

# California Pepper Commission

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**-2016-**

## **Chairman, California Pepper Commission**

***Glen Fischer, Saticoy Foods***

The California Pepper Commission focuses its efforts on improving the chemical, disease and pest issues that concern the pepper industry. The Commission met earlier this year with the purpose of discussing any current and future issues along with research projects that can improve the California pepper industry. Consisting of five producers, five processors and one public representative, these members are nominated by the industry to represent their interests on the Commission.

Our annual newsletter contains summaries of the research projects completed during the 2015-16 year. Each of these projects was considered by the Commission's Research Committee and then recommended to the Commission for approval. Most of our projects have been ongoing, focusing on the more practical issues of farming peppers, while some focus on more basic research that the Commission feels deserves attention. You can view these research reports plus more on the Pepper Commissions website [www.calpeppers.com](http://www.calpeppers.com).

This last year the Commission held a series of nomination meetings to allow interested producers an opportunity to serve a three year term. Processors/handlers are chosen by a recommendation from within the industry. Following the recent nomination meetings the elected members and alternates will be serving on the California Pepper Commission till 2019. With possible member and alternate changes within the Commission an election of officers takes place during the first meeting of the new serving term. Glen Fischer of Saticoy Foods was again elected to serve as Chairman while producer Mike Chuck was elected to serve as Vice Chairman. Bob Heisey was then chosen to serve as Research Committee Chairman.

The Commission worked with Valent and the Department of Pesticide Regulation on obtaining a Special Local Need (SLN) 24C on Chateau. Chateau is available to growers for a pre-transplanting application for weed control on mallow in the furrow bed. The Label can be found on the Valent website [www.valent.com](http://www.valent.com). Dual Magnum continues to be available as a 24C label from Syngenta through their website [www.farmassist.com](http://www.farmassist.com). Without the assistance of the Pepper Commission herbicides such as Chateau and Dual Magnum as well as the registered fungicide Rally would not be available to the industry.

You can also find a pepper-related pesticide list, which is provided to the industry by the California League of Food Processors at their website [www.clfp.com](http://www.clfp.com). You can sign in to view this list on the Pesticide Program page with the ID: **nathan@tabcomp.com** and password **nathan93618**.

For the past several years the Commission has been a member and active participant with the California Specialty Crops Council (CSCC). The CSCC provides the Commission the opportunity to work with similar groups to focus on research, education, and regulatory activities, which may affect California agriculture. By representing a variety of groups, the CSCC is well supported when communicating industry issues with state and federal agencies. The CSCC also acts as a conduit of information between its members and various entities. For more information you can visit the CSCC website at [www.specialtycrops.org](http://www.specialtycrops.org).

With the increasing demand for agricultural sustainability from the retailers, buyers and consumers, several commodity groups worked to put together a strategic plan growers and industry members can use to determine if their industry practices fall in line with the sustainability standards being set by those demanding them. Being a part of that process the pepper industry now has a strategic plan available on the Commission website or you can request a copy from the Commission office.

A new relationship has the Commission contributing to the Alliance for Food and Farming [www.foodandfarming.info](http://www.foodandfarming.info) to help support the safe fruits and veggies message of eat more produce. Using science based data safe fruits and veggies are educating the consumer on how conventional produce is just as safe as organic and how we should be consuming more. Consumers can visit the site [www.safefruitsandveggies.com](http://www.safefruitsandveggies.com).

The Commission continues its attempt at gathering production data to assist Western Growers in the process of filing for crop insurance on California peppers. Initial attempts at producing adequate data came up short. The Commission will continue using its industry contacts list to encourage producers to provide production data this next year.

Food Safety awareness continues to grow and groups such as the Center for Produce Safety [www.centerforproducesafety.org](http://www.centerforproducesafety.org) are leading the way with research to prevent or minimize produce safety vulnerabilities. The Commission agreed to contribute to this cause in order to become more involved and aware of the CPS activities.

