Developing Integrated Pest Management (IPM) Tools
For Managing Thrips and TSWV in Pepper

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Introduction.

The trial included four (4) treatments using a combination of insecticide applications and three (3) bell pepper varietals. In addition, a subset of replicated plots included 21 pepper varieties with varying degrees of resistance to *Tomato spotted wilt virus* (TSWV).

Table 1. Treatments used in thrips management trial.

Treatment code	Treatment
1	Control: no treatment
2	Treat at transplant (Cyazypyr) only
3	Treat at transplant, followed by 3 Radiant applications
4	Grower's -no insecticide to control insects other than thrips

Insecticide application schedule.

Four treatments were carried out in this trial. The first sprays (treatments 2 and 3) took place just prior to transplant (May 24, 2013). Plants were sprayed with the equivalent 13.5 fl oz/acre of Cyazypyr (Verimark) in trays one hour before planting the field. The control and grower's treatments (numbers 1 and 4) were not sprayed prior to planting.

Spinetoram (Radiant) applications were applied on June 6, 14, and 21 to plots for treatment number 3. The spray solution was the equivalent rate of 10 fl oz/acre. Adjuvant (Dyna-mic) was also added to each spray solution.

Results

Thrips populations invading the pepper plots were low early in the season but eventually increased in numbers (Fig. 1). Thrips numbers peaked in the summer months then steadily declined. Although seasonal dynamics of thrips were significant, the data also show that thrips were present season-long in the area. Since no incidence of TSWV was observed or detected in the plants, it appears that most of the thrips invading the field were non-virulent. At harvest,

we evaluated the thrips numbers by using wash and beat-cup sampling methods; however, the thrips numbers were still very low on pepper plants.

In addition, testing three leaf samples per plot at 2 occasions did not reveal the presence of any of the three common viruses in the area TSWV (tomato spotted wilt virus), CMV (cucumber mosaic virus), or INSV (impatiens necrotic spot virus).

In the absence of TSWV, yield data from the treated plots only reflected varietal differences. Across treatments “Riata” significantly out-yielded both “UG 1112408“ and “Baron,” producing 3.21, 2.95, and 2.94 lbs/plant, respectively (Table 2).

Table 3 shows yield responses of 20 varieties to local conditions. No virus (TSWV, CMV, or INSV) indication was observed in these plots.

Several entries showed good production levels of 6 lbs/plant (RPP 28634, E20B.24971), while many others produced over 5 lbs/plant (Table 4)

TSWV did not appear in any of the plants used in three field projects. Disease was also light in the commercial portion of the field used for this years trials.

We would like to continue the study using a similar design so as to determine more clearly the how management approaches could reduce damage and losses from TSWV.

