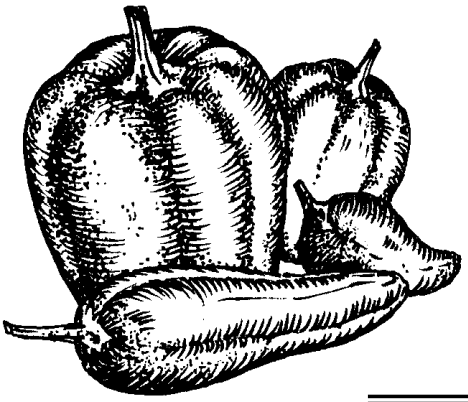

Pepper News

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California Pepper Industry at a Glance
Glen Fischer, Saticoy Foods
Chairman, California Pepper Commission

Farming in California has entered a new era headlined by "Food Safety" and "Sustainability." While California farmers have always been in the forefront of developing and using techniques that give the consumer the best quality and safest food products obtainable, it is a never ending struggle for the growers to produce these quality products while still trying to make a profit.

The California Pepper Commission strives to be the industry's vehicle to obtain research projects that will help us in this new era. In addition, we are the only pepper group that deals directly with California pesticides and their true performance.

Over the past year the Pepper Commission has continued many research projects and started a few new ones. While we have printed "laymen's summaries" of these projects in this issue, anyone wanting a copy of a full report can receive it by calling the Pepper Commission office.

We also had a successful conference in May of 2006 in Palm Springs. A special thanks to all who helped! Many of the issues that concern us also concern many other areas of the world, and it was good to be able to discuss these with our fellow pepper growers and researchers

California received a hard freeze in January and rainfall has been much less than normal in most parts of the state. Only time will tell what this water shortage will do to our season because weeds, insects, disease and yields could all be affected— either way. However, at this time, all seems to be going well.

Complete research reports available at the Commission Office

Weed Control Trials Evaluations in Peppers
Richard Smith& Michelle LeStrange, Farm Advisors Monterey & Tulare Counties, respectively

Peppers are long-season vegetables that have several weed control challenges: They compete weakly with weeds for the first 40 to 60 days following transplanting. They are a long-season crop in many production districts that can be subject to flushes of both winter and summer weeds over the course of their growing cycle. The preemergence herbicides registered for peppers have gaps in the spectrum of weeds that they control. As a result, growers may spend from $200 to $350/acre on weed management. Field selection, field sanitation, cultivation and the use of plastic mulches are cultural practices that reduce weed pressure in production fields. Devrinol, Prefar and Treflan are registered preemergence herbicides in peppers. Dual Magnum is registered under a 24C and provides good control of hairy nightshade (*Solanum sarrachoides*) and yellow nutsedge *(Cyperus esculentus)* which are not controlled by the other preemergent materials. However, late season weed control is also an important issue in this crop. The objective of these studies was to examine at transplant (Goal Tender 4F, Dual Magnum, and Outlook)and layby (Dacthal – standard, Dual Magnum, and Outlook) herbicides. Postemergence evaluations of Sandea and V-10142 (Valent Corp.) were also evaluated. The goal was to evaluate strategies to provide long-term and economical weed control for peppers grown without plastic mulch. Trials were conducted in the Central Coast production district and in the San Joaquin Valley.

The Central Coast trial was located on a site with a good spectrum of weeds. All pretransplant treatments provided excellent weed control for 28 days following transplanting and significantly reduced weeding time. All layby applications were effective and low weed pressure was observed in all preplant followed by layby treatments 85 days following the layby application. Postemergence

applications were evaluated and provided good but not long-lasting weed control. All postemergence applications were safe on the pepper crop. Promising pretransplant materials include Goal Tender, Outlook and Spartan. V-10142 is a promising postemergence material.

The South San Joaquin Valley trial investigated the same herbicides mentioned above. The trial was conducted on a Panoche clay loam soil at the UC West Side Research and Extension Center (WSREC) near Five Points in Fresno County. Weed pressure in the field (especially purslane) was substantial throughout the entire season. All at-planting followed by layby applications of the above mentioned preemergent herbicides were very effective in providing excellent weed control (up to 99 days after planting) with little crop phytotoxicity and no reduction in pepper yield. Post-emergence applications of several other herbicides ten days after layby were less effective and need further evaluations.

Insect Pest Management on Peppers
John Trumble, 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 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 Admire Pro, Alverde SC, Avaunt 30 WD, Lannate 2.4 LV, Oberon 2 SC, Pounce 3.2 EC, Radiant, S-1812 4 EC, Success 2 SC, and Xentari 10.3 WD. The Alverde treatment was applied weekly. The Lannate and Pounce combination was also applied weekly as a chemical standard. The remaining materials were applied according to different rotation schedules. The IPM trials examined Actara 25 WG, Admire Pro, Avaunt 30 WD, Courier 40 SC, Knack 0.86 EC, Lannate 2.4 LV, Oberon 2 SC, Platinum 2 SC, Pounce 3.2 EC, Success 2 SC, and Xentari 10.3 WD. The materials used in the IPM trial were applied according to 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, potato psyllid, whitefly, and leafminer pressure were low in the chemical and IPM trials. All of the treatments provided good worm control except the Oberon and Admire treatment. Alverde from BASF was a new compound that performed well. The IPM trial had nine treatments. The low input treatment consisting of Success, Xentari, and Avaunt performed well against worm pests. For a complete copy of the report contact the California Pepper Commission.