UC Davis will be hosting this year's Solanaceae Conference. More information and registration can be found at the website [www.solgenomics2016.ucdavis.edu](http://www.solgenomics2016.ucdavis.edu).

Among Commission activities, the agricultural sustainability strategic plan, research reports and this newsletter can be found on the website [www.calpeppers.com](http://www.calpeppers.com). You will also find links to the SLN Labels for Chateau and dual magnum along with a link to the CLFP site.

## **Pepper Weed Control Studies 2015**

**Richard Smith, UCCE Monterey County**

Methods: Trial No. 1: was conducted in a commercial pepper production field near Soledad to evaluate weed control and safety on peppers. All materials were applied pretransplant to shaped beds on April 27 and the field was transplanted on the same day. Sprinkler irrigation applied within four hours after transplanting to set the plants and incorporate the herbicide treatments. Phytotoxicity and weed evaluations were made on three dates (Table 1). Harvest evaluations were conducted on October 5. Soil type was Pico fine sandy loam: pH = 7.35; organic matter = 1.49; sand = 60, silt = 26 and clay = 14%. The variety was 'Accura'. See table for evaluations and dates. Trial No. 2: was conducted in a commercial pepper production field near Gilroy. Pretransplant applications were made to shaped beds on April 28 and the field was transplanted on the same day. Sprinkler irrigation was applied within four hours after transplanting to set the plants and incorporate the pretransplant herbicide treatments. Only one phytotoxicity and weed rating was conducted on June 17 (the trial was terminated after this evaluation date). Soil type was Campbell silty clay loam and the variety was 'Baron. See table for evaluations and dates. Methods common to both plots: Each plot was one 40-inch bed wide by 10 feet long and replicated three times in a randomized complete block design. All treatments were applied with 2 passes of a one tip wand with an 8008EVS nozzle at 30 psi applying the equivalent of 55 GPA

Results: There was little phytotoxicity on the first evaluation date on May 12 (Table 1). Both Zidua and Zeus reduced the number of weeds in the plots on this evaluation as well; the higher rates of Zidua were also particularly effective. The Zidua treatments had little phytotoxicity on May 19 and 28, but the 1.33 lb a.i./A rate had significant phytotoxicity on June 16 (Table 2). The Gilroy trial had significant phytotoxicity on June 17 in the 0.07 and 1.33 lbs a.i./A treatments, and no further evaluations were made of this trial. Good weed control was seen in all herbicide treatments in comparison with the untreated control. There were no differences in yield among the treatments (Table 3). The results of these trials indicate that Zidua may have promise as an herbicide for transplanted peppers. More tests will need to be done to better understand the higher level of phytotoxicity that was observed at the Gilroy site. Presumably differences in soil characteristics may have been responsible for the observed differences.

## **Insect Pest Management on Peppers**

**John T. Trumble, and Greg Kund, UC Riverside**

Pepper field trials were conducted at the University of California South Coast Research and Extension Center (SCREC). The project included both a chemical screening trial and an IPM trial. The chemical screening and IPM trials were structured to identify new compounds that can potentially be used in a commercial IPM program. The IPM program was conducted using a large-scale commercial field design and was used to evaluate treatment rotations against a complex group of insects for efficacy. We also compared a standard rate of fertilizer with a low rate (50% of the standard rate) to determine if there were differences in yield and insect damage. Two separate fields were used to test six treatments in a randomized block design with standard or low rates of fertilizer.

The purpose was first to see if using half the rate would reduce insect pressure. Several studies have shown that insects grow faster on plants with high N. We asked the question, if N is reduced, would insect populations become less of a problem? The second purpose was to reduce potential for N runoff, which is a major concern for growers. As part of this study we also examined yield effects.

Chemical trials examined Radiant SC, and Sivanto SL. Radiant was applied on a weekly basis. Sivanto was applied three times.

