bloom. Plants covering beds

no surfactant for PPI treatments

R11 surfactant for post treatments

40 ml per 2 gals

PPI treatments incorporated with sprinkler irrigation

Post treatments made over the top of tomatoes

2 gals per treatment, 8004 nozzles, 30 psi

plot size: 2 beds x 50 ft

Subjective weed and crop phyto observations on 0 - 10 scale

Treatments	June 3, 2009, evaluation			June 30, 2009, evaluation			29-Sep-09
	Bindweed	Crop Phyto	Other	Bindweed	Crop Phyto	Other	Bindweed
	0 - 10 scale (0 = nothing, 10 = 100% weeds or phyto)						
1 UTC	1.50	0	0	1.50	0.00	0.75	3.75
2 Sandea PPI 1 oz/A	0.75	0	0	0.50	0.00	0.00	0.25
3 Matrix PPI 2 oz/A	1.00	0	0	1.75	0.00	0.75	2.50
4 Sandea 1 oz + Matrix 2 oz/A PPI	0.75	0	0	1.00	0.00	0.00	1.75
5 Chateau PPI 2 oz/A	0.75	0	0	0.00	0.00	0.00	0.50
6 Matrix 2 oz/A + R11 post	1.00	0	0	1.25	0.75	0.00	2.25
7 Sandea + Matrix + R11 post	1.25	0	0	0.75	4.50	0.00	1.00
8 Matrix PPI + Matrix post	1.00	0	0	1.50	0.75	0.00	0.25
9 Sandea & Matrix PPI and post	1.25	0	0	1.00	5.25	0.00	0.75
# Chateau 2 oz/A PPI + Sandea + Matrix post	did not evaluate			0.75	4.25	0.00	0.75
Average	1.03	0.00	0.00	1.00	1.55	0.15	1.38
p value	0.99	---	---	0.86	0.001	---	0.08
LSD 0.05	ns	---	---	ns	0.9	---	ns
CV, %	143	---	---	155	40	---	118

Conclusions. Due to the high variability in this trial, no treatment showed any significant reduction of bindweed as compared to the untreated control. While some crop phytotoxicity was seen following the post emergence applications of Sandea, the tomato plants completely recovered.