Additional funding has been received from the University of California Agriculture and Natural Resources (UC ANR) to expand the project to include trials in the desert at the Coachella Valley Agricultural Research Station (CVARS). These funds will allow us to test additional materials this year. We will report these results to the California Pepper Commission as well. Additional funding will be solicited from the Hansen's Trust in Ventura County to test varietal resistance in peppers, allowing us to develop a comprehensive program for insect suppression.

Assessment of new Fungicides as potential Management Tools for Phytophthora crown and root rot
Michael Matheron, University of Arizona

The oomycete pathogen, *Phytophthora capsici*, can cause extensive losses in pepper plantings. Fungicides are an important component of a Phytophthora disease management system, when used in combination with other management practices such as crop rotation, raised beds, and water management. The number of fungicides currently registered to combat this disease is limited. Also, populations of *P. capsici* resistant to Ridomil Gold (mefenoxam) have developed in many growing areas. There is a definite need for more fungicides to incorporate into an integrated disease management plan. Several new fungicides are being developed with known activity against oomycete pathogens closely related to *P. capsici*. The objective of the following trial, conducted in 2006, was to evaluate these new chemistries for their efficacy in suppressing development of crown and root rot on pepper plants grown in soil naturally infested with the pathogen.

Soil aturally infested with *P. capsici* was collected from around diseased pepper plants within a field planting in southeastern Arizona in September, 2006 and transported to the Yuma Agricultural Center for establishing a trial in the greenhouse. Five parts of this naturally infested soil was thoroughly mixed with 2 parts sand in a large container, then dispensed into a series of 1-pint capacity plastic pots. A bell pepper seedling (cultivar 'Aristotle') was transplanted into the soil within each pot in mid-September, after which one of the various chemical treatments was applied by drenching the soil within each container with a solution of each chemistry to be evaluated. Each treatment was evaluated on 10 replicate plants. Control plants were grown in untreated field soil. Treatments were applied again at 3 and 6 weeks after transplanting. Plants were watered daily for the duration of the trial. The experiment ran for 63 days and was ter-

minated on November 27. The following data were collected either during or at the end of the experiment: i) time in days from initiation of the experiment until a plant permanently wilted (duration of plant survival), ii) fresh weight of plant shoots and roots, and iii) number of dead plants.

The average duration of survival for Aristotle bell pepper plants in untreated soil containing *P. capsici* was 29 days. On the other hand, the average survival of plants treated with Reason (fenamidone) + Previcur Flex (propamocarb), SA-111021, Ranman (cyazofamid), Omega (fluazinam), Ridomil Gold (mefenoxam), V-10161(fluopicolide), Forum (dimethomorph), NOA-446510 (mandipropamid), IR-6141 (kiralaxyl), and Maestro (captan) was 62, 60, 59, 56, 56, 53, 52, 51, 48 and 47 days, respectively, all values significantly greater than the untreated control. If we use the fresh weight of plant tops as a measure of fungicide efficacy, then significant increases compared to untreated plants were realized on plants treated with Reason + Previcur Flex, SA-111021, Ranman, and IR-6141 + Remedier (*Trichoderma* spp.). The plant growth data (fresh weight of shoots and roots) may not be as important as plant survival for assessing fungicide efficacy in this greenhouse trial, since plant growth was restricted within the 1-pint containers for all treatments. The data from this trial and trials conducted in 2005 suggest that several fungicides currently not registered for use on peppers could be effective components of a management program for Phytophthora crown and root rot.

Developing Commercial Pepper Varieties with Resistance to Powdery Mildew (Leveillula Taurica)
Kevin Crosby, Texas A&M University

During 2006, I worked in collaboration with Dr. Michael Coffey to determine which of my breeding lines and parents exhibited the best resistance to powdery mildew. Dr. Coffey has identified a highly virulent isolate from Hollister, which he used to inoculate my lines and other germplasm accessions in his shade-house at UCR. I visited his trial at Riverside in August and observed the results, along with his techniques for inoculation. At Weslaco, we included our breeding lines, parents and some commercial checks in both greenhouse, and field experiments, allowing natural disease infestation. Some of the results at Weslaco corresponded with the results at Riverside, while others were slightly different.