The IPM trials examined two rotational treatments and a chemical standard. The first IPM treatment consisted of a rotation of Verimark 200 SC, Radiant SC and Closer SC. The other IPM treatment was comprised of Pyrellin EC, Trilogy, Mycotrol EC, and Entrust. A chemical standard treatment was Lannate 2.4 LV plus Pounce 3.2 EC. The materials used in the IPM trial were applied according to rotational strategies that would support a commercial grower operation. The first IPM treatment had Verimark applied once as a soil drench, with Radiant and Closer tank mixed and applied three times. The second IPM program had applications of Pyrellin combined with Trilogy and Mycotrol combined with Entrust for a total of six applications. The chemical standard of Lannate and Pounce was applied six times. The fruit from the chemical and IPM trials were harvested and assessed for insect damage. The assessment included damage from worms, pepper weevils, stink bugs, and potato psyllids.

Worm populations were moderate-high this field season. Pepper weevil numbers were moderate-high this season with the untreated control sustaining 18% damage. Several treatments reduced pepper weevil damage significantly. Whitefly and leafminer pressure were low in the chemical and IPM trials. We did see some differences between the treatments for psyllid (*Bactericera cockerelli*) numbers. Peppers treated with Lannate plus Pounce had higher psyllid numbers at harvest. These insecticides either stimulated the psyllids to oviposit or negatively affected beneficial populations, which help control the psyllids. The use of these types of materials, carbamates and pyrethroids, has been shown to actually increase populations of psyllids in the field in other locations. The fertilizer rates had no impact on the yield or amount of insect damage on the fruit. For a complete copy of the report contact the California Pepper Commission.

We continued to investigate the ecological and epidemiological relationships among solanaceous plants, plant pathogenic viruses, vectoring, and non-vectoring insects. We published a paper that shows how the presence of one pathogen in the field affects landing preferences of insects carrying the other pathogen: Prager, S. M., C. Wallis, and J.T. Trumble. 2015. *Indirect effects of one plant pathogen on the transmission of a second pathogen and the behavior of its potato psyllid vector. Environmental Entomology 1-11.*

## **Evaluation of the Effect of Foliar Applied Hormones to Abort Young Pepper Fruits (Naphthalene Acid)**

**Bill Wier**

The application of 0.11% naphthalene acid (NAA) three times during the growing season resulted in early abortion of small fruits compared to an untreated control. After a transplant date of April 22, 2015, the three applications of NAA were made on April 28, May 16 and June 5. The test was replicated four times.

Numbers of fruits were significantly reduced during the first and second harvests, showing that young peppers were aborted. The third harvest resulted in a larger number of fruits than the untreated control.

### Evaluation of Foliar Feeding of Peppers to Increase Yields

A mixture of Stollerusa products that contained nitrogen, potassium, calcium, boron, molybdenum and cytokine was applied as a foliar spray in 20 gallons of water per acre to established pepper plants. The rate was 1.0 pint per acre applied 24 days after transplanting and replicated four times in a randomized complete block statistical design. The treated plots yielded 5,230, 40 pound boxes of peppers compared to 5068 boxes in the untreated control. Similar experiments in other crops have consistently given positive yield responses.

### Evaluation of Materials to Cause Red Fruits to Ripen Evenly and Harvest More Easily (Ethephon and Abscisic Acid)

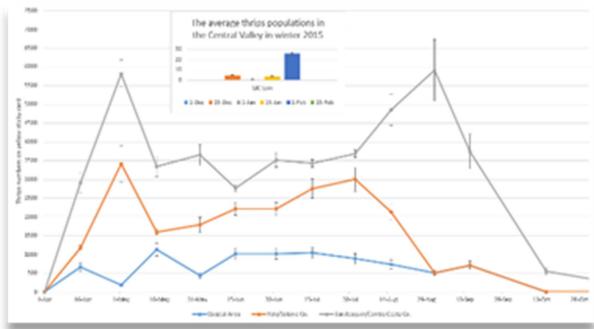
Abscisic Acid was applied as a foliar spray at the rate of 1.0 gms/liter to peppers that were beginning to turn red, on the 54th day after transplanting. Fruits were allowed to turn red and a subjective harvest and evaluation were made 20 days later on July 7. Abscisic Acid treated peppers separated cleanly between the fruit stem and main plant resulting in a full length stem attached to the fruit. Less effort was required to remove fruits from the plants than in the untreated control plots.