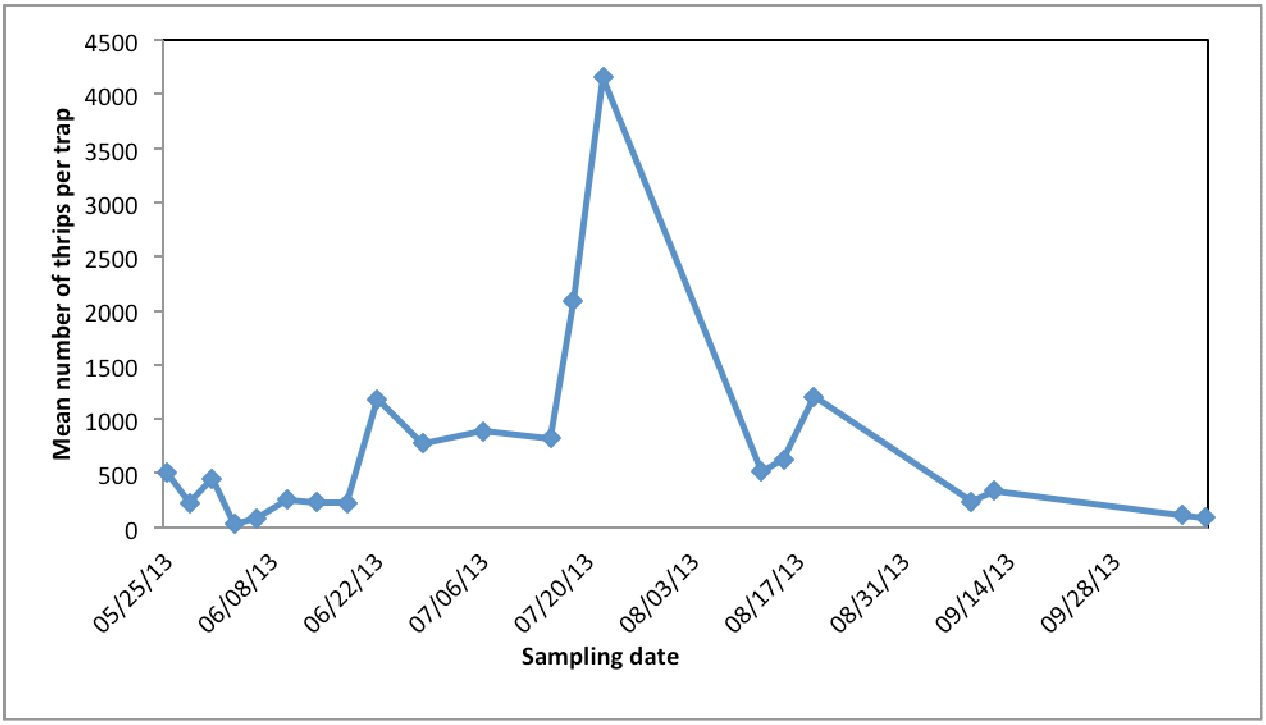

Figure 1. Seasonal dynamics of thrips in a pepper field in Gilroy. Thrips were collected using yellow sticky traps after 3-day exposures. Traps were deployed at tri-weekly intervals until harvest.

Table 2. Virus plots treated with insecticides: Treatment protocol

Treatment code	Treatment	Lb/plant	Tons/acre
2	Treat at transplant (Cyazypyr)	3.21	18.00
3	Treat at transplant + 3 Radiant applications	2.95	16.54
1	Control	2.94	16.44
4	Grower's	2.71	15.19
LSD (5%)		2.45	2.45

Table 3 Virus plots treated with insecticides: Fruit production in absence of virus

Var. code	Variety	Lbs/plant	T/a
19	Riata	3.31	18.54
15	UG 1112408	2.79	15.65
21	Baron (field variety)	2.75	15.43
LSD (5%)		0.43	2.38