In general, the resistance in *C. baccatum* and *C. chinense* was outstanding against the PM strain at Weslaco. This was also apparently the case against the Hollister strain at UCR. These are the donors of resistance in the Weslaco breeding program, due to the failure of the *C. annuum* resistance reported in HV12 in our greenhouse. However, all F_1 progeny between these resistant species and susceptible C. annuum lines were at least moderately susceptible. This suggests recessive gene control, negative epistatic interactions (linkage drag) or suppression of resistance gene expression due to the interspecific nature of these hybrids. However, just as was the case in previous field screening experiments in Texas and in the shade-house test at UCR, a small number of F_2 individuals exhibit resistance similar to the *C. chinense* parents. This is currently still under investigation for a greater number of interspecific families in the Weslaco greenhouse. Several of these have better fruit quality, more similar to bell peppers, than our first family- J214, which is like a jalapeño. Resistant F_2 and BC_1F_2 plants are being selected in the GH and used as either pollen or seed parents for the next round of backcrossing at the current time. Due to the apparent recessive nature of the resistance genes, seed of these crosses will be grown to produce another selfed generation in the GH, prior to PM resistance screening in mid-late 2007. Screening in the Fall season at Weslaco provides conditions more conducive to PM infestation and development. This fact became evident when we failed to fix resistance in F_2 selections of line J214, due to poor PM development in the spring GH screening of the F_3 generations. This led to selection of clean plants which were actually susceptible to PM, as evidenced by the reaction of the F_4 progeny in the 2006 trials.

The logical next step would be to continue screening with multiple virulent PM isolates in California and Texas in the BC_2F_2 generations with bell fruit types. Development of a resistant, open-pollinated, bell pepper will probably require 2-3 more backcrosses and selection for resistance along with other important traits.

Pepper Powdery Mildew
Mike Coffey, UC Riverside

Powdery mildew of peppers has emerged in recent years as a serious economic threat to processing and fresh market pepper producers in California. Its high capacity for sporulation, very long latent period (18-21 days) and explosive epidemic potential can make it very difficult to control. Fungicides are frequently applied too late often resulting in severe sunscald of the pepper fruit, leading to significant and sometimes disastrous economic crop losses.

The 2006 research proposal embraced a broad range of aspects of the effective control and management of pepper powdery mildew. One important focus in 2006 was on the efficacy of the newer fungicide chemistries, especially V-10118 and Quintec. Quintec gave results similar to the Rally/Cabrio control. In marked contrast, a new experimental fungicide effective against other powdery mildews, V-10118, even when used at very high rates, gave little or no control of mildew.

2007 Mildew Forecasting

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. During 2007, up to five data collection units will be placed in pepper fields throughout California. Environmental data will be collected and downloaded to a PC, and incidence of PM will be noted. We have developed PERL-based software that can be used as an interface on a Linux-driven (Max OS X) server in my UCR office to instantly convert field data into a format compatible with the disease prediction programs. The data will then be analyzed, to determine if we can use prediction models to forecast PM epidemics.

California Pepper Commission 2007-10

MEMBERS	ALTERNATES
Burt Silva King City 831/385-4540	**Peter Iverson** King City 831/385-6460
Ryan Talley Arroyo Grande 805/489-2508	**Danny Pereira. Jr.** Oxnard 805/240-1979
Mike Chuck Gilroy 408/848-6373	**Dan Fiorio** Gilroy 408/842-1809
Fred Podesta Jr. Linden 209/887-3701	**Bob Giampaoli** Le Grand 209/389-4576
Richard W. Bradford La Quinta 760/275-6070	**Abel Balderrama** Coachella 760/399-4278
Dave Veneman Escalon 209/838-4040	**Mark Thompson** Escalon 209/838-4040
Daniel Brotslaw Turlock 209/656-5821	**David Anderson** Hanford 559/333-2315
Glen A. Fischer Ventura 805/647-5266	**Jerry Hensley** Ventura 805/647-5266
Tim Baloian Fresno 559/485-9200	**Edward Chell** Camarillo 805/987-7702
Terry Berke Woodland 530/669-6119	**Bob Heisey** Hollister 831/636-4882
Dave Nirenberg Camarillo 805/484-2692	
Jerry Munson/Manager Dinuba 559/591-3925	**Nathan Sano/Ast. Mgr** Dinuba 559/591-3925

2006-07 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 brought in closer to $ 143,000.

At this year's annual meeting, the Commissioners agreed to keep the same assessment rate as the previous year, a move partially prompted by the expected carry-over into the 2007-08 year of over $67,000.

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.

California Pepper Commission

Financial Report

Fiscal Year: March 1, 2006 through February 28, 2007

Account Name	*Amount*
IMCOME	
Carry-Over from 2005-06	$56,236
Assessment Income, 2006-07	143,458
Interest Income	3,002
Total Income	**$202,696**
EXPENDITURES	
Management Services	$36,540
Legal Counsel	694
Audits	1,684
Office Supplies	541
Telephone	1,280
Postage	627
Reports & Publications	450
Travel & Mileage	2,951
Meetings	950
Insurance	436
Marketing Branch, CDFA	5,070
Production Research	70,192
California Minor Crops Council	5,000
Chemical Research	8,500
Total Expenditures	**$134,915**
Carry-over to 2007-08	$67,781
Total Expenses & Reserve	**$202,696**