California Pepper Commission 2007-10

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California Pepper Commission

Financial Report

Fiscal Year: March 1, 2008 through February 29, 2009

Account Name	*Amount*
INCOME	
Carry-over from 2007-08	$97,944
Assessment Income, 2008-09	179,296
Interest Income	2,940
Total Available Funds	**$280,180**
EXPENDITURES	
Management Services	$38,400
Audits	1,931
Office Supplies	1,022
Telephone	707
Postage	1,409
Reports & Publications	88
Travel & Mileage	2,124
Meetings	926
Insurance	658
Marketing Branch, CDFA	8,570
Production Research	90,265
California Minor Crops Council	6,000
Chemical Research	1,900
Total Expenditures	**$153,147**
Carry-over to 2009-10	126,180
Total Expenses & Reserve	**$280,180**

2008-09 Financial Report

The accompanying Financial Report shows that the Commission continues to be in excellent financial shape, with the income from marketed peppers again exceeding the Commission's budget. The Commission budgeted on the basis of receiving income from the equivalent of 350,000 tons of fresh peppers, which would bring in $140,000 at the $.40 per ton rate. However, the actual tonnage from the 2008 crop brought in closer to $173,500, which was augmented by an additional $5,500 from prior year crops.

At this year's annual meeting, the Commissioners agreed to lower the assessment rate to $.35 per ton, with an estimate of 380,000 tons.

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.

Complete research reports available
at the Commission office

Pepper News

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July, 2009

California Pepper Industry Report

Glen Fischer, Saticoy Foods
Chairman, California Pepper Commission

Each year the California Pepper Commission commits time and effort into improving the chemical, disease and pest issues that concern the pepper industry. The Com-mission meets each year with the purpose of discussing any current and future issues and finding research projects that can improve the California pepper industry. Last year at this time the Commission experienced a referendum vote of the industry to gauge whether the Commission had benefited and will continue to benefit the industry. A large percentage of ballots were returned, and a majority of those voted to approve the continuance of the Commission for another 5 years. As Chairman of the California Pepper Commission, I would like to thank you all for taking the time to fill out your ballot and supporting the Commission and its efforts.

Our annual newsletter contains summaries of the research projects completed during the 2008-09 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.

Dual Magnum has benefited many growers over the years and over time we have recognized the importance of maintaining its availability. The Commission staff had been responsible for the 24C and issuing the label on Dual Magnum for the last few years, but last year Syngenta decided to take on the responsibility by providing the label online at www.farmassist.com.

Last year the Commission received access to the 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 with the ID: **nathan@tabcomp.com** and password **nathan93618**.

The Commission and staff are always available to answer questions or assist in any way they can. Jerry Munson (jerry@tabcomp.com) is the Board Manager, and Nathan Sano (nathan@tabcomp.com) is the Assistant Manager, and they can be contacted via email or at 531-D North Alta Ave Dinuba, CA 93618 and at 559/591-3925.

2008 Project Reports

Virus Prediction and Management in Pepper Fields
Aziz Baameur, Cooperative Extension Santa Clara Co.

This study was undertaken to assess the effectiveness of chemical treatments in suppressing aphids and thrips, vectors of cucumber mosaic virus (CMV) and tomato spotted wilt virus (TSWV). It compared a control, no chemical application to four other chemical treatments. Plots were located in two different fields, one planted to chili (Morgan Hill), the other to bell peppers (Gilroy).

A week prior to field transplanting, pepper plant trays were treated as follows: two trays received a foliar application of Safari 20 SG, two trays received no insecticide, and the fifth tray was treated with Admire (Imidacloprid).

Six weeks later, the first field treatments were made. The two Safari treatments received Radiant applications. The Admire treated plants were sprayed with Venom (Dinotefuran). One of the unsprayed treatments received an Admire application, while the control received water spray only.

Four weeks later, additional insecticide applications were made as outlined in table 1.

Table 1. Table of insecticide treatments for suppressing aphids and thrips in pepper field.

