

California Pepper Commission

531-D North Alta Ave ~ Dinuba, CA 93618, Phone (559) 591-3925 Fax (559) 591-5744

-2017-

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 2016-17 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.

Every three years the Commission holds a series of nomination meetings to allow interested producers an opportunity to serve a three year term. The processors/handlers are chosen by a recommendation from within the industry. The Commission held its latest nomination meetings in 2016 and is currently in the second year of this term which ends in 2019. Despite the roster being set in 2016, several changes occurred during the 2017 annual meeting to allow new members and alternates to take position. With these changes the Commission gains new perspectives and experience within the pepper industry. Glen Fischer of Saticoy Foods remains as Chairman with producer Mike Chuck serving as Vice Chairman. Bob Heisey of United Genetics remains as the 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. Dual Magnum continues to be available as a 24C label from Syngenta through their website 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. 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.

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 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.

Food Safety awareness continues to grow and groups such as the Center for Produce Safety 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.

Among Commission activities, the agricultural sustainability strategic plan, research reports and this newsletter can be found on the website 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.

While the Commission has traditionally focused its attention on agronomic research, labor has become a growing concern for the industry. The Commission has taken an interest in pursuing mechanical harvesting type projects as well as research that looks at different ways to easily remove the fruit from the plant. The future of breeding research will also need to consider the removal of the fruit by way of mechanical harvesting as this idea progresses.

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Pepper Weed Control Studies 2015

Richard Smith, UCCE Monterey County

There have been few new herbicides developed for use on vegetables in the past 10-15 years. This phenomena has been due to changes in the agricultural chemical industry brought about by the advent of glyphosate tolerant corn and soybeans which resulted in reduced demand for research and development in traditional preemergent herbicides. Three years ago Kumiai Chemical Corp. began researching the use of pyroxasulfone (Zidua) on vegetables. In 2015 we initiated trials of these materials in collaboration with the California Pepper Commission and cooperating growers.

The 2015 trials indicated that the safety of this material is strongly correlated with the soil type. However, we saw greater safety on a fine sandy loam soil than on a silty clay loam which goes against the normal pattern of greater selectivity on heavier soils. The 2016 trial was conducted on a silty clay loam soil (30% sand, 34% silt and 36% clay). Zidua rates at and above 1.0 ounce both pre and post transplanting provided significant reductions in the number of hairy nightshade and reduced weeding time. However, these rates also reduced the tonnage of marketable peppers. The 0.5 ounce rate of Zidua was safe on peppers and did not reduce the yield, however, it provided only marginal control of nightshade and reductions in weeding time.

Insect Pest Management on Peppers

John T. Trumble, and Greg Kund, UC Riverside

Pepper field trials were conducted at the University of California Riverside Agricultural Operations. 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.

Chemical trials examined Radiant SC, Minecto Pro, Sequoia 2 SC, and VST-06330 with Beetle!Gone (this last product is a *Bacillus thuringiensis* formulation designed for beetles). All of these materials were applied on a weekly basis.

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 Sequoia 2 SC. The other organic IPM treatment was comprised of Pyganic 5 EC, Trilogy EC, Mycotrol O, and Entrust SC. A chemical standard treatment was Asana XL. 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, Radiant applied three

times as a foliar spray, and Closer applied two times. The second IPM program had applications of Pyganic combined with Trilogy and Mycotrol combined with Entrust for a total of six applications. The chemical standard of Asana 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, aphids, and potato psyllids.

Worm populations were moderate-high this field season. All treatments for worm control performed well and were significantly better than the untreated control. Pepper weevil numbers were low this season due to hot weather conditions. We did not see differences between the treatments for psyllid (*Bactericera cockerelli*) numbers due to a low population. For a complete copy of the report contact the California Pepper Commission.

Laboratory studies with a new experimental material, VST-06330, developed by Vestaron showed some promising results. The product has not been released but the trade name is Spear T™ and is expected to be available within the year. Tests were performed on aphids (*myzus persicae*), psyllids (*Bactericera cockerelli*), pepper weevils (*Anthonomus eugeni*), and two spotted spider mites (*Tetranychus urticae*). The material was very effective on the two spotted spider mites. This product could have a place in an IPM rotational strategy to help control pepper pests and reduce pesticide resistance related issues.

We continued to investigate the ecological and epidemiological relationships among solanaceous plants, plant pathogenic viruses, vectoring, and non-vectoring insects. We have developed a low-input IPM program, which in field trials produced encouraging results in peppers, potatoes and tomatoes compared to broad-spectrum insecticides. This research resulted in a publication describing the development of a low input IPM program to control psyllids: [Prager, S. M., G. Kund and J.T. Trumble. 2016. Low-input, low-cost IPM program helps manage potato psyllid. California Agriculture 70\(2\):89-95. DOI: 10.3733/ca.v070n02p89. April-June 2016.](#)

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

Bill Wier

INTRODUCTION/OBJECTIVES:

This test was conducted on red bell peppers to determine ease of harvest, lack of stem breakage and earlier maturity due to the foliar applications of abscisic acid and Ethrel.