The addition of 0.1 pint per acre of ethephon applied on June 15, assisted in ripening fruit at approximately the same time perhaps aiding in the formation of an abscission layer in the stem.

### Monitoring of thrips & Tomato Spotted Wilt Virus (TSWV) in CA Peppers & the Development of a Regional IPM Strategy for Reducing the Incidence and Severity of TSWV

Robert L. Gilbertson, UC Davis

Thrips and *Tomato spotted wilt virus* (TSWV) incidence in pepper fields in the Central Valley (Yolo, Solano, San Joaquin and Contra Costa counties) and the coastal area (Santa Clara and San Benito counties) were again monitored in 2015. The overall goal is to better understand the dynamics of thrips and TSWV development in order to develop an IPM program.



**High Thrips populations precede appearance of TSWV and Lateplanted fields have highest TSWV incidence.** Relatively high populations of western flower thrips (*Frankliniella occidentalis*) were detected in pepper fields as soon as plants started growing (late-April, Fig.1). In 2015, TSWV was detected later, mid- to late May in the Central Valley and mid-June in coastal counties. TSWV was eventually detected in all 13 monitored fields, including those with TSWV-resistant pepper varieties (with the *Tsw* gene).

Figure 1. Average thrips counts per yellow sticky card in monitored fields in 2015.

Table 1. Pepper fields monitored in 2015: Locations, incidences of TSWV and other viruses, and TSWV Risk Index (TRI) values

Monitored Pepper Fields in 2015						
Fields	Yolo and Solano counties	TSWV %	TRI	Points *	Other Virus Incidences	
YO	Rafiki, Yolo Farm	early-planted TP	2	Moderate	129	<1% AMV and <1% BCTV
SI	Sutton Rd., Davis	early-planted DS	2	Moderate	125	<1% BCTV
PS	Pan School Rd., Davis	early-planted DS	2	High	169	<1% AMV and <1% BCTV
HS**	Hickson Rd., Davis	early-planted DS	1 (and 2)	Moderate	129	1% AMV and 1% BCTV
FR	Frank Rd., Davis	early-planted DS	2	Moderate	129	8% AMV and <1% BCTV
OD**	Old Davis Rd., Davis	early-planted DS	1 (and 2)	Moderate	149	2% AMV, 1% Phytoplasma and <1% BCTV
KV*	Kettleby Ave., Woodland	late-planted TP	<1	Low	72	1% AMV and 1% BCTV
San Joaquin and Contra Costa counties						
SE*	Seller Rd., Brentwood	early-planted TP	<1	Low	70	2% AMV and 1% BCTV
SA	Ara Rd., Stockton	early-planted TP	1	Low	95	1% AMV and 1% BCTV
RX	Raska Rd., Brentwood	late-planted TP	4	High	185	1% AMV and 1% BCTV
The coastal area						
H15	Sungliss Rd., Hollister	only-planted TP	1	Moderate	119	2% AMV, 1% Phytoplasma and 1% BCTV
E9	Eady Rd., Hollister	early-planted TP	2	Moderate	115	1% AMV, <1% Phytoplasma and <1% BCTV
MAK*	Marcella Rd., Geary	only-planted TP	4 (and 7)	High	365	1% AMV, <1% Phytoplasma and 1% BCTV

\*This field was planted with a TSWV-resistant variety  
 \*\*Part of this pepper field was kept for red pepper harvest and the final TSWV incidence is in parentheses.  
 \*Main values are calculated from factors listed in Table 3  
 TP= transplanted and DS= direct seeded peppers

Overall, TSWV incidences in early-planted monitored fields remained very low (<1-3%) through harvest, similar to 2013 and 2014. Incidences were higher (4-7%) in some late-planted fields monitored in 2015 (Table 1). The highest TSWV incidence in 2015 (7%) was observed in a late planted field kept for red peppers in Gilroy; this field also was planted adjacent to a processing tomato field that had TSWV symptoms (Table 1). It appears that the virus needs to build-up early to generate inoculum for late-planted fields; early thrips management may delay the appearance of TSWV.