Treatment Code	Greenhouse Treatment	Field treatment 1	Field treatment 2
1 – (W)	None	None	None
2 – (Y)	None	Admire	Venom
3 - (B)	Safari	Radiant	Venom
4 – (G)	Safari	Radiant	Radiant
5 – (O)	Admire	Venom	Radiant

Plots were monitored for aphids and thrips with sticky yellow traps and later on with the planting of three TSWV-varieties of hypersensitive petunia plants. Very low aphid numbers were observed in both fields. Weekly harvest of flowers from each plot were treated in the lab for thrips present and counted.

Results

Virus presence was very low in both fields as manifested by very fewer plants and fruit showing virus symptoms in areas surrounding plots (table 2). Laboratory analysis of weekly thrips samples showed that collected thrips tested negative to TSWV.

Fruit Yield data showed no statistical differences among treatments in both fields. All plots in each field produced similar yield regardless of treatment.

Table 2. Thrips population count in live flower traps by field & treatment.

Thrips Cumulative count in 5 insecticide treatments-Santa Clara County						
Location	Treatment Code					Total Count
	1 (W)	2 (Y)	3 (B)	4 (G)	5 (O)	
Gilroy	952	728	692	877	913	4,162
Morgan Hill	1090	1086	986	942	1040	5,143

Powdery Mildew on Peppers

Mike Coffey, UC Riverside

Powdery mildew of peppers, caused by aggressive strains of the fungus *Leveillula taurica*, has emerged in recent years as a serious economic threat to processing and fresh market pepper producers in California. Its essentially unpredictable nature, high capacity for sporulation, very long latent period (18-21 days) and explosive epidemic potential under as yet largely undefined conditions can make it very difficult to control. Fungicides are frequently applied too late, often resulting in severe sunscald of the pepper fruit, typically to significant and sometimes disastrous economic crop losses.

The unpredictable nature of the disease underlines the critical need to invest in research both on more effective control measures, including better timing and appropriate dosage of fungicides such as Rally and Quintec, and the assessment of accurate early warning methods. There also needs to be a closer examination of the efficacy of fungicides towards the distinctly different strains of powdery mildew currently attacking peppers in California.

Research by our lab in 2008 determined that there are genetically distinct strains of powdery mildew present. There has been no critical work on the sensitivity of these different strains to fungicides such as Rally and Quintec and the outbreaks of mildew in recent years are a warning that current control strategies are probably not very effective under high disease pressure.

The onset of powdery mildew occurrence has been impossible to predict in recent seasons in California. A critical factor in these outbreaks is the role of weather conditions. What are the key environmental conditions, especially temperature and relative humidity that trigger the onset of mildew epidemics? Some simple experiments in 2005 using growth chambers set with various temperature/humidity environments provided evidence that the 'Hollister' pepper strain used in our research behaves similarly to a tomato strain used in the development of the Guzman-Plazola Model for mildew prediction.

In 2008 we looked at the effect of different temperatures and humidities using a constant environment. While this is an artificial situation it allowed us to determine that relatively high temperature (28 C) could shut down initial mildew development completely over a wide range of relative humidities. This last year we focused on testing the Spectrum WatchDog datalogger technology in conjunction with a disease risk prediction model for *Leveillula taurica*, which has been developed by Dr. Remigio Guzman-Plazola, while working at UC Davis with Dr. Mike Davis.

For pepper growers, field validation at sufficient locations and through several mildew years might encourage growers to use fungicides in a more effective manner, with economic and environmental benefits. In particular, such disease prediction technologies could be used to determine if and when to apply the first fungicide spray. Such field-based analysis and research would permit modifications and fine-tuning of prediction programs to make them more robust. We used the latest SAS version of this model in collaboration with Dr. Remigio Guzman-Plazola.

