California Pepper Commission

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-2018-

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 2017-18 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 five years the California Department of Food and Agriculture must hold a referendum to determine if the industry would like to continue the Pepper Commission. A ballot has been sent out to the industry allowing producers and handers the opportunity to vote. The voting period ends January 2, 2019. You can contact the Commission office or CDFA economist Kacie Fritz if you have any questions.

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 final year of this term which ends in 2019. Despite the roster being set in 2016, several changes occurred 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 and Bob Heisey of United Genetics remains as the Research Committee Chairman.

The Pepper Commission would like to recognize longtime commission member Bob Heisey of United Genetics who most recently received the Lifetime Achievement award from the International Pepper Conference for his work in breeding research. Congratulations Bob.

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, and several commodity groups worked to put together a strategic plan, growers and industry members can use it 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.

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.

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 rotations of Radiant SC, Minecto Pro, Sequoia 2 SC, Warrior II 2.08 CS, Actara 25 WG, Vydate C-LV 3.77 SL, Endigo 2.06 ZC, Exirel 0.83 SE, and Brigade 2 EC. 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 this field season. Most 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 see differences between the treatments for psyllid (*Bactericera cockerelli*) numbers and the Asana XL product had the highest number of total psyllids. For a complete copy of the report contact the California Pepper Commission.

Laboratory studies with a new experimental material, VST-06340 combined with Capsil at 0.125% vol/vol, developed by Vestaron showed some promising results. The trade name is Spear T™ and is expected to be available within the year. Tests were performed on green peach aphids (*myzus persicae*) and aphid numbers were significantly reduced. This product could have a place in an IPM rotational strategy to help control pepper pests and reduce pesticide resistance related issues.

Another laboratory study examined Venerate XC, and Grandevo WDG for control of pepper psyllids. Both materials provided significant control.

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 life history of psyllids and development of a low input IPM program: Prager, S.M., Trumble, J.T., 2018. Psyllids: Biology, Ecology, and Management. In: Wakil, W., Brust, G.E., Perring, T.M. (Eds.), Sustainable Management of Arthropod Pests of Tomato. Academic Press, Elsevier, pp. 163–181. ISBN: 9780128024416

Completion of a Flyer Describing Integrated Pest Management (IPM) of Thrips/Tomato Spotted Wilt Virus (TSWV) in Pepper in California and Surveys of Fields Pepper for Emergence of Resistance Breaking Strains

Robert L. Gilbertson, UC Davis

For 2017, we had two objectives: 1) complete a flyer providing information on tomato spotted wilt disease of pepper and 2) continue our survey for the appearance of isolates of *Tomato spotted wilt virus* (TSWV) that may overcome (break) the *Tsw* resistance gene.

We successfully completed the flyer on TSWV on pepper and we will provide a draft to the Pepper Commission for their input before going to publication. Our second objective involved conducting a survey of Central Valley pepper fields for plants with symptoms of virus infection. A total of 40 plants with virus symptoms from 5 counties were collected, and RT-PCR tests with four common pepper viruses were conducted. The most common virus was *Alfalfa mosaic virus* (37%), followed by TSWV (22%) and then *Cucumber mosaic virus* (15%) and *Pepper mottle virus* (15%). Of the total 9 samples of TSWV, 8 infected susceptible pepper cultivars, whereas one sample of TSWV infected a resistant cultivar. To confirm that this was a true resistance-breaking strain of TSWV, we mechanically (rub) inoculated susceptible and resistant pepper cultivars with this putative RB strain and a control strain. The putative RB strain infected plants of the susceptible and resistance cultivars, whereas the control TSWV strain only infected the susceptible variety. These results indicate that a RB strain has emerged in California. It remains to be determined if this RB strain will persist in the Central Valley of

California, but this shows the potential for RB strains and warrants continued surveying.

Evaluation of Ethephon on Yield and Quality of Mechanically Harvested Processing Peppers

Bill Wier

INTRODUCTION/OBJECTIVES:

To evaluate the beneficial effects of applying ethephon at two rates and comparing them with an untreated control in mechanically harvested processing red peppers.

TREATMENTS:

1. Untreated Control
2. 2.0 quarts ethephon per acre
3. 4.0 quarts ethephon per acre

Site Location: Rossow Farms – Merced, California

Host Crop Variety: Processing red peppers

Plot Description and Size: 4.75 feet by 200 feet, replicated 2 times

Experimental Design: Completely randomized design

Application Conditions:

Date:	August 4, 2017
Time:	7:30 a.m.
Wind:	Calm
Sky:	Clear
Temperature:	76 F

ASSESSMENTS:

Yields and visual quality assessments

METHODS AND MATERIALS:

On August 4, 2017 areas were selected from a field of established red peppers for ethephon evaluations. Plots 6.75 feet by 200 feet were measured and staked. Ethephon was applied in three treatments replicated two times. They were: none, 2.0 quarts per acre and 4.0 quarts per acre. A fourth treatment was planned consisting of a water run application in the drip irrigation system. After much discussion regarding rates and observing the effects of the 4.0 quarts per acre foliar applied ethephon, it was decided to omit the treatment.