**Weeds around pepper fields are not heavily infected with TSWV.** Most weeds collected before and during the pepper growing season were symptomless and tested negative for TSWV. A small number of weeds including rough-seeded buttercup, chickweed, sowthistle, nightshade and Malva were infected with TSWV (Table 2). Thus, weeds do not seem to be a major source of the virus.

Table 2. Results of survey of weeds and cover crops in Yolo/Solano and San Joaquin Counties and coastal areas for TSWV infection in 2015.

Weeds/Cover crops	Total tested (Number positive)	Weeds	Total tested (Number positive)
Dandelion	3 (0)	Nightshade	4 (1)
Picky Lettuce	7 (0)	Sowthistle	12 (1)
Burdock	9 (0)	Nettle	3 (0)
Fava Pea	16 (9)	Mustard	6 (0)
Chickweed	10 (1)	Groundsel	4 (0)
Knotweed	3 (0)	Cutleaf Geranium	2 (0)
Swine cress	5 (0)	Minor's Lettuce	7 (0)
London rocket	6 (0)	Hebar	4 (0)
Redmaids	4 (0)	Fiddleneck	3 (0)
Shepherd's purse	4 (0)	Person lambsick	6 (0)
Malva	18 (1)	Pineapple weed	4 (0)
Fulcrum	3 (0)	Chinese lantern	6 (0)
Rough seeded Buttercup	17 (1)	Pigweed	6 (0)
Lamb's quarters	5 (0)	Others	3 (0)
		<b>Total:</b>	<b>190 (14)</b>

Plants were tested for TSWV by immunosorbent and/or RT-PCR.

**Bridge crops can be sources of TSWV.** In coastal areas, four lettuce fields surveyed near monitored pepper fields had little (<1%) or no TSWV infection. A fava bean cover crop in a young almond orchard adjacent to a monitored direct-seeded pepper field in Solano County had high rates of TSWV infection (56%) (Table 2). Bridge crops can be a source of inoculum early in the season and should be avoided or monitored.

**Alfalfa mosaic virus (AMV) was the most common virus in peppers but did not seem to cause economic damage.** In 2014 and 2015, AMV was more common than TSWV in monitored pepper fields, with incidences as high as 40% early in the season (Table 1). However, later in the season, the shoots that developed from these initially infected plants did not

show symptoms and produced normal fruits. Thus, AMV does not seem to pose a major threat to peppers.

**Degree-day model allows prediction of when to commence spraying for thrips and the risk index allows growers to identify fields at risk for TSWV.** In 2015, our degree-day model predicted generations of adult thrips in peppers with ~80% accuracy. For all years, the appearance of second generation should trigger spraying for early planted pepper, whereas it is the third generation for late-planted fields. The TSWV risk index (TRI) for peppers assigns fields high, moderate and low risk values (Table 1). When TRI values were compared with the actual TSWV incidences in these fields in 2015, there was a good correlation, i.e., fields with high TRI values had highest incidences of TSWV and fields with lowest TRIs had lowest incidences (Table 1). The degree-day model and TRI will be made available for pepper growers in the Central Valley and coastal production areas in 2016 and can be accessed via the webpage: [http://ucanr.edu/sites/TSWVfieldriskindex/Thrips\\_Population\\_Projection/](http://ucanr.edu/sites/TSWVfieldriskindex/Thrips_Population_Projection/)

**IPM Strategy for TSWV in peppers.** Using the information generated in this project, we have developed the following **IPM program for TSWV and thrips in peppers in the Central Valley of California.** Implementation of this program (all or in part), especially on a regional level, should reduce TSWV to levels where economic losses are minimized.

**Before planting**

- i. **evaluate planting location/time of planting** this will involve determining proximity to potential inoculum sources during the time of planting (if possible avoid hot spots, planting near fields with tomato or susceptible bridge and cover crops and weedy orchards or late planting dates).
- ii. **use TSWV and thrips free transplants**
- iii. **plant TSWV resistant varieties** (possessing the *Tsw* gene)-these are available but may not be necessary if other practices are followed. Resistant cultivars should be used in hot-spot areas or in late-planted and red pepper fields, especially those that will be established near early-planted pepper or tomato fields.
- iii. **implement weed management** maintain weed control in and around pepper fields and especially in fallow fields and orchards, as some weeds are TSWV hosts, such as rough-seeded buttercup. If weeds are allowed to grow in fallow fields, they can amplify thrips and TSWV and serve as inoculum sources for peppers.

**During the season**

- i. **monitor fields for thrips** with yellow sticky cards or use the predictive phenology (degree-day) model to estimate when thrips populations begin to increase.
- ii. **manage thrips with insecticides** at early stages of crop development and when thrips populations begin to increase (usually 2<sup>nd</sup> and/or 3<sup>rd</sup> thrips generations).
- iii. **rotate insecticides** to minimize development of insecticide resistance in thrips.
- iv. **monitor fields for TSWV and remove infected plants** early in development (<30 days old) and when percent infection is low (<5%).
- v. **implement weed management** maintain effective weed control in and around pepper fields.

**After harvest**

- i. **promptly remove and destroy plants after harvest**

- ii. **avoid planting bridge crops** and cover crops that are thrips/TSWV reservoirs (e.g., fava bean and radicchio) or monitor for and control thrips and TSWV in these crops.
- iii. **control weeds/volunteers** in fallow fields, non-cropped or idle land near next year's pepper fields.

**2015-16 Financial Report**

The accompanying Financial Report shows that the Commission continues to be in good financial shape, due partly to meeting the expected income from marketed peppers. The Commission budgeted on the basis of receiving income from the equivalent of 380,000 tons of fresh peppers, which would bring in \$114,000 at the \$.30 per ton rate. While the surplus carryover might seem large, the Commission has chosen to keep a substantial reserve to prevent the possibility of needing to fund a project without having the money available.

The Commission's books are audited annually by an independent Certified Public Accountancy firm, and any pepper industry member wanting a copy of said audit may apply to the Commission office.

**Fiscal Year: March 1, 2015 through February 29, 2016**

<b>Account Name</b>	<b>Amount</b>
<b>INCOME</b>	
Assessment Income, 2015-16	\$114,314
Assessments Prior	1,186
Interest Income	<u>1,264</u>
<b>Total Income</b>	116,764
<b>Carryover from 2014-15</b>	206,591
<b>Income/Carryover</b>	<b>\$323,355</b>
<b>EXPENDITURES</b>	
Management Services	\$42,240
Audits	2,655
Office Supplies	1,562
Telephone	740
Postage	846
Reports & Publications	0
Subscriptions	2,000
Travel & Mileage	2,335
Meetings	551
Insurance	883
Website	1,950
Marketing Branch, CDFA	8,921
Market Enforcement Branch	2,400
California Specialty Crops Council	6,000
Production Research	53,700
Chemical Research	<u>3,472</u>
<b>Total Expenditures</b>	<b>\$130,255</b>
Cash-Balance 5/31/16	<u>\$193,100</u>

The Commission and staff are always available to answer questions or assist in any way they can. Nathan Sano ([nathan@tabcomp.com](mailto:nathan@tabcomp.com)) is the Board Manager, and Kim Sakamoto ([kim@tabcomp.com](mailto:kim@tabcomp.com)) is the Assistant Manager, and they can be contacted via email or at 559/591-3925.

Complete research reports available from the Commission office upon request or on the website [www.calpeppers.com](http://www.calpeppers.com)