One trial evaluated pepper tolerance to Outlook applied 1) just prior to transplanting, 2) over the top immediately after transplanting, and 3) directed spray immediately after transplanting. The trial only received the one herbicide application. All plots were precision machine cultivated at layby, and a hoeing crew only weeded the check plots. The "over the top at transplanting" application definitely had the best weed control that lasted throughout the growing season. There was negligible phytotoxicity to the peppers and they quickly outgrew any symptoms. Pre-transplant applications and directed spray applications had many more weeds within the transplant row. The pre transplant application had the most weeds.

Another trial evaluated preemergence herbicides applied over the top at planting and at layby. Dual Magnum, Dacthal, and low and high rates of Outlook and Prowl H2O were compared to each other. All combinations of these herbicides were evaluated. Dual Magnum and Outlook provided excellent weed control of all weeds present and the "at planting" application nearly lasted the entire season. These same herbicides followed by a layby application gave virtually perfect control of all weeds. Dacthal and Prowl H2O provided significantly less weed control as they were more selective on the weeds they killed. All herbicides performed much better than the check plot. There was no crop phytotoxicity from the application of any of these herbicides.

Insect Pest Management on Peppers

John T. Trumble, William Carson, and Greg Kund

Pepper field trials were conducted at the University of California's South Coast Research and Extension Center. The project included both a chemical screening trial and an IPM trial. The chemical screening trial was used 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 as well as economic benefits for pepper growers.

Chemical trials examined Voliam Flexi 40 WG, Voliam Xpress ZC, Leverage 2.7 SE, NNI-0871, GF 1029, XR-25, and Radiant SC. All treatments were sprayed weekly with the exception of Voliam Flexi and Voliam Xpress which were sprayed every 14 days.

The IPM trials examined a low input treatment of Actara WDG and Xentari DF. The other treatment representing a chemical standard was Lannate 2.4 LV, combined with Pounce 3.2 EC. The materials used in the IPM trial were applied with rotational strategies that would support a commercial grower operation.

The fruit from the chemical and IPM trials were harvested and assessed for insect damage. The chemical screening trial focused primarily on insect damage and the IPM trial included insect damage and a harvest yield component.

Worm pressure was high and the pepper weevil populations were significant. Potato psyllid, whitefly, and leafminer pressure were low in the chemical and IPM trials. Most of the treatments in the chemical trial provided good worm control. The best control of pepper weevils were from the Voliam Flexi and GF-1029 + XR-25 treatments. The IPM trial had two treatments. The low input treatment consisting of Actara and Xentari performed well against worm pests. The low input treatment did not perform as well as the chemical treatment against pepper weevils. We believe that an additional application of Acatara early in the filed season could have provided better control of the weevil populations. The Lannate and Pounce treatments provided significantly better suppression of pepper weevils when compared to the untreated control. For a complete copy of the report contact the California Pepper Commission.

Additional behavior and developmental studies on leafminer and potato psyllids were performed on five different pepper varieties ('Mercado', 'Double Up', 'Baron', 'Sweet Pepper Orange Belle', and 'Valiant'). There were no noticeable differences between any of the varieties. However, crossing resistant plants with the commercial varieties may provide some resistance to the leafminer and psyllid pests. Additional funding from the Hansen's Trust and UC ANR was also used to support our pepper research.

Listing of 2009-10 Approved Projects

Aziz Baameur – Tracking of Disease-Carrying Insects	$3,000
Aziz Baameur – Methods to Recycle Plastic Mulch	1,000
Lestrange/Cantwell – Nitrogen Fertilizer on Yield	9,408
Joe Nunez – Cucumber Mosaic	6,000
Smith/LeStrange – Weed Control	8,392
John Trumble – Insect Management	19,000
Total	**$46,800**

The results neither proved nor disproved the validity of the model. The main problem was getting continuous data sets on a regular basis. In the instances where we did manage to obtain good data sets, the SAS program accurately reflected subsequent disease development. However, there were insufficient sets of data and results obtained to evaluate the reliability of the model. If there is sufficient interest, a future project might envisage remote sensing of field sites using radio telemetry to relay the data to the home base for analysis.