On August 31, 2017 the plots were mechanically harvested by the grower and resulting peppers weighed using the University of California Extension bin scales.

RESULTS:

There were very little numerical differences among the three treatments. The untreated control was slightly lowest at 16.9 tons per acre, with the 2.0 quarts per acre and the 4.0 quarts per acre yielding 18.3 tons per acre and 17.7 tons per acre, respectively. (table 1).

Lack of differences may be in part due to the time span between application and harvest. Although ethephon causes earliness, there was time for even maturation among the treatments.

There were noticeably more green fruits in the untreated control bins than the ethephon treated bins. The visual differences were noticed in the field also.

The 4.0 quarts per acre ethephon treatment caused the fruits to be softer and perhaps over ripe. They possibly reached maturity too soon prior to harvest.

CONCLUSION:

Although trends for increasing yields were similar to earlier tests this year and prior years, actual differences were very small. Based on this year's evaluations, there does not appear to be any measurable benefit to using ethephon on this variety of processing red peppers under these cultural practices.

Table 1 – Bin Weights of Three Treatments of Red Peppers in Tons per Acre.

Treatment	-------Replication----------		Tons/Acre
	# 1	# 2	AVE
Untreated Control	17.0	16.6	16.8
2.0 quarts/acre	18.9	17.7	18.3
4.0 quarts/acre	17.7		17.7

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 major objectives of this project were: 1) assess the season-long incidence and abundance of pepper weevil in the pepper fields, 2) determine if there is preference among pepper type, time of harvest time (early versus late) on pest infestation levels.

Pheromone-baited yellow sticky traps were deployed (Figure 1) in commercial production fields in the Santa Clara and San Benito

pepper region. Pheromone-baited yellow sticky trap is the best monitoring tool for adult pepper weevil (UC IPM, 2012; Segarra-Carmona and Pantoja, 1988), and adult pepper weevil captures from a trap are equivalent to surveying 50 flower buds (Riley and Schuster, 1994). Six traps were deployed in each field at approximately 30 feet from the border towards the center to detect weevils migrating into the fields. The traps were placed at an equal distance from each other varying with the size of the field. During the growing season, the trap height was adjusted to plant canopy height. The yellow sticky traps were collected and replaced (Figure 2) weekly from May 23, 2017 to November 14, 2017 (final harvest). The sticky cards were transported to laboratory and carefully inspected for adult pepper weevil.

Results

We obtained pepper weevil monitoring data from 60 fields spread across Santa Clara and San Benito pepper production region. Adult pepper weevil was first detected on 23 May, 2017. Thereafter, weevils were continuously detected throughout the Santa Clara and San Benito pepper growing region until November 14, 2017 (Figure 4). The seasonal total weevil counts per production field ranged between 0 and 434 adults. Weevils were detected in 85% of the fields monitored (Table 1). Most of the fields were infested with weevils by late August. The adult weevil captures per week peaked in September and October.

Out of all the monitored fields, five fields were planted late (planted between July and August). Three of them were infested by August and the highest total monthly weevil counts per field were seen in October. In the field that we monitored, immature fruit drop was detected from October 10, 2017 onwards. Random inspection of dropped fruits showed that some fruits were infested with adult weevils (Figure 3).

In 2017, pepper types from 24 fields were evaluated for susceptibility to pepper weevil. Amongst the varieties, 20 varieties were bell pepper, two mini sweet and two chili pepper. One of the chili pepper field had no weevil infestation at all. Based on the data analysis, there was no difference in the level of infestation for the three types of pepper (Figure 6).

The major outcomes from this survey are:

There appears to be two peaks of pepper weevil population in fields, one prior to the application of pest management sprays, and the second overlapping with a decrease in insecticidal application during the last two to three months of the season. The first peak is smaller than the second peak.

The peak in weevil population was reached later in late planting fields than in early planting fields.

The infestation level was not different in the bell, mini sweet or chili pepper fields.

Early season pepper weevil management sprays (May-June) is advised to minimize the number of pepper weevil life cycles in the field.

Mid-season (mid-July to August) and late season (August to November) management sprays are advised to discourage buildup of pepper weevil population in the fields.

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 removed.

Over the last three years, pepper weevil infestations have noticeably increased in the region. These data suggest that pepper fields need to be monitored for pepper weevil using pheromone lures. UC IPM (2012) recommends that the pheromone-baited traps should be deployed prior to bloom to detect first adult emergence, and around the perimeter of the field to detect migrating weevils into the field. The traps should be mounted on poles and should be adjusted during crop growth to ensure that the bottom of the traps is just at or slightly below the tops of the plants. Check traps twice a week in the morning or more frequently if adults are known to be present. Apply insecticidal sprays when the first adult is captured.

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

Seasonal Total Pepper Weevil Counts Per Field	Number of Fields
Less than 10	10
10-20	9
20-30	7
30-40	12
40-50	6
50-60	0
60-70	4
70-80	1
100-200	6
200-400	4

Efficacy of Novel Nematicides and Plant Resistance Against Root-Knot Nematodes on Bell Peppers

Antoon Ploeg, UC Riverside

Two identical field experiments were done to evaluate novel nematicides in bell pepper. One experiment was at the Coachella Valley Agricultural Research Station (CVARS), and one at the

SouthCoast Research and Extension Center (SREC, Irvine). Two pepper cultivars were transplanted: the nematode-susceptible "Baron" and the nematode-resistant "Carolina Wonder". The Nematicides evaluated were Nimitz, Salibro and Velum (applied 1 wk pre-plant, drench and then soil-incorporated) and were compared to an untreated control and Vapam. Both field and sites were infested with the southern root-knot nematode *Meloidogyne incognita.*

There were only very minor effects of the nematicides on plant yield or plant growth, and they did not result in significant differences compared to the untreated control. Nematode symptoms or the level of infestation of the pepper roots at harvest also were not significantly lowered by the nematicides.

At the CVARS field, the yield from the resistant cultivar was significantly higher than from the susceptible cultivar. Although the nematode symptoms and root-infestation by nematodes was reduced in the resistant cultivar at both locations, the level of resistance was very different between the locations. At SCREC, the resistant cultivar remained virtually free of root symptoms and root infestation (>99% reduction compared to susceptible), but at CVARS the resistant cultivar still had significant root symptoms and high nematode infestation (50% reduction compared to susceptible). We speculate that the breakdown of resistance at the CVARS site, but not at the SCREC site, is related to differences in soil temperature during the crop between the two sites. This will be tested in further field and greenhouse experiments.

2017-18 Research Projects

John Trumble	Insect Pest Management	$22,000
Bob Gilbertson	Screening for TSWV Resistance	15,000
Kerry Mauk	Evaluating Plant Immune Elicitors	9,879
Antoon Ploeg	Efficacy of Nematicides	13,538
United Genetics	Pepper Detachment through Drip	1,000
Kevin Crosby	Test Removal of Fruit from Plant	4,000

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

2017-18 Financial Report

The accompanying financial report shows the Pepper Commission is not as financial comfortable as previous years. Despite anticipating a drop in production, the Commission was unable to reach its projected budget of $108,000 at the $0.30 per ton assessment rate. The Commission based its income off 360,000 tons of fresh peppers, which is roughly a 6% decrease from the previous year. With several years of a strong carryover, the Commission was comfortable with setting an expenditure budget which exceeded the projected income knowing the reserve would provide the flexibility of spending.

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, 2017 through February 29, 2018

Account Name	***Amount***
INCOME	
Assessment Income, 2017-18	$98,597
Assessments Prior	3,390
Interest Income	1,520
Total Income	103,507
Carryover from 2016-17	173,120
Income/Carryover	**$276,627**
EXPENDITURES	
Management Services	$42,240
Audits	2,750
Office Supplies	553
Telephone	519
Postage	220
Reports & Publications	1,093
Subscriptions	2,040
Travel & Mileage	991
Meetings	0
Insurance	1,094
Website	1,950
Marketing Branch, CDFA	11,246
Market Enforcement Branch	2,400
California Specialty Crops Council	6,000
Production Research	67,708
Chemical Research	3,512
Total Expenditures	**$144,316**
Cash-Balance 4/30/2018	$132,312

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.

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 2018-19 fiscal year.

California Pepper Commission

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California Pepper Commission 2016-19

MEMBERS	ALTERNATES
Producer Representatives	
Vacant	John Hook King City
Ryan Talley Arroyo Grande	William Terry Oxnard
Mike Chuck Gilroy	Dan Fiorio Gilroy
Ben Migiazzo Le Grand	Patrick Cerutii Newman
Richard W. Bradford La Quinta	Adrian Zendejas Coachella
Handler Representatives	
Matthew Terra Escalon	Larry Rettmann Escalon
Sam Myers Farmington	Juan Lopez Hanford
Glen A. Fischer Ventura	Mark Hensley Ventura
Yosh Kamine Fresno	Edward Chell Camarillo
Bob Heisey Hollister	Terry Berke Woodland
Public Representative	
Dave Nirenberg Camarillo	*Vacant*
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