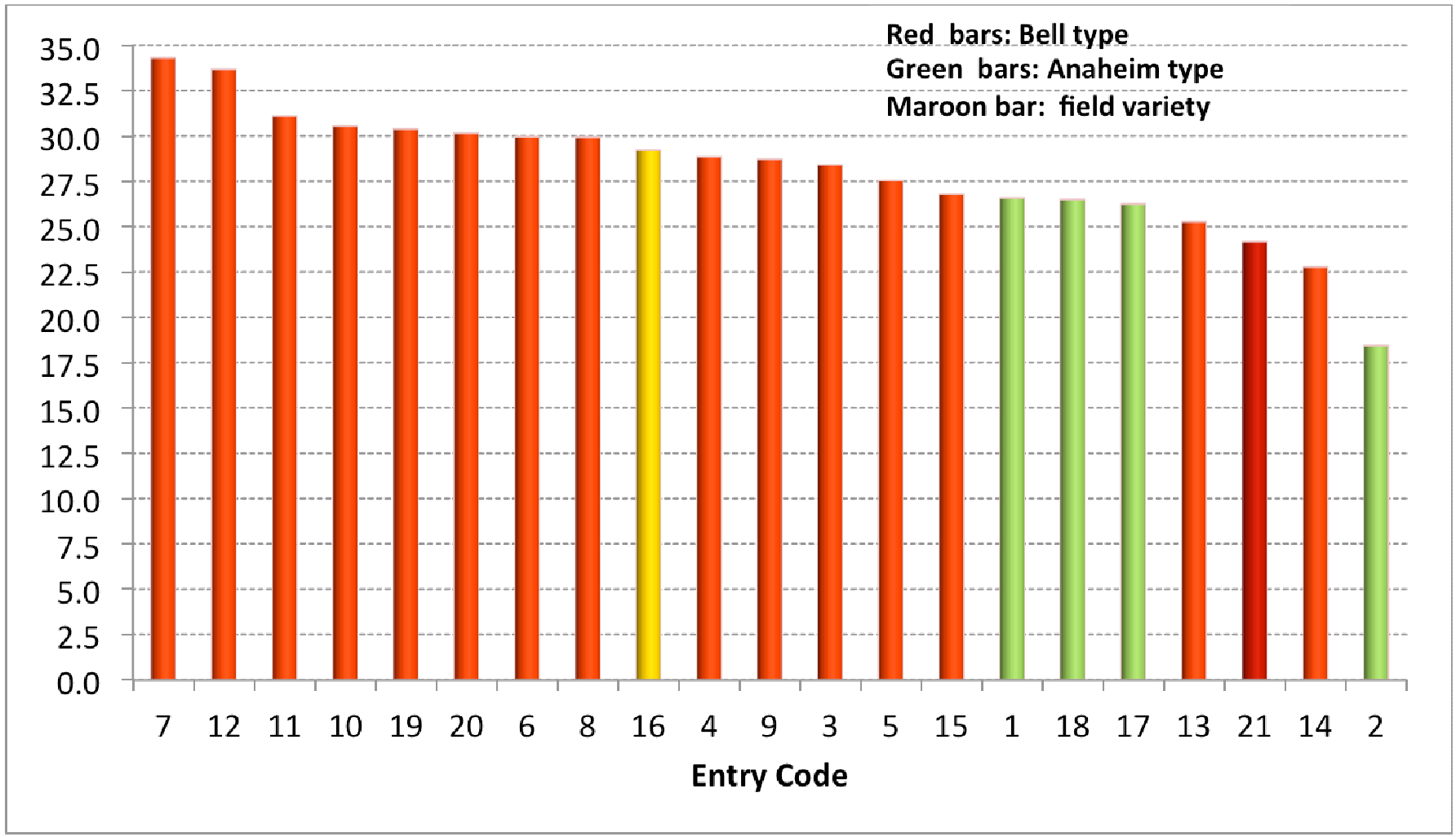
Red bars: Bell type
Green bars: Anaheim type
Maroon bar: field variety
35.0
32.5
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
7 12 11 10 19 20 6 8 16 4 9 3 5 15 1 18 17 13 21 14 2
Entry Code

Table 4. Yield characteristics of mixed pepper varieties: Gilroy, 2013

Code	Name	Lbs/plant		frt/plant	Tons/acre
7	RPP 28634	6.12	A	10.0	34.3
12	E20B.24971	6.01	A	8.9	33.7
11	Procraft	5.55	AB	8.6	31.1
10	RPP 33100	5.45	AB	7.5	30.5
20	PPX 1841	5.38	AB	8.5	30.2
6	RPP 28627	5.34	ABC	8.5	30.0
8	Bayonet	5.34	ABC	6.8	29.9
16	UG 113508	5.21	ABC	6.8	29.2
4	Red Victory	5.14	ABC	7.8	28.8
9	Cutlass	5.12	ABCD	6.6	28.7
3	Red Belt	5.07	ABCD	8.8	28.4
19	Riata	4.73	BCD	7.2	27.7
5	Rising Sun	4.91	BCD	7.2	27.5
15	UG 1112408	4.78	BCD	7.1	26.8
13	E20B.24972	4.51	BCD	7.1	25.3
21	Baron (field variety)	4.31	CDE	8.3	24.2
14	UG 111208	4.06	DE	5.3	22.8