2008 Fungicide Trials with Powdery Mildew

Dave Holden

In a randomized complete block design (RCBD) trial, nine different fungicide treatments were evaluated against an untreated check, to screen for efficacy against Powdery mildew (Leveillula taurica). Conditions in the field did favor the development of this disease during the 2008 season in the Ventura growing area. Significant control of this disease was seen on average from eight of the nine tested products, with six products giving superior control of the disease over the other products and untreated check. All data rated as significant was done so utilizing the New Duncan's Multiple Test Range at a 95% confidence level.Of the nine tested products, six showed superior control of Powdery mildew. Those six products were Cabrio, Flint, Inspire (not registered yet for use on Peppers), Rally, Quadris, and Quintec. Three other products provided significant control over the untreated check. These products were LEM 17 (not registered for use on peppers yet), Milstop, and Revus.

2008 Phytophthora Root and Crown Rot Project

Dave Holden

In two demonstration design trials, six different fungicide treatments were evaluated against an untreated check, to screen for efficacy against Phytophthora Root and Crown Rot (Phytophthora capsici) infecting peppers in two separate fields. One treatment regime was started soon after transplanting of the crop, while the second study commenced once early symptoms of disease development were observed. Conditions in the field did favor the development of this disease during the 2008 season in the Ventura growing area. In the trial that was started soon after transplanting, significant control of this disease was seen on average from five of the six tested products, with three products giving superior control of the disease over one other product and untreated check. In the trial started after disease development was observed significant control of this disease was seen on average from four of the six tested products, with two products giving superior control of the disease over the other products and untreated check. All data rated as significant was done so utilizing the New Duncan's Multiple Test Range at a 95% confidence level.

Superior disease control was provided through multiple applications of Aliette (not registered for use in CA), Bayer Experimental 1, Fungi-Phite, Presidio, and Ridomil.

With heavy disease pressure development seen during the 2008 season in these test plots, the effectiveness of the tested products was well defined. Though differences in disease incidence between the early treatment and late treatment regimes was not significant, the data would tend to confirm that starting treatments early for this disease in fields known to be infected does provide better season long control of this disease. It would appear that growers have numerous effective products either available or in the development stage for control of this disease for conventionally grown peppers.

Field evaluation of new fungicides to manage Phytophthora crown and root rot on pepper plants

Mike Matheron, University of Arizona

The oomycete pathogen, *Phytophthora capsici*, can cause extensive losses in pepper plantings due to crown and root rot As fungicides are an important component of a Phytophthora disease management system, a field trial was established to evaluate some new chemistries. This trial was conducted in a grower's chile pepper field in southeastern Arizona. Plots were established in a randomized complete block design, with four replicate plots per treatment. Plants within each plot, consisting of two 20-ft-long rows of chile peppers, were treated weekly from July 24 through Sep. 8 with different products in alternation or combination sequences. Fungicides tested included EA-7408 (a biological material), Forum, Omega, Presidio, Ranman, Revus, and Ridomil Gold. Treatments were applied with a CO_2 sprayer either to the base of plants or to the foliage, depending upon the treatment. Disease progress and severity was assessed by counting the number of chile pepper plants that had died at crop maturity on Sep 26 due to infection by *Phytophthora capsici*.

Due to highly variable development of disease among the replicate plots of each treatment within this field trial, which can occur in commercial fields with Phytophthora crown and root rot, statistically significant differences among treatments could not be determined. On average, nontreated chile pepper plots sustained a 38% loss of plants due to *Phytophthora capsici*. On the other hand, although not statistically different in this trial, plant losses in plots averaged 10% when treated with Omega alternated with Forum, 17% with application of Ridomil Gold alternated with Revus, 19% for Ranman alternated with Forum, 20% with Presido+Forum alternated with Ranman, and 22% when treated with the biological fungicide EA-7408. Please keep in mind that several of these chemistries are not registered for use on peppers.