METHODS AND MATERIALS:

On August 25, 2016, fourteen days prior to the harvest, 10,000 ppm and 100,000 ppm abscisic acid and 1.0 quart and 2.0 quarts of Ethrel were applied in a randomized complete block statistical design, and compared to an untreated control.

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On September 7, 2016, when the grower was conducting the first harvest all plots were hand harvested by experienced workers. They were asked to give a subjective number representing the ease of harvesting the fruit in the various treatments.

To obtain additional numerical data, the numbers of peppers with full peduncles and those with broken ones were counted for each treatment and each replication. The % intact peduncle peppers was then calculated.

TREATMENTS:

- 1) Untreated check
- 2) 10,000 ppm abscisic acid
- 3) 100,000 ppm abscisic acid
- 4) 1.0 quart Ethyrel
- 5) 2.0 quarts Ethyrel

Site Location: Live Oak Farms
 Host Crop Variety: Barron Bell Pepper
 Plot Description and Size: Two lines 10 ft. long, replicated 4 times
 Experimental Design: Randomized complete block
 Application Conditions:
 Date: August 25, 2016
 Time: 4:30 p.m.
 Wind: Calm
 Sky: Clear
 Temperature: 88 F

ASSESSMENTS:

Ease of harvest, intact peduncles and earliness

RESULTS:

Table 1 – Subjective ease of harvesting red peppers (avg. of 4 replications)

---Above 5 = more difficult, Below 5 = less difficult---

<u>TREATMENT</u>	<u>SUBJECTIVE EASE</u>
1. Untreated check	5.0
2. 10,000 ppm abscisic acid	5.5
3. 100,000 ppm abscisic acid	5.3
4. 1.0 quart Ethyrel	4.8
5. 2.0 quarts Ethyrel	4.8

Table 2 – Percent intact peduncles (Average of four replications)

<u>TREATMENTS</u>	<u>% INTACT PEDUNCLES</u>
1. Untreated check	45
2. 10,000 ppm abscisic acid	37
3. 100,000 ppm abscisic acid	43
4. 1.0 quart Ethyrel	52
5. 2.0 quarts Ethyrel	55

Table 3 – Numbers of 25 pound boxes (Average of four replications)

<u>TREATMENTS</u>	<u>25 POUND BOXES</u>
1. Untreated check	570
2. 10,000 ppm abscisic acid	721
3. 100,000 ppm abscisic acid	723
4. 1.0 quart Ethyrel	744
5. 2.0 quarts Ethyrel	944

Table 4 - Analysis of Variance for yield - Type III Sums of Squares

<i>Source</i>	<i>Sum of Squares</i>	<i>Df</i>	<i>Mean Square</i>	<i>F-Ratio</i>	<i>P-Value</i>
MAIN EFFECTS					
A:treat	284720.	4	71180.1	1.06	0.4177
B:rep	140668.	3	46889.3	0.70	0.5708
RESIDUAL	805720.	12	67143.3		
TOTAL (CORRECTED)	1.23111E6	19			

All F-ratios are based on the residual mean square error.

Table 5 - Multiple Range Tests for yield by treat

Method: 95.0 percent LSD

<i>treat</i>	<i>Count</i>	<i>LS Mean</i>	<i>LS Sigma</i>	<i>Homogeneous Groups</i>
1	4	570.0	129.56	X
2	4	721.25	129.56	X
3	4	723.25	129.56	X
4	4	746.0	129.56	X
5	4	944.0	129.56	X

<i>Contrast</i>	<i>Sig.</i>	<i>Difference</i>	<i>+/- Limits</i>
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1. The subjective rating of ease of harvest made by the workers is shown in table 1. The untreated check was a rating of 5.0 and the two treatments that received Ethyrel each averaged 4.8. This is an indication that Ethyrel allowed somewhat easier removal of the fruits.

2. The % of intact peduncles is shown in table 2 and reveal that the Ethyrel treatments resulted in about 10% more fruit that abscised cleanly from the main stem compared to those that broke upon being harvested.

3. Table 3 shows the numbers of 25 pound boxes per acre resulting from each of the treatments. The multiple range tests in table 5 shows that the high rate (2.0 quart/acre) of Ethyrel yielded highest, followed by the 1.0 quart/acre treatment. The next two highest yielding treatments were the 100,000 ppm and the 10,000 ppm applications of abscisic acid. All treatments out yielded the untreated check.

CONCLUSIONS:

Ethyrel treated plots yielded highest due to earliness of ripening. The material also appears to allow for easier removal of fruits from the plant and results in fewer peduncles being broken during harvest.

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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

For the past four years, we have monitored thrips populations and the incidence of *Tomato spotted wilt virus* (TSWV) and other viruses in pepper fields in the Central Valley and coastal production areas. In general, thrips and TSWV start out at low levels in the beginning of the season (April-May depending on the location). As the season progresses (May-July) thrips populations can increase rapidly, and may or may not be followed by outbreaks of TSWV, depending on nearby TSWV inoculum sources (i.e., TSWV infected bridge hosts, weeds and/or tomatoes).

At all locations, fields established early in the season (April-May) had low TSWV incidences (1-5%), whereas some later planted fields had higher incidences, though generally <10%. *Alfalfa mosaic virus* was most common in the monitored fields, but infected plants recovered and did not appear to experience yield loss. Based on the results of our research, we have developed an integrated pest management (IPM) program (involving location and time of planting of fields, resistant varieties, removing symptomatic plants <30 days after planting and thrips management early in the season based on a predictive degree day model) that can minimize TSWV incidence, and a risk index that can tell growers the potential for TSWV in their fields and the relative need to implement the IPM program.

Understanding the Season Long Incidence of Pepper Weevil in the Santa Clara and San Benito Pepper Production Areas

Aparna Gazula, UCCE Santa Clara and Monterey Counties

The objectives of this project were to 1) determine if pepper weevil is established in the Santa Clara-San Benito pepper production areas, and 2) assess the season long activity of pepper weevil on pepper fields.

Pheromone baited yellow sticky traps were installed (Figure 1) in four grower fields in the Santa Clara-San Benito pepper growing region. The four grower fields that were selected had a history of pepper weevil infestation in the 2015 growing season. The trap installation height was adjusted with plant growth. The sticky traps were assessed for the incidence of pepper weevil adults on a weekly basis from May 13, 2016 to October 21, 2016 (last harvest) for a total of 23 weeks. Nightshade plants belong to the *Solanaceae* family and are known to support pepper weevil populations, especially black nightshade. So, after transplanting all four fields were assessed for the presence of nightshade plants. Fields 1, 2 and 3 had bell peppers, and field 4 had banana peppers.

Results

None of the four grower fields that we monitored had nightshade either in the fields or adjacent to the fields, and overall the fields were free from any weed infestation. In collaboration with local Pest Control Advisers (PCAs) and trapping that we conducted, weevil monitoring data for 63 fields in the Santa Clara-San Benito pepper production region were analyzed and is presented in this report. Pepper weevil was first detected on May 27th, 2016. Following this instance of detection, weevils were detected regularly throughout the entire Santa Clara and San Benito pepper growing region until the end of the production season in November (Figure 2).

The seasonal total weevil counts per production field ranged between 0-176 and the pest was detected in 55 of the total 63 fields that were monitored (Table 1). In the fields where pepper weevils were detected, majority of the fields had weevil infestation by September and the highest monthly total weevil counts per field were also seen in September (Table 2).

Out of all the 55 infested fields, immature fruit drop was detected only in Field 3 on August 19th, 2016. The dropped fruit were confirmed to be infested with weevils. Prior to that date, weevils were not detected in any of the sticky traps installed in this field. The major outcomes from this survey:

- There appears to be two peaks of pepper weevil detection in the field. The first peak is smaller than the second peak.
- The pepper weevil detection intensified by mid-to late-season.
- Early season pepper weevil management sprays (May-June) is advised to discourage weevils from laying eggs in the field.
- Mid-season management sprays (mid-July to August) is advised to discourage newly introduced weevils and re-infestation.
- Transplants should be inspected or treated with effective insecticides.
- Potential sources of pepper weevil such as weed hosts or infested pepper residues should be monitored and managed.

These data suggest that pepper fields need to be monitored for pepper weevil using pheromone lures. Over the last two years weevil infestation has noticeably increased in the region. Therefore, survey of pepper fields is warranted for another year to better understand the seasonal incidence of the pest. This information will help determine the insecticide spray timing.

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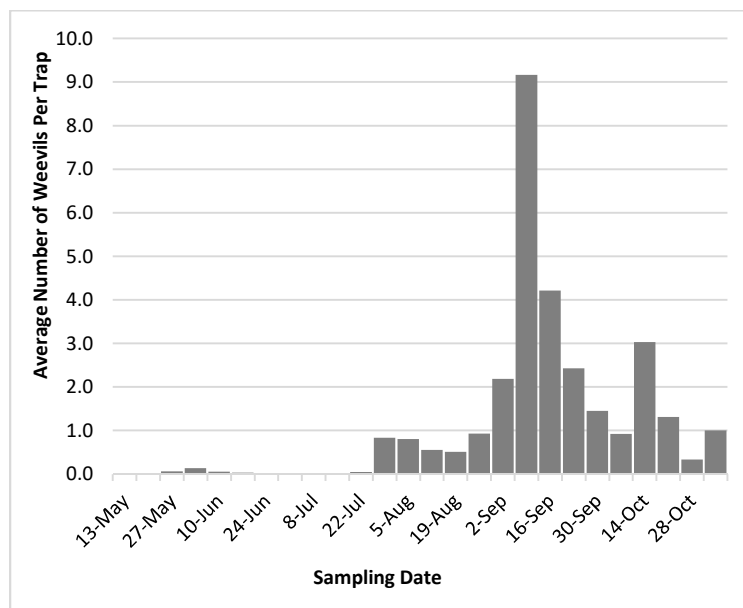
Table 1: Seasonal total pepper weevil counts of infested pepper fields.

Seasonal Total Pepper Weevil Counts Per Field	Number of Fields
Less than 10	31
10-20	9
20-30	5
30-40	2
40-50	1
50-60	2
60-70	1
70-80	2
100-176	2

Table 2: Number of pepper fields with weevil infestation by month of production.

Month	Total Number of Pepper Fields in Production	Number of Pepper Fields with Weevil Infestation	Range of Monthly Total Weevil Counts Per Field
May	15	1	0-1
June	32	4	0-1
July	45	10	0-12
August	50	25	0-28
September	53	46	0-140
October	40	28	0-26
November	2	2	1

Figure 2: Seasonal levels of pepper weevils in the Santa Clara-San Benito pepper production region as detected by trapping with pheromone baited yellow sticky traps.



2016-17 Financial Report

The accompanying financial report shows the Pepper Commission remains in a good financial position due partly by exceeding its expected income for marketed peppers. The Commission again based its income off 380,000 tons of fresh peppers, which would bring in \$114,000 at the \$0.30 per ton assessment rate. With several years of a strong carryover, the Commission was comfortable with setting an expenditure budget which exceeded the projected income knowing this reserve would provide the flexibility of spending. The Commission continues to maintain a strong reserve to offset any possible research projects or activities that may come up during the season.

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, 2016 through February 29, 2017

<i>Account Name</i>	<i>Amount</i>
INCOME	
Assessment Income, 2016-17	\$119,802
Assessments Prior	2,415
Interest Income	<u>1,367</u>
Total Income	123,585
Carryover from 2014-15	193,100
Income/Carryover	\$316,685

EXPENDITURES

Management Services	\$42,240
Audits	2,750
Office Supplies	220
Telephone	744
Postage	625
Reports & Publications	0
Subscriptions	3,000
Travel & Mileage	691
Meetings	0
Insurance	883
Website	1,950
Marketing Branch, CDFA	10,749
Market Enforcement Branch	3,200
California Specialty Crops Council	6,000
Production Research	67,000
Chemical Research	<u>3,512</u>

Total Expenditures **\$143,565**

Cash-Balance 5/31/16 \$173,120

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

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Every three years the Commission is required to provide industry members the opportunity to participate in a nomination to represent their district as a member or alternate to the Commission. The following is the Commission roster for the 2016-17 fiscal year.

California Pepper Commission 2013-16

MEMBERS

ALTERNATES

Producer Representatives

Burt Silva
King City

John Hook
King City

Ryan Talley
Arroyo Grande

William Terry
Oxnard

Mike Chuck
Gilroy

Dan Fiorio
Gilroy

Bob Giampaoli
Le Grand

Patrick Cerutti
Newman

Richard W. Bradford
La Quinta

Adrian Zendejas
Coachella

Handler Representatives

Matthew Terra
Escalon

Vacant

Joe Martins
Merced

Juan Lopez
Hanford

Glen A. Fischer
Ventura

Jerry Hensley
Ventura

Tim Baloian
Fresno

Edward Chell
Camarillo

Bob Heisey
Hollister

Terry Berke
Woodland

Public Representative

Dave Nirenberg
Camarillo

Vacant

Staff

Nathan Sano
(Manager)
Dinuba

Kim Sakamoto
(Asst. Manager)
Dinuba

2017-18 Research Projects

John Trumble	Insect Pest Management	\$22,000
Bob Gilbertson	Monitoring Thrips & TSWV	15,000
Bill Weir	Use of Growth Regulators as Harvest Aids	7,500
Aparna Gazula	Incidence of Pepper Weevil	10,000
Antoon Ploeg	Efficacy of Nematicides	13,208

**Full Reports are Available at the Commission
Office or website www.calpeppers.com**