Evaluation of Insect Repellents and Barriers as Methods to Control Cucumber Mosaic Virus

Joe Nunez, UC Cooperative Extension Bakersfield

Bell peppers and chile peppers in Kern County have been afflicted by cucumber mosaic virus (CMV) for the past several years. Some fields have had over 50% yield reduction due to CMV. There is no pattern as to when it might happen or how severe the infection will be. The earlier in the season that it does appear, however, the more severe the yield loss is.

Even though the plants are being treated with a systemic insecticide from the time they are young seedlings, fields are still being infected with CMV. The reason for this is most likely because once an aphid lands on a plant surface it immediately begins to probe the plant to see if it is a suitable host plant. Once this probing begins the virus is transmitted to the plant. Even if the aphid is killed by the insecticide, it is not killed quickly enough to prevent the vectoring of the virus. Although treating pepper fields with imidacloprid reduces the buildup of aphids in field, it doesn't prevent viruses from being introduced to a field.

A trial was conducted in spring of 2008 with bell peppers to determine if CMV can be controlled by insect repellents, reflective mulch, and insect barriers. The insect repellents are composed of botanical oils that are commercially available. The botanical oils tested were: A) 40% citronella oil; B) 25% citronella oil, 25% clove oil, and 5% of geranium oil; C) 20% clove oil and 10% rosemary oil; D) 5% garlic oil; and E) 3% citronella oil and 0.5% garlic oil. Other treatments included a floating row cover and silver reflective mulch.

The trial was evaluated for aphid counts on a weekly basis by placing yellow sticky cards just above the plant canopy. The impact of CMV was determined by harvesting the bell peppers over the course of several weeks. Aphid counts were significantly reduced by the floating row cover and silver reflective mulch as compared to the control. The aphid counts were not different for any of the botanical oils compared to the control. At harvest, the floating row cover and silver reflective mulch had significant yield increase over the control plots. The botanical oils plots yielded the same as the control plots. We showed that the use of silver reflective mulch and floating row covers can reduce the incidence of CMV in peppers.

2008 Weed Control Trials in Monterey County

Richard Smith, Farm Advisor in Monterey County

Four trials were conducted in 2008 in Monterey County. In the screening trial, Dual Magnum and the combination provided better weed control (weeds present at the site included hairy nightshade, shepherd's purse, purslane and sow thistle) and reduced weeding time than Prowl H2O alone. Layby applications of Dual Magnum + Prowl H2O and directed applications of Chateau controlled 83 and 95% of weeds at 85 days after transplanting, respectively. By 134 days after transplanting, at planting and layby herbicide applications still had measurable reductions in weed pressure.

In the past we have examined the use of Chateau (flumioxazin) as a pretransplant application and as a post transplanting application with the granular form of this material, Broadstar. In the earlier studies both Chateau and Broadstar provided excellent weed control but were too phytotoxic to the tender transplants. However, at layby, pepper plants are more hardened off, and in preliminary evaluations in 2008, Chateau as a directed spray at layby looked promising; it provided excellent, long-term weed control and did not reduce yield. In 2009, follow-up studies of layby applications of Chateau will be further evaluated. In addition we will evaluate it in conjunction with water-repellant adjuvants that have the potential to reduce foliar damage to peppers that may result from directed sprays.

2008 Weed Control Trials in Fresno County

Michelle Le Strange, Farm Advisor in Tulare and Kings Counties

Two field trials were established at the UC West Side Research and Extension Center in Five Points, CA. Peppers were transplanted on April 18th and harvested on August 4th. Only preemergence herbicides were tested. Layby was June 18th. There was very heavy weed pressure in the field. Main weeds were pigweeds (prostrate, redroot, & tumble); groundcherry, lambsquarters, nighthade, purslane, London rocket, punctureevine, shepherdspurse, and barnyardgrass. There was a lot of volunteer wheat prior to the cultivation at layby, but after layby there were virtually no grasses